


WRAPPED BALED SILAGE

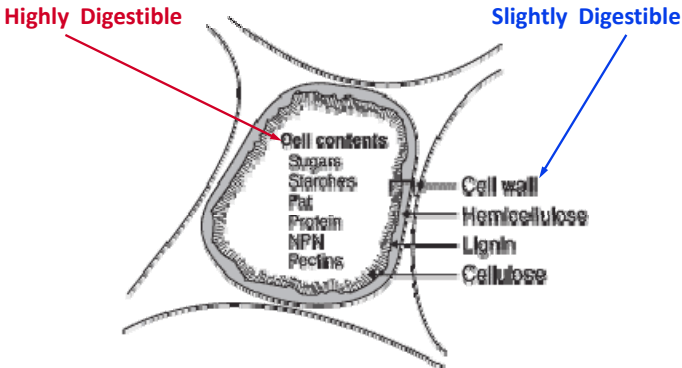


1 February 2012
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Outline

- Silage Biology 101
- Wrapped Bales vs. Dry Hay and Chopped Silage
- Baleage – Moisture and Number of Wraps
- Film Wrap Information
- Simple Tips to Make Successful Baleage
- Film Recycling

Plant Cell

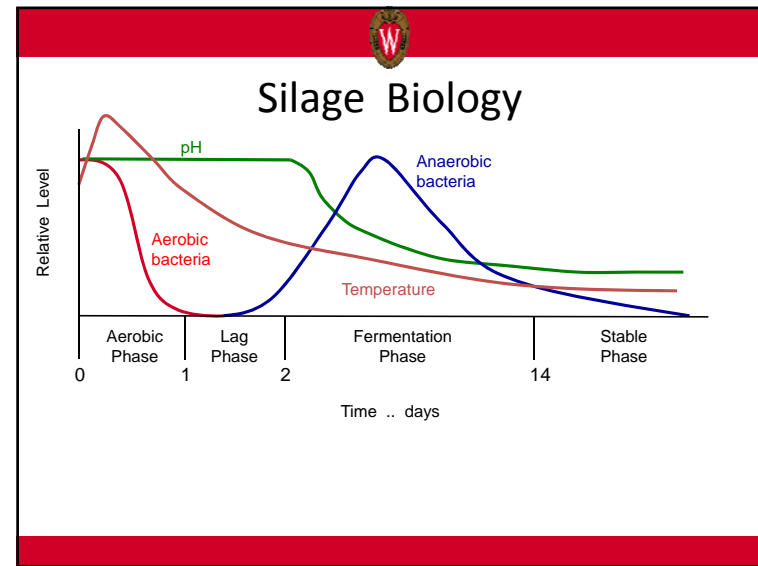



Highly Digestible (points to Cell contents)

Slightly Digestible (points to Cell wall)

Cell contents: Sugars, Starches, Fat, Protein, NPN, Pectins


Cell wall components: Hemicellulose, Lignin, Cellulose






Silage Biology

- Who's Doing the Work In Aerobic Phase?
 - ✓ Plant cells and aerobic bacteria
- How Long Should This Phase Last?
 - ✓ Short as possible
- Why Should This Phase Be Short?
 - ✓ Both organisms consume valuable substrate, produce heat




Silage Biology

- Is Prolonged Heating Bad?
 - ✓ Damages protein availability, reduces available substrate
- What's Produced During Ensiling Phase?
 - ✓ Mainly Lactic and Acetic acids
- Who Makes These Acids?
 - ✓ Initially acetic acid bacteria, then lactic acid bacteria (LAB)



Silage Biology


- Where do LAB Come From?
 - ✓ Found on plant exterior, on soil, on equipment, inoculants
- What Makes LAB Active?
 - ✓ Anaerobic environment, water & access to WSC
- Would Chopping Provide Better Fermentation?
 - ✓ LAB located on outside of plant, their not very mobile
 - ✓ WSC located inside cells




Silage Biology

- What's In a Good Fermentation Report?


	Moisture .. % w.b.		
	50 – 60%	40 – 50%	30 – 40%
pH	4.3 – 4.7	4.7 – 5.0	5.0 – 5.6
Lactic acid	4.0 – 7.0	2.0 – 4.0	0.1 – 2.0
Acetic acid	1.0 – 3.0	0.5 – 2.0	< 0.5
Propionic acid	< 0.3	< 0.2	< 0.1
Butyric acid	< 0.1	< 0.1	< 0.1
Ethanol	< 1.0	< 0.5	< 0.3


Baleage vs. Dry Hay




<ul style="list-style-type: none"> • <u>Advantages Baled Silage</u> <ul style="list-style-type: none"> ✓ Less field drying time <ul style="list-style-type: none"> • Greater harvest window • Less weather risk ✓ Lower losses <ul style="list-style-type: none"> • Harvest and storage ✓ More uniform product ✓ No taxable structure 	<ul style="list-style-type: none"> • <u>Advantages Baled Hay</u> <ul style="list-style-type: none"> ✓ More marketable <ul style="list-style-type: none"> • Horses • Lower trucking costs ✓ No fermentation ✓ Less equipment ✓ No film disposal issues
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Baleage vs. Chopped Silage

<ul style="list-style-type: none"> • <u>Advantages Baled Silage</u> <ul style="list-style-type: none"> ✓ Less equipment ✓ Wider moisture range ✓ Targeted feeding ✓ No taxable structure ✓ Ideal for small operator 	<ul style="list-style-type: none"> • <u>Advantages Chopped Silage</u> <ul style="list-style-type: none"> ✓ Better fermentation ✓ More versatile ✓ High capacity ✓ Easier TMR mixing ✓ Less sorting
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Tube vs. Individual Wrapping

<ul style="list-style-type: none"> • <u>Advantages – Tubes</u> <ul style="list-style-type: none"> ✓ Less plastic used ✓ Greater productivity ✓ Less labor 	<ul style="list-style-type: none"> • <u>Advantages – Individual</u> <ul style="list-style-type: none"> ✓ Targeted feeding ✓ Marketable product ✓ Occupies less area ✓ Less aerobic loss @ feedout
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Tube vs. Individual Wrapping




Right Baling Moisture

> 65%:	Danger of "sour" fermentation, botulism
55 – 65%	Plenty of fermentation, surface condensation
45 – 55%	Ideal, good fermentation
35 – 45%	Some fermentation, more layers of wrap
25 – 35%	Very little fermentation, feed quickly
< 25%	Baled hay

Right Baling Moisture

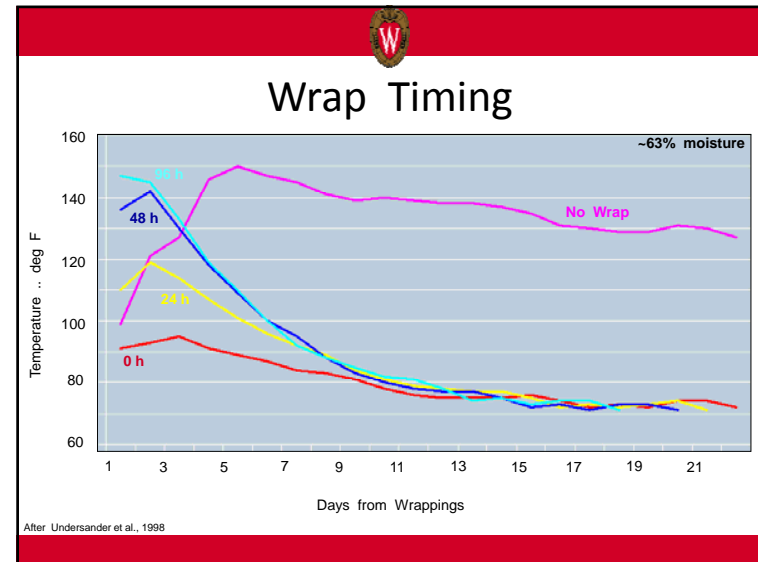
	DM Loss .. % of total DM	
	1 st Cutting – 157 days	2 nd Cutting – 348 days
Tube	3.8	2.0
Individual	3.7	2.7
LRB	3.2	2.3
LSB	4.4	2.5
High (~52%)	4.5	2.7
Low (~37%)	3.1	2.0

After Shinnars et al., 2009

How Soon To Wrap

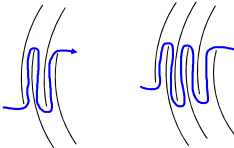
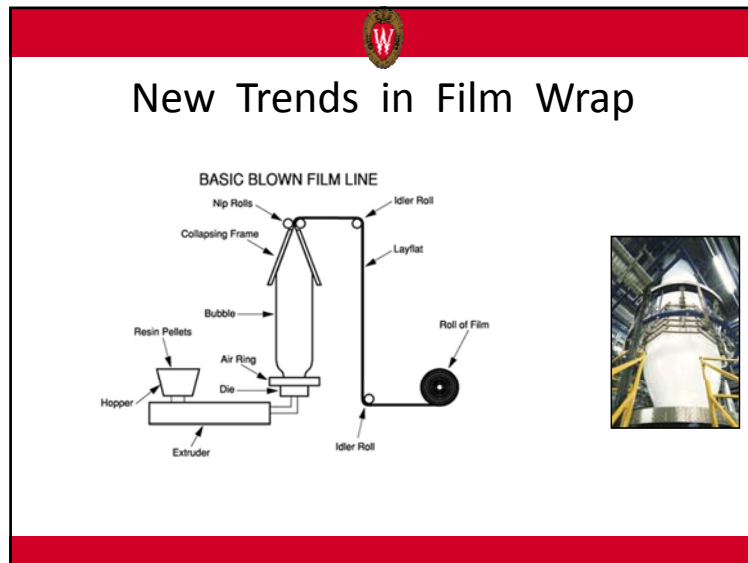
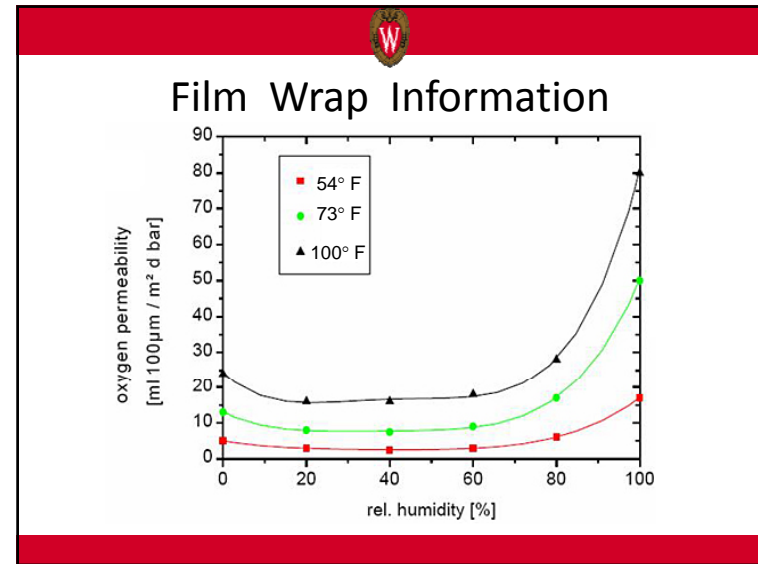
- How Soon After Baling Should You Wrap?
 - ✓ No brainer – sooner the better
 - ✓ Makes aerobic phase shorter, temperature lower




Film Wrap Information

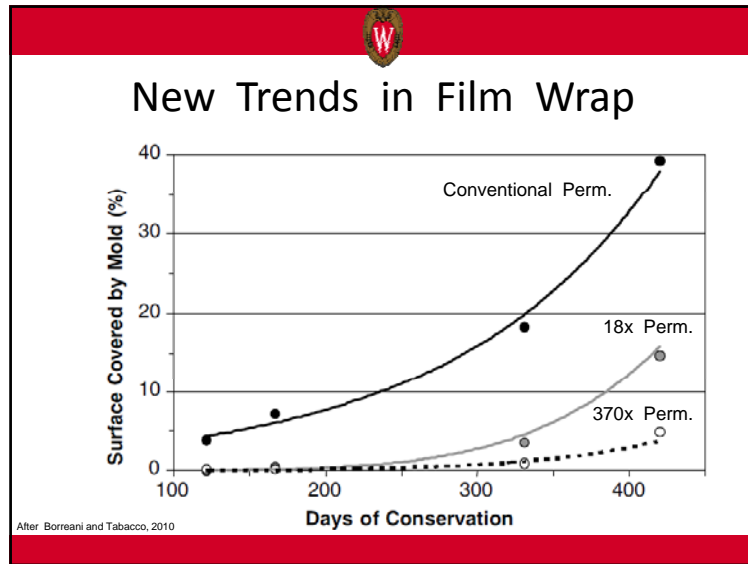
- Blown low-density polyethylene ~1-mil thick
- Stretching increases cling and makes tight seal
 - ✓ Stretching also reduces thickness by up to 25%
- High temps makes film more permeable
- More layers increases distance O₂ must travel

New Trends in Film Wrap

- Higher density resins – better O₂ barrier allows for:
 - ✓ Thinner (19 vs. 26 µm) with same permeability
 - ✓ Longer rolls 1,500 to 2,100 m
- More pre-stretching
 - ✓ Less necking at wrapping
 - ✓ Narrower rolls (730 vs. 750 mm width)
- Thinner, narrower but longer = about same weight




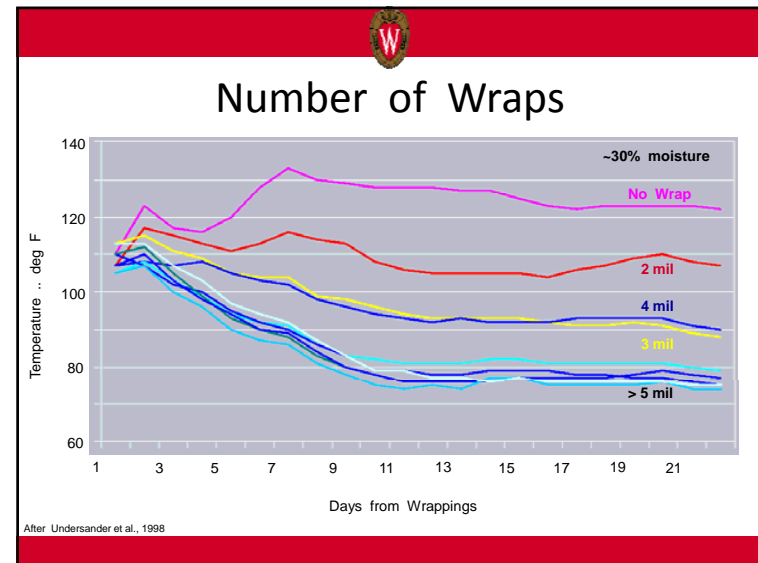


New Trends in Film Wrap

	Film Type		
	Conventional	18x Perm.	370x Perm.
Number of layers	6	4	4
Plastic Use lb./ton	16	12	11
DM loss % of total	~8	~6	~3
Relative Cost	-	1.11	1.02

After Borreani and Tabacco, 2010

- ### Number of Wraps
- Lots of Variables Here:
 - ✓ Film quality, thickness, material density
 - ✓ Generally minimum of 4 layers (2 turns at 50% overlap)
 - ✓ More layers needed as:
 - Moisture decreases
 - Maturity increases
 - Baling crops with sharp stems
- 





Film Wrapping at Baling



http://www.youtube.com/watch?v=IPEDSp_MgAk



Film Wrapping at Baling

- Potential Advantages:
 - ✓ Eliminates net wrap – only one plastic source to dispose
 - ✓ Less stretch than net, so cylindrical bale shape maintained
 - ✓ Greater bale density – reportedly up to 10%
 - ✓ Fewer layers of film at wrapping, faster wrapping
 - ✓ Easier unwrapping
 - ✓ Crop won't stick to surface, easier to recycle

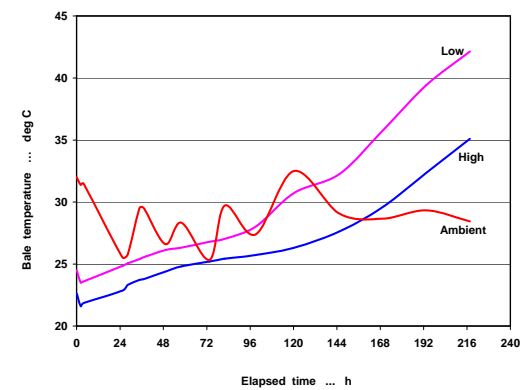


Aerobic Stability


- At Feeding:
 - ✓ Aerobic microorganisms reactivate
 - ✓ Low pH and high acid content slow growth rate
- Limiting Oxygen Exposure Important:
 - ✓ Especially at low moisture
 - ✓ Advantage of individual versus tube wrap?
 - ✓ Advantage of baleage versus bunk or bag silo?



Aerobic Stability





After Shinnars et al., 2009



Getting The Most from Baleage


- Starts at Cutting:
 - ✓ Lay wide, condition well, and don't cut too low
- Windrow Formation:
 - ✓ Avoid raking soil into windrow
- When to Bale:
 - ✓ Ideal moisture 45 – 55%
 - ✓ Avoid rains
- Make Uniform Cylindrical Bale Shape & Size



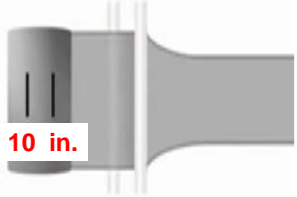


Getting The Most from Baleage

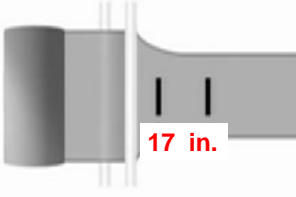
- Use good quality plastic and avoid treated twine.
- How To Wrap:
 - ✓ Stretch to 55 – 70% of original length; 77 – 82% of width
 - ✓ Insure 50% overlap
 - ✓ Center roll on bale center
 - ✓ Minimum 5 (high moisture) to 8 layers (low moisture)
 - ✓ Avoid wet conditions (film losses tackiness)




Measuring Stretch and Overlap




10 in.




17 in.



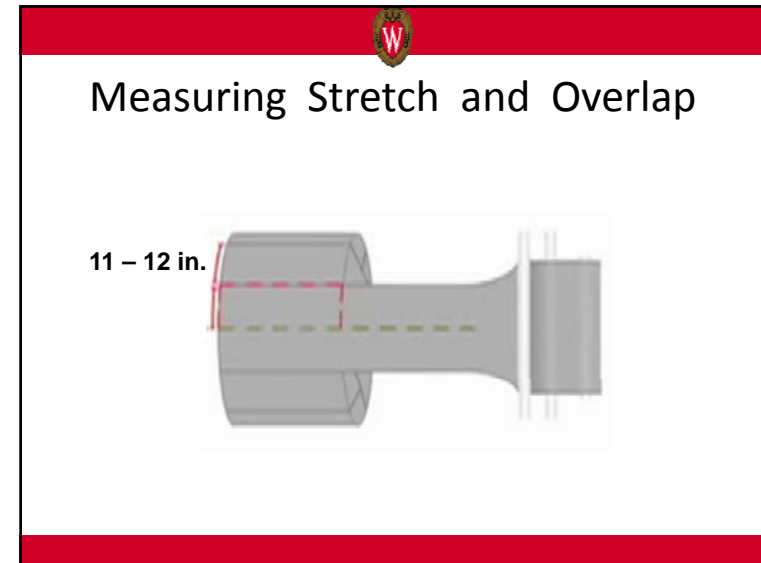
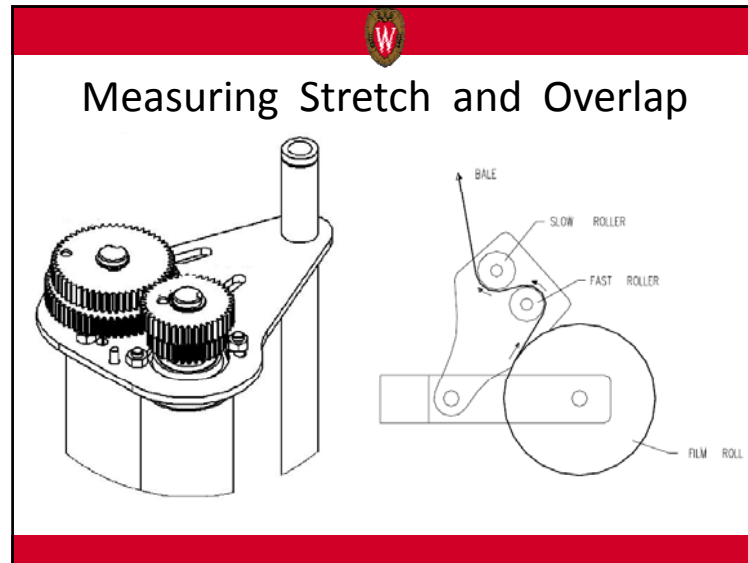
Measuring Stretch and Overlap



30 in. **23 – 24 in.**



20 in. **15 – 16 in.**



Getting The Most from Baleage

- Handling:
 - ✓ Minimum possible, avoid after 12 h
 - ✓ Use squeeze, avoid over pinching, store close to storage site
- Storing:
 - ✓ Avoid woods, sharp stubble, poorly drained areas, wildlife
 - ✓ Stack where possible, saves room
 - ✓ Store round bales on end – more plastic, less “squish”
 - ✓ Avoid stacking at high moisture
 - ✓ Run the rows N – S rather than E - W





Improper Baleage Storage





Billowing tails cause oxygen leaks.




Unrepaired stem pokes.



Improper Baleage Storage







Repair tears or punctures with quality tape.



Storing in wrong location or stacking too high.


Film Recycling

- Unlawful to open burn plastics in WI and MN.
- Open burning creates “low-temp” burning :
 - ✓ Dioxins released are toxic and potential carcinogens.






Recycling Practices

- Try to keep clean until removal.
- May need to separate plastic types.
- Store plastic indoors, under cover, or in special container.
- Keep plastic clean and dry.
- Increase density prior to shipping.





Recycling Practices



Recycling Practices

Formerly of: GENESIS POLY RECYCLING, INC.

STATE-OF-THE-ART PLASTICS RECYCLING FACILITY

INCLUDING: SHREDDING, GRANULATING, WASHING, EXTRUSION & PELLETIZING, PLUS LARGE QUANTITY OF PLASTIC SCRAP



20 CROWN CTS-16-8 DENSIFYING EXTRUDER



CROWN SCREEN CHANGER & COW UNDER WATER PELLETIZER

CROWN WASH/FLOTATION SEPARATOR UNIT



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