

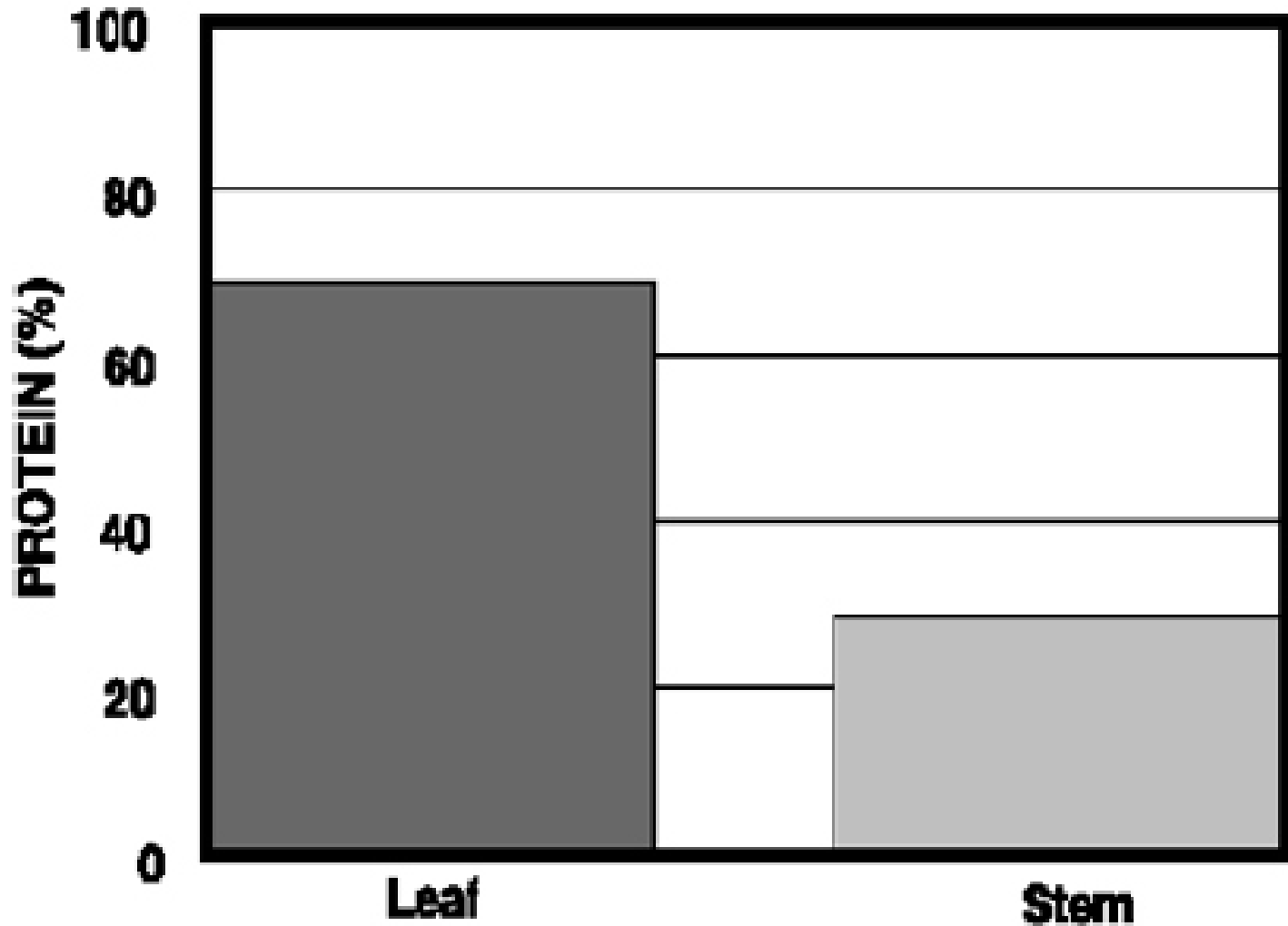
Making Dry Hay & Baleage

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Just Trying To Preserve Forage Quality

Leaf retention is critical for quality hay



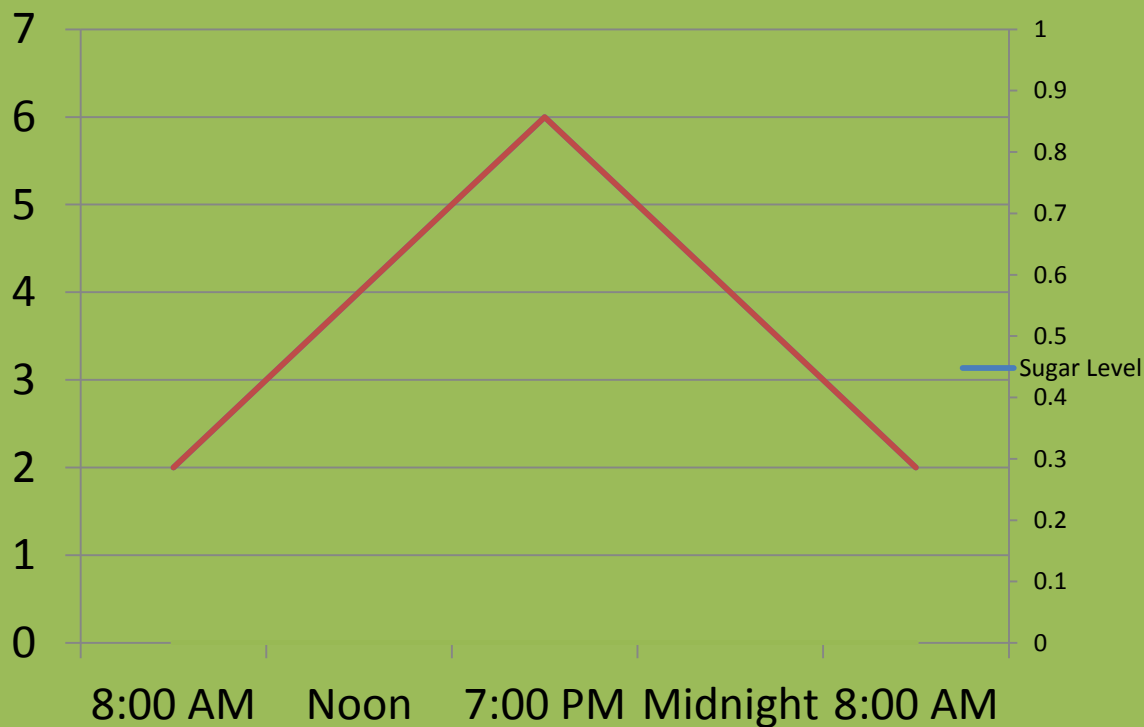
Something Can Be Managed At Each Step

- **Mowing**
- **Conditioning**
- **Tedding**
- **Raking**
- **Baling**
- **Wrapping for baleage**
- **Transporting**
- **Storage**



Morning or Afternoon mowing makes no difference in the northeast 90% of the time

Estimated gm sugar/Kg grass DM

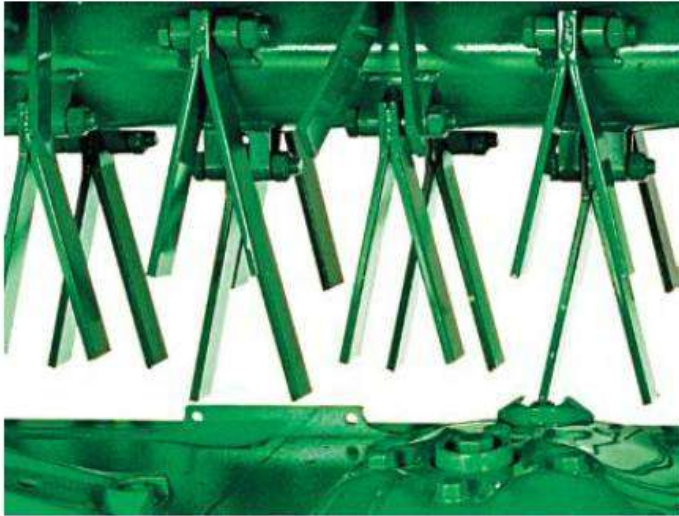


Discbines

- can travel 5 – 10 mph
 - do not plug like sickle mowers
 - Cut a lodged crop better
- * easier to replace knives



Conditioning is essential for dry hay, but not for baleage



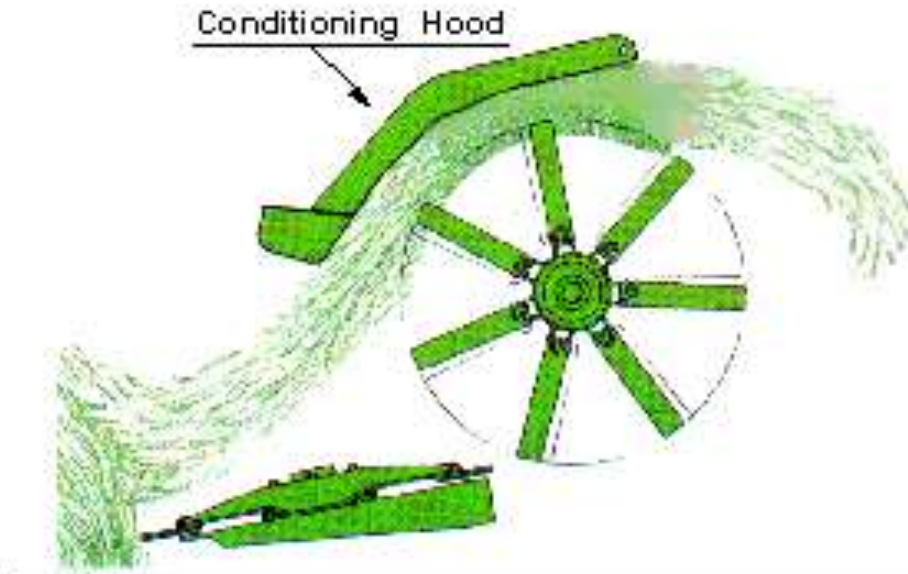
Flail Conditioner



Roll Conditioner

Rubbing wax off leaves vs crimping stems

- 2-4% more leaf loss with tines, but can be adjusted less
- Tines work best on grass
- Rolls are good for alfalfa, wear out in the middle fastest



Tine or Finger Conditioner

tines may swing on some brands



Macerator

gain from 0 to 24 hrs drying time





**Rubber rolls in front
hold forage firmly.**



**Steel rolls behind spin
at different speeds to
nick and scrape wax
off grass leaves and
alfalfa stems**





Teddar ted hay soon after mowing



Teddar with horizontal long & short tines





Hay Rakes

- rake at >35% moisture



Roping

Gentle,
roping
roping

[http://www.dyersold.com/equipment_for_sale/New%20holland%20hay%20rake%20\\$%201,850.00.jpg](http://www.dyersold.com/equipment_for_sale/New%20holland%20hay%20rake%20$%201,850.00.jpg)



<http://tractortoolsdirect.com/wp-content/uploads/2013/12/Galfre-5-wheel-hay-rake.jpg>



Fluff for good
drying,
Set PTO to
wheel speed,
repairs

No roping,
repairs

http://www.progressivedairy.com/features/full_photos/2008/0108/0108hg_shinners_1_full.jpg



http://www.progressivedairy.com/features/full_photos/2008/0108/0108hg_shinners_2_full.jpg

Keep Soil Out of Hay

< 10% ash on soil test

- **Mow at a decent height (4" grass, 3" alfalfa)**
- **Properly adjust tedder**
- **Properly adjust the rake**
- **Properly adjust pick-up on baler**
- **Plow & fit fields well so they are smooth**



Moisture Testing

- 1) “Dish rag” test. – Wring out moisture when above the 65%
- 2) Commercially available testers poor at <40% moisture
- 3) Koster moisture testers - heated, forced-air dryers, takes longer than a microwave moisture test.
- 4) **Best Method** - microwave moisture test.
 - Measure 100 grams forage, chopped 1”
 - Place a cup of water in the microwave
 - Microwave 1 minute at a time at first, weigh when it feels dry
 - Microwave 30 seconds or less and weigh each time (avoid burning it)
 - When it stops losing weight, it is dry (~99% dry)
 - Starting weight – final weight = % moisture (water was removed)

Leaf loss in grass during round baling – moisture effect

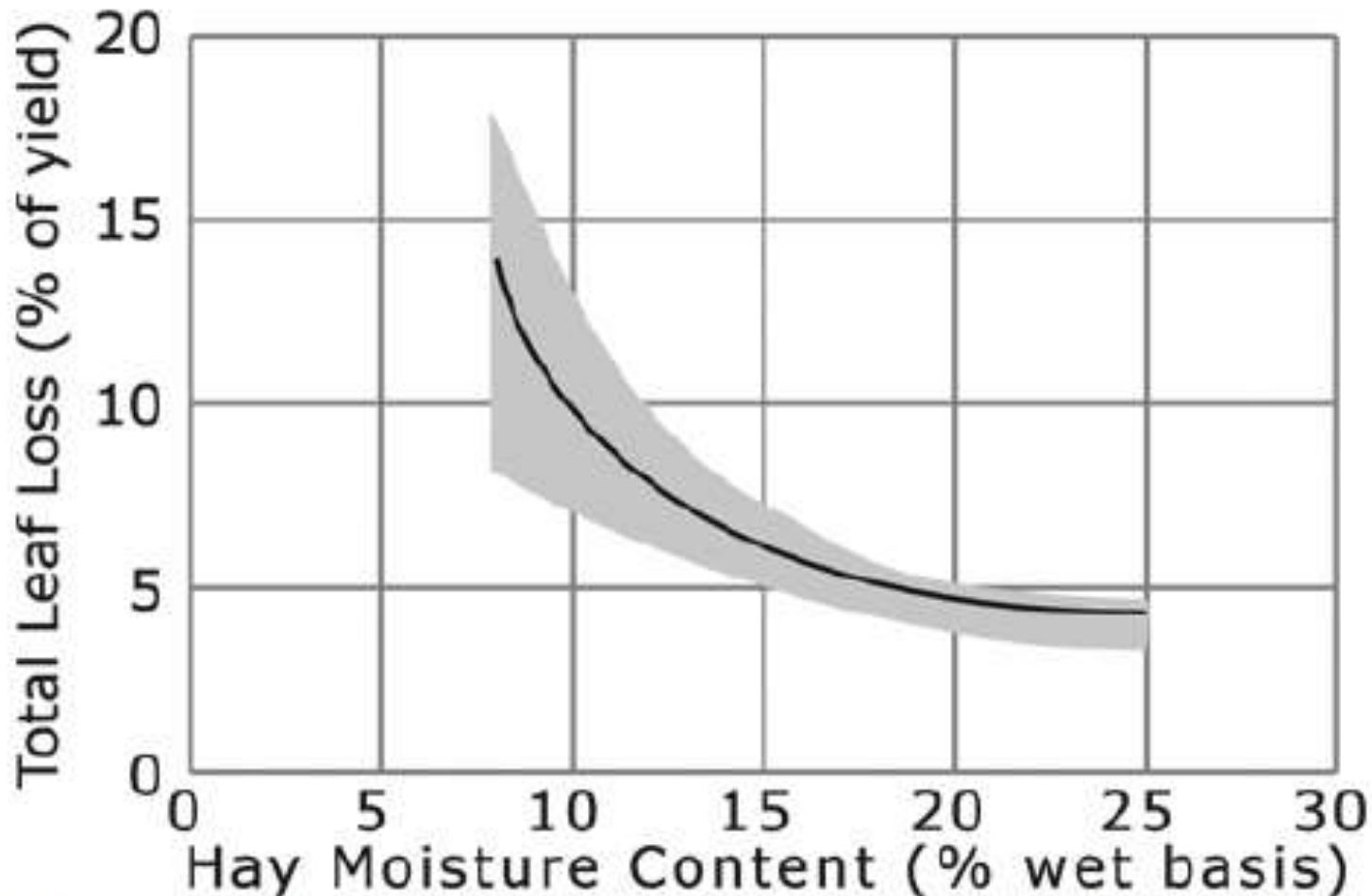


Figure 1. Leaf loss during baler operation. Accumulation of data for several large round balers over a range of hay moisture contents in fields of mixed alfalfa, crested wheatgrass and brome grass. Data source: Prairie Agricultural Machinery Institute.

Preservatives – liquid & granular proprionate



- Bale at 5% more moisture
- Better leaf retention
- Beat the weather
- May be necessary for large squares
- ~\$15/ton
- Excellent coverage is necessary

<http://harvesttec.com/images/cs/sbx%202006%20003.jpg>



<http://www.nuhnbiotech.ca/assets/uploads/pages/image/granularapplicator5.jpg>

<http://www.valmar.com/img/455/455-cover.jpg>

Preservatives Can Maintain Quality

Table 1. Storage losses and composition of alfalfa hay baled at 32% moisture and treated with different rates of propionic acid at baling. 1 Hay at harvest was 70.5% IVDDM (In vitro dry matter digestibility)

Source: Knapp, Holt and Lechtenberg, 1976.

Treatment	Max. Storage Temperature, °F	Dry Weight Loss, %	Digestibility, %	Total Carbohydrates, %
Control	124	15.1	60.5	3.4
Propionic Acid Rate				
0.02%	127	16.7	61.8	3.1
0.2%	115	13.2	62.2	3.9
0.5%	104	11.7	61.0	4.1
1.0%	84	7.6	65.0	6.5

Recommended rates for applying organic preservatives to hay.

Hay Moisture Level, %	Rate, % (dry wt basis)	lb/ton
20-25	0.5	10
25-30	1.0	20
30-35	1.5	30

Variable Chamber Baler

Tractor should be heavier than the baler plus bale



Variable Chamber Round Baler





Fixed Chamber Baler

Less than perfect conditions for round baling

Baling short, dry and slick material such as straw from a rotary combine can be a challenge. The baler may continually plug or starting the bale may be difficult.

Make decent-sized windrows

Bale in late evening or early morning to take advantage of moisture

Reduce bale density settings

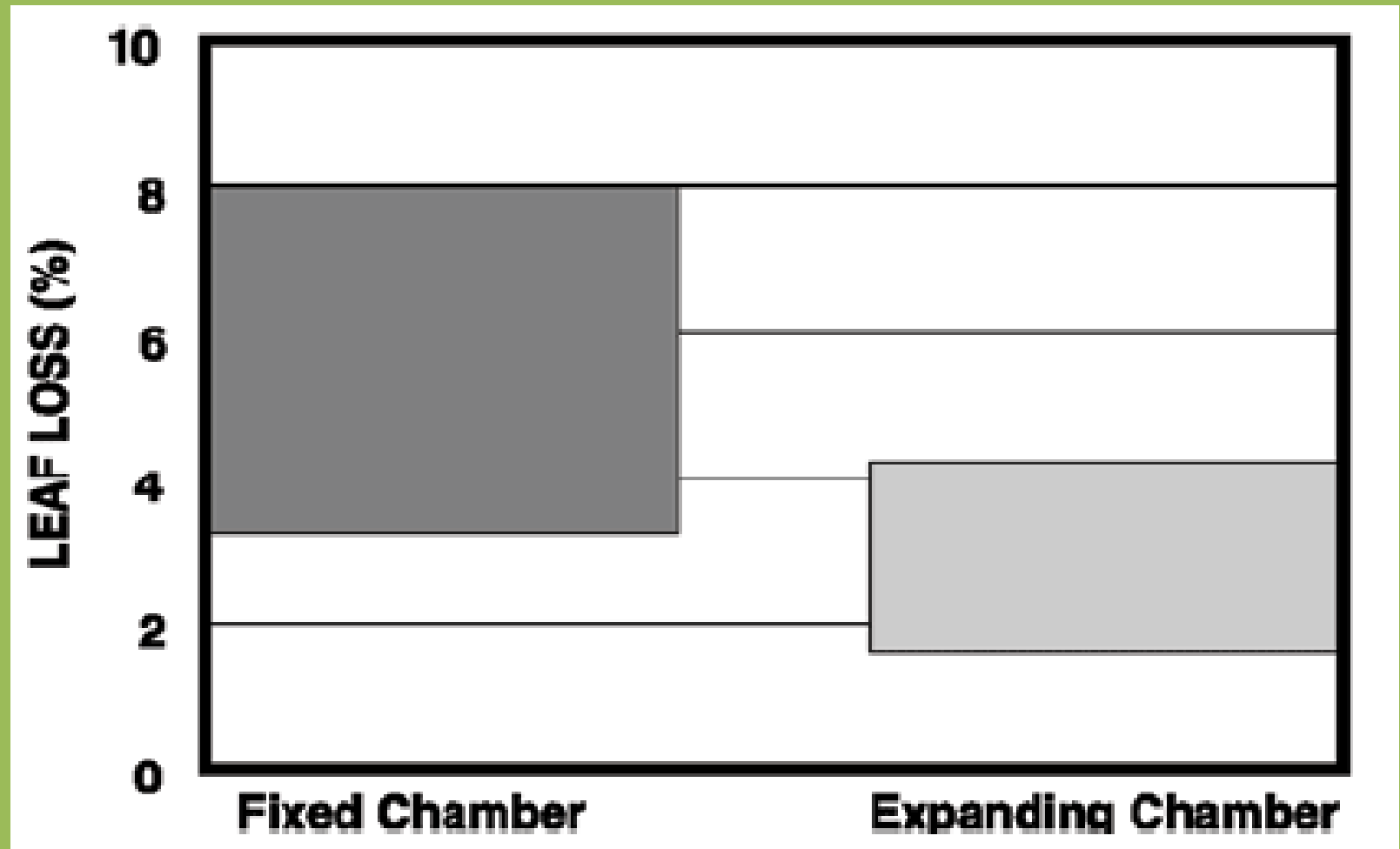
Make smaller bales

Decrease the PTO speed while maintaining normal ground speeds

If possible, adjust the distance from the twine to the end of the bales as wide as possible so the twine doesn't slip off the end of the bale

Use a close twine spacing across the bale

Round Baler Leaf Loss in Chamber



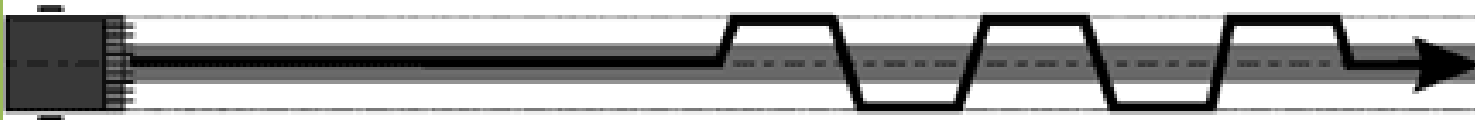
Round Baler Drive Pattern for Good Bale Shape

WEAVING PATTERNS

Expanding Chamber (Hard Core) Baler- Right



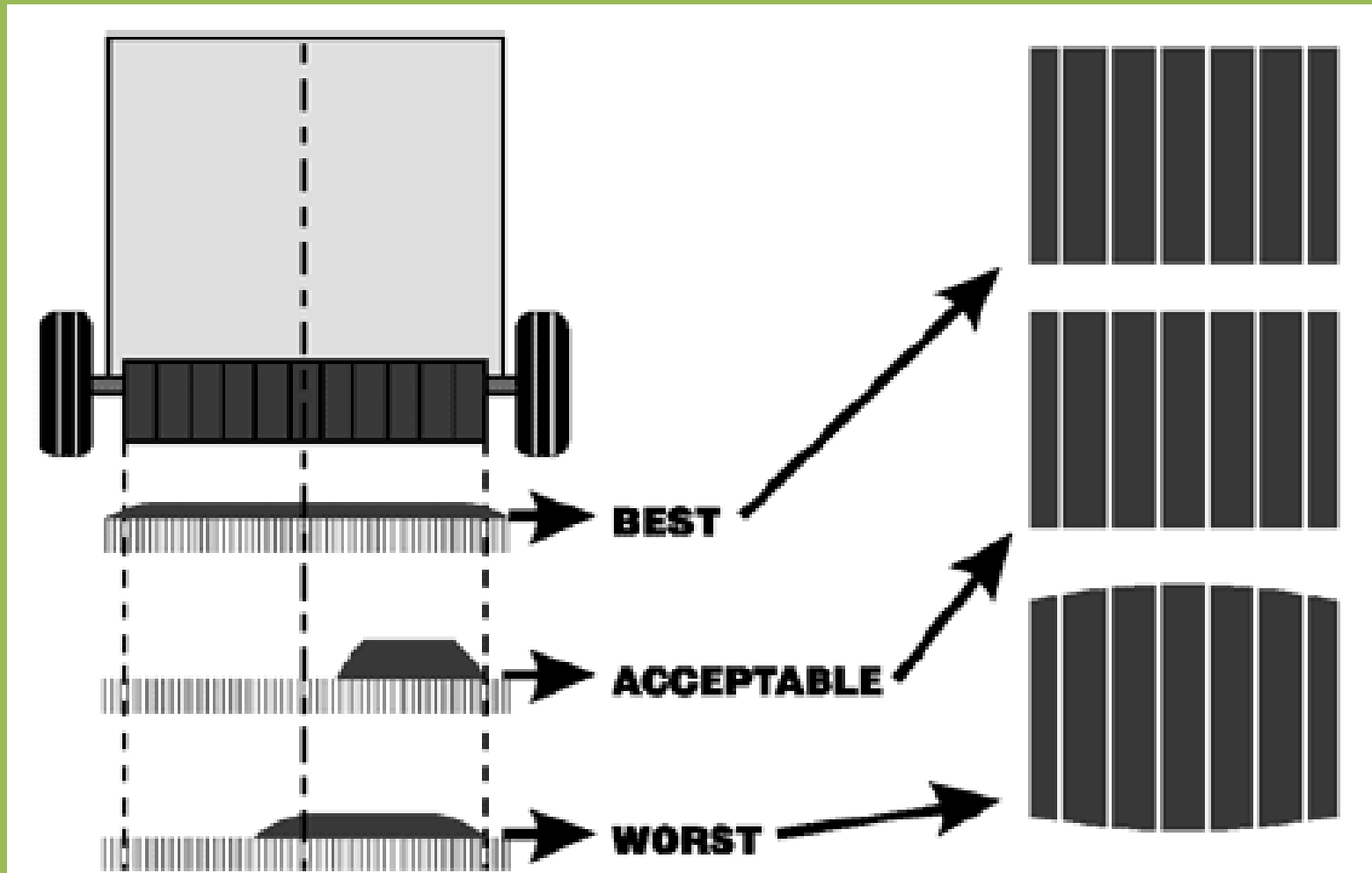
Fixed Chamber (Soft Core) Baler- Right



Wrong



Windrow Size – full or $< \frac{1}{2}$ pick-up width for good bale shape



Variable vs Fixed Chamber Round Balers

COMPARISON	Variable	Fixed
Power Req.	Less	More
Purchase Price	More	Less
Maintenance Cost	More (belts)	Less
Bale Size	Adjustable	One size
Bale Pressure	Adjustable	Slightly adjustable
Leaf loss	2 – 4%	3 – 8%
Baleage	Yes	Yes

Management Areas for Leaf Retention

- Ted and Rake at Proper moisture, no less than 35 or 40%
- Ted and Rake at a gentle speed
- Bale at proper moisture: 18-20% sm sq. / 16-18% Round / 15-16% lg sq
- Baler pick-up speed, same as forward speed.
- Baler forward speed, do not pull or push forage into the baler
- Windrows full of hay
- Round balers should turn no more than necessary to form the bale; square bale plunger should plunge a chamber full of hay
- Square bales partially on thrower belt lose leaves
- Handle bales as few times as possible

John Deere B-Wrap for Dry Hay

- Sheds rain and snow
- Lets moisture escape, so bales can cure
- Protects bales from ground moisture



http://www.deere.com/en_US/media/corporate_images/2014/01/2014_releases/b_wrap_eject_large.jpg

Baleage balers

- heavy duty bearings & rollers
- scrapers to keep gum off belts and rollers



Table Wrapper

- Either place bale on table with tractor or it will have an arm to lift bales onto table
- 20 – 30 bales / hour



In-line (tootsie roll) bale wrapper

40 – 50 bales/hr

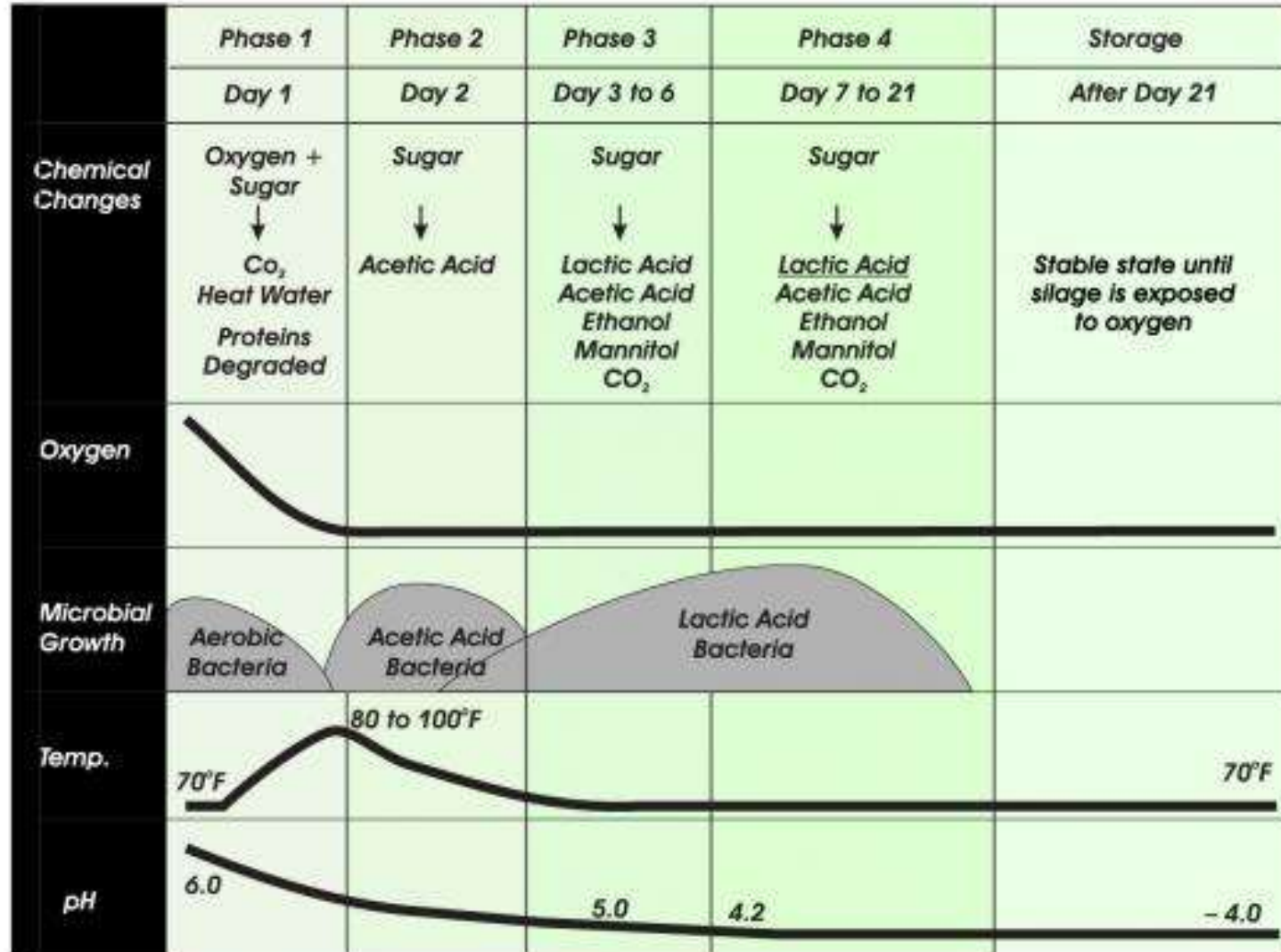


Inline Wrapper



Silage Fermentation

wilt forage to 40 – 60% moisture



Baleage Tips

- 1. Use good quality forage, no rain damage**
- 2. Make dense bales**
- 3. Wilt to 40 -60% moisture**
- 4. Wrap with 6 mil (6 layers) of plastic. Do not stretch plastic too much.**
- 5. Wrap ASAP, w/in 2 hr on a hot day, w/in 12 hr on cool days**
- 6. Wrap in a area free of puncture hazards**
- 7. Store in area of low temperature fluctuation**
- 8. Check bales weekly, repair with polyethylene tape**

Vough, L.R., and I. Glick. 1993. Round bale silage. pp. 117-123. *Silage Production*, Proceedings, National Silage Production Conference, February 23-25, 1993. Syracuse, N.Y.

Table 1. Temperature (^oF) in silage bales bagged immediately, after 8 hours, and after 24 hours.

	Interval Between Baling and Bagging (hours)		
Days After Ensiling	0	8	24
1	118	129	125
2	111	140	135
3	113	127	132

Source: University of Missouri, 1983 Research Reports.



Bale Grabber

handle bales as little as possible to keep sealed



<http://kts.se/NT/images/multigrip7.jpg>

Labor Saving Machinery

- **There is a lot of different bale handling equipment**
- **Youtube has many videos**

Bale throwers are safer than kickers



Bale table accumulates bales, places them on the field for later pickup by a grabber



Very few moving parts
Works on hills according to the dealer



<http://ak3.picdn.net/shutterstock/videos/215389/preview/stock-footage-farmer-square-baling-hay.jpg>



Bale grabber has hydraulically operated hooks



<http://www.hoelscherinc.com/g/fork3.jpg>

Tractor pulled bale wagon



<http://roederimp.com/specks/1003.jpg>

Bale wagons work well when you stack bales in sheds



**There are many types of bale accumulators.
Youtube has lots of videos**



<http://www.rciengineering.com/pics/BaleAccumulator.jpg>

**This accumulator picks up bales in the field.
Some are designed to not tear baleage plastic**



http://hayandforage.com/site-files/hayandforage.com/files/imagecache/galleryformatter_slide_penton/gallery_images/63proag900-Hay-Hikerroundbalecarrier.jpg

Round Bale Unroller



<http://www.ibiblio.org/farming-connection/grazing/forgey/images/unroll.gif>

Questions?

