Making and Using Baleage

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Forage Quality Needs of Animals

Dairy, 1st trimester
Dairy Calf

Dairy, last 200 days
Heifer, 3-12 month
Stocker cattle

Heifer, 12-18 mo
Beef cow & calf

Heifer, 18-24 mo
Dry cow

100 110 120 130 140 150 160

Relative Forage Quality

Forage Quality Needs of Animals

- Stocker cattle
- Growing lambs & kids

- Nursing mare
- Hard working horse

- Beef cow & calf
- Ewe with lamb
- Doe with kid

- Ewe/doe, not lactating
- Idle horse

100 110 120 130 140 150 160

Relative Forage Quality

Alfalfa Forage Quality Change per Day

Component	Mean
Crude Protein, % DM	-0.25
Acid Detergent Fiber, % DM	0.36
Neutral Detergent Fiber, % DM	0.43
Neutral Detergent Fiber Digestibility, % NDF	-0.43
RFV, points	-2.9
RFQ, points	-3.6

Source: Undersander, 2009 unpublished

Why make baleage?

- Harvest with less weather effect
- Harvest higher quality forage
  - Less rain damage
  - Less leaf loss above
    20% moisture

Why make baleage?

- Harvest with less weather effect
- Harvest higher quality forage
- Increased yield
  - Less wheel traffic damage

Minimize wheel traffic damage

Wheel traffic 5 days after cutting

No wheel traffic

Alfalfa regrowth 10 days after cutting

Hay Preservation

- Mold growth – molds grow at 20% to 35% moisture:
  - Consume nutrients, sugars, starch
  - Respiration causes heating →hay fires
  - Produce mycotoxins
    - Detrimental to animal health
    - May decrease feed intake
  - Produce spores
    - if inhaled may cause lung disease
  - Presence reduces value of hay

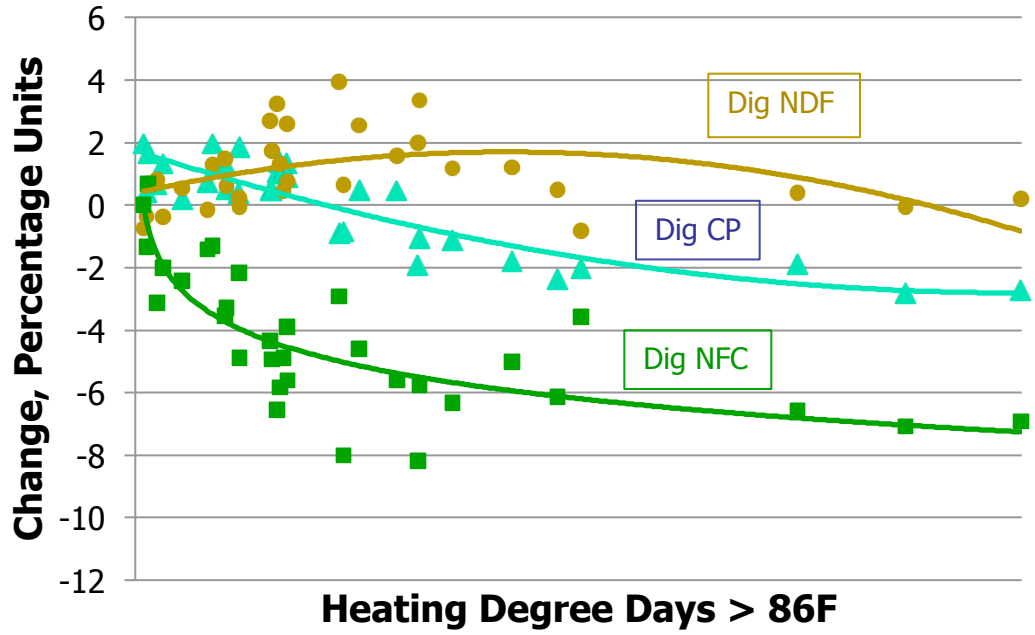
Moisture for baling to prevent mold

Square Bale Size		
Small	Medium (3’ x 3’)	Large (4’ x 4’)
<20%	<16%	<14%

Round Bale Size		
Small (4’ w x 5’ h)	Medium (5’ w x 5’ h)	Large (5’ w x 6’ h)
<17%	<16%	<15%

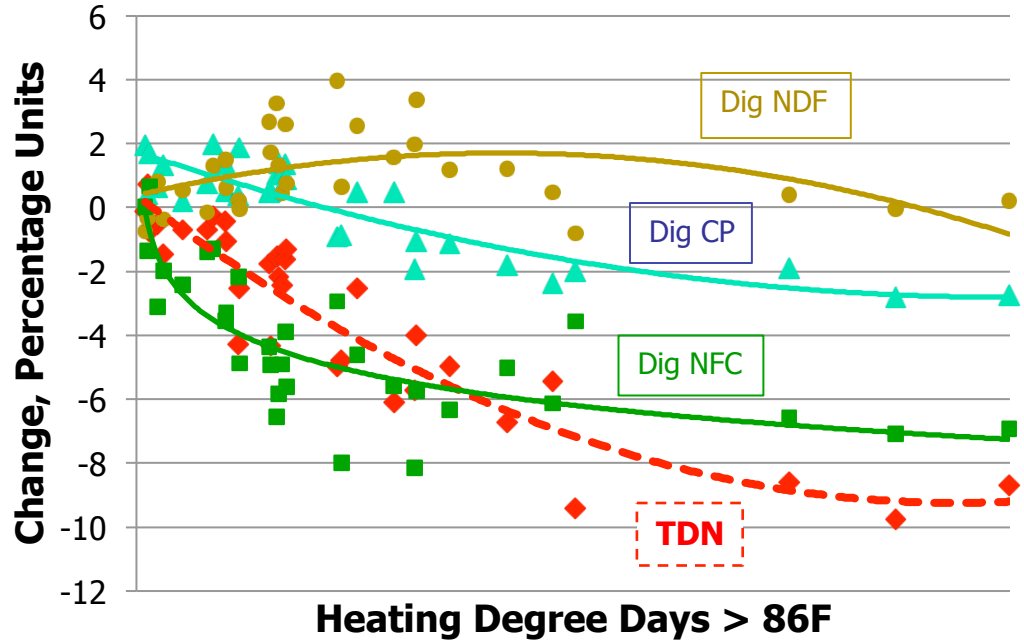
Amount of heating depends on heat transfer conditions.

Hay Preservation – Results of Malliard Reaction

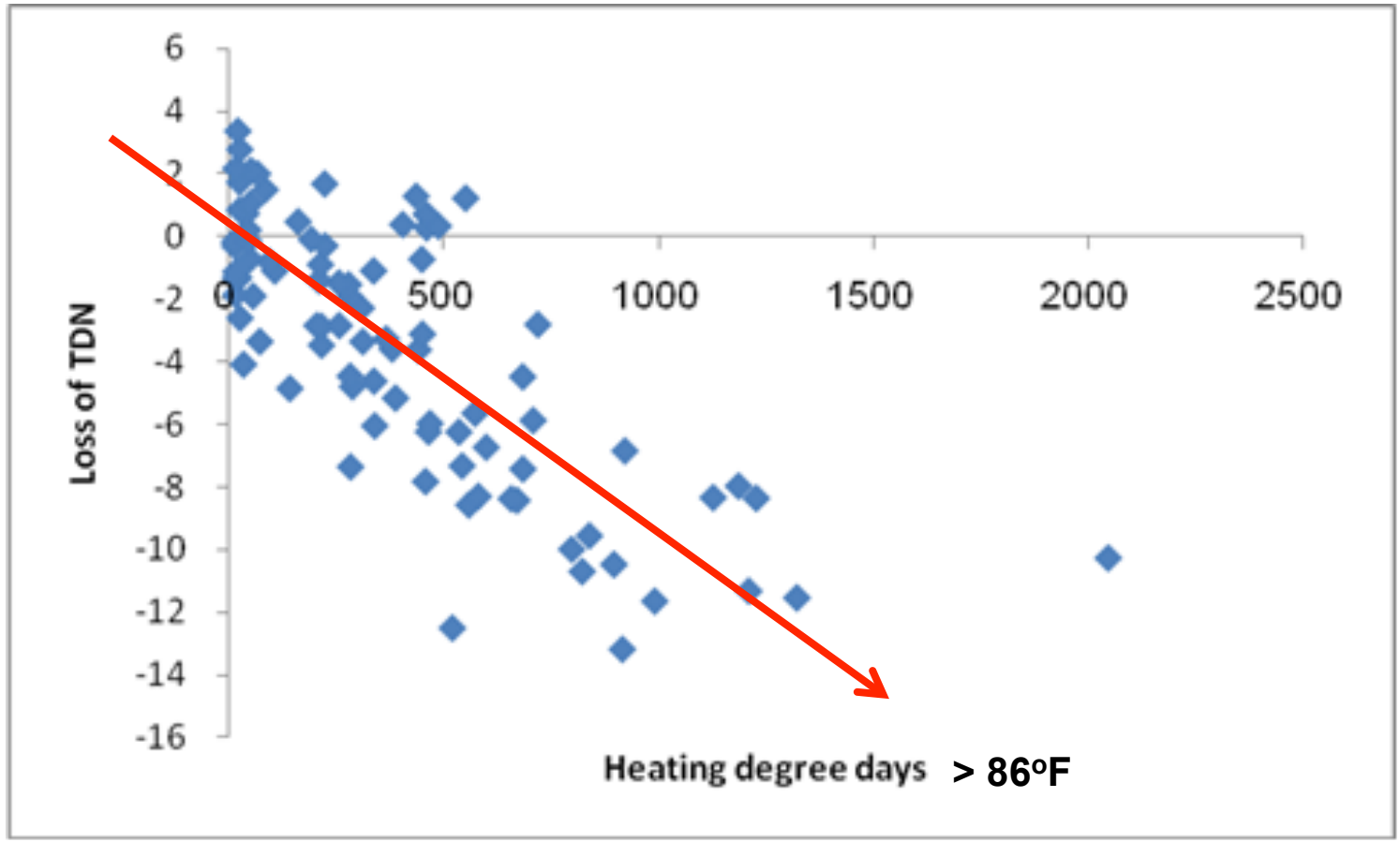


Hay Preservation – Results of Malliard Reaction

- TDN = dNFC + dCP+ 2.25*FA + dNDF - 7



TDN loss as result of heating damage



TDN losses of farmer submitted samples to forage testing laboratories

TDN losses (% of DM)	Number of samples	Percent of total
<0	911	25
0-4.0	894	25
4.0-8.0	1221	34
8.0-12.0	517	14
>12.0	69	2
Total	3612	

With corn at $4.50/bu, TDN is 7¢/lb

TDN losses of farmer submitted samples to forage testing laboratories

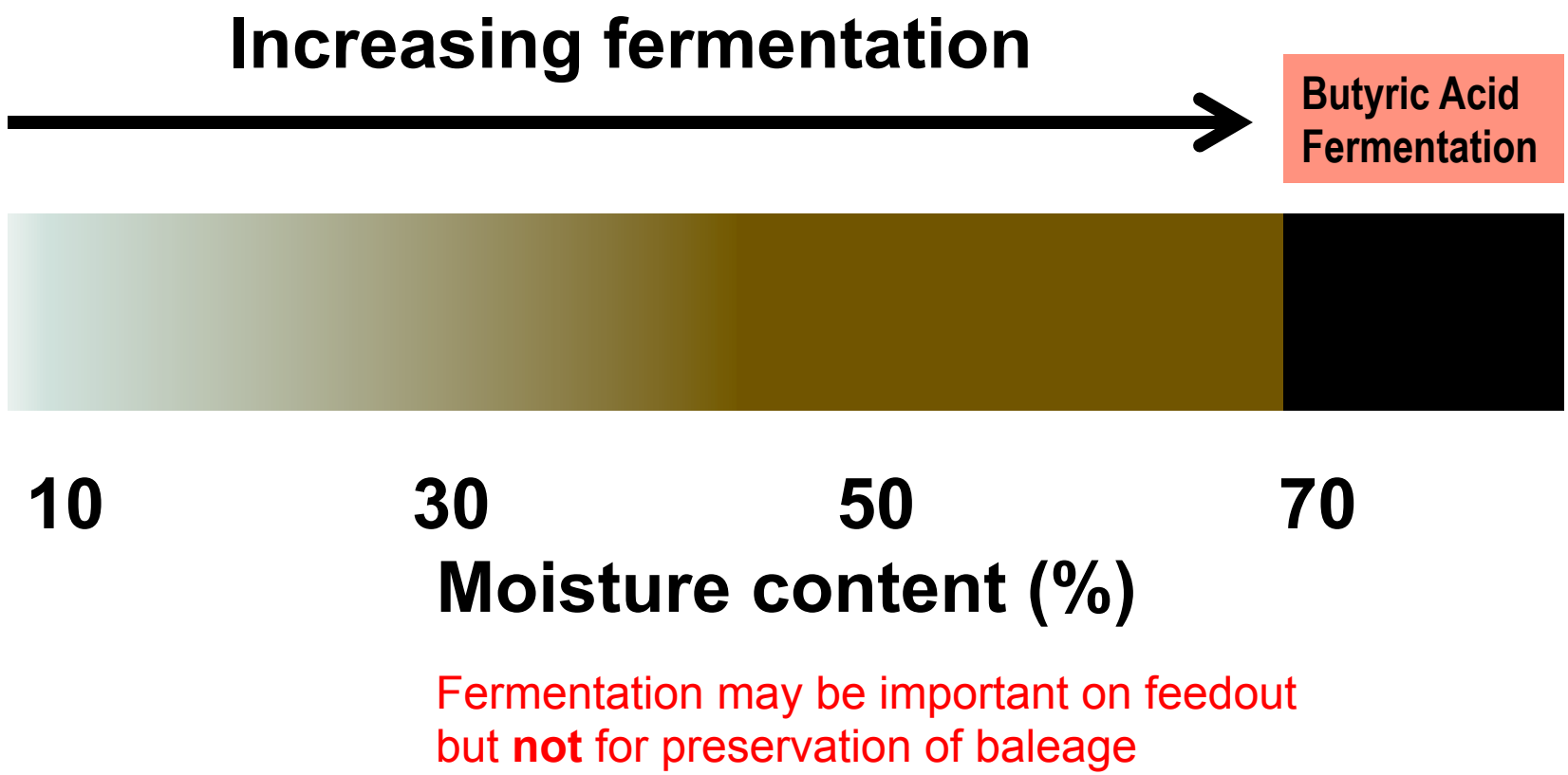
TDN losses (% of DM)	Number of samples	Percent of total	$/ton Loss
<0	911	25	0
0-4.0	894	25	0 - $5.60
4.0-8.0	1221	34	$5.60 - $11.20
8.0-12.0	517	14	$11.20 - $16.80
>12.0	69	2	>$16.80
Total	3612		

With corn at $4.50/bu, TDN is 7¢/lb

Allowable moisture without spoilage in hay

- Depends on heat transfer conditions.
- Can bale without spoilage at higher moisture content if:
  - Cooler air temperatures (e.g. fall vs summer)
  - Smaller bale – less self insulation
  - Single bale vs stack – some growers let bales “sweat” for a couple weeks then stack.

Fermentation and moisture content



Fermentation may be important on feedout
but **not** for preservation of baleage

Wrap in plastic

- Can wrap bales at any moisture between 20 and 70%
- Below 50% moisture - oxygen exclusion
- Above 50% moisture – both oxygen exclusion and fermentation with acid production
  - Less spoilage on feedout

How to make baleage:

Hay preservative additives not needed for baleage

Possible Preservatives

Ammonia
Urea
Inoculants
Propionic acid
Acetic acid
Buffered acids
Acid salts
Ethoxyquin

Note: Ammonia recommended only for grass, not alfalfa

Wrap in plastic

- ✓Preserves by excluding oxygen
- ✓Need at least 6 wraps

Silage inoculant

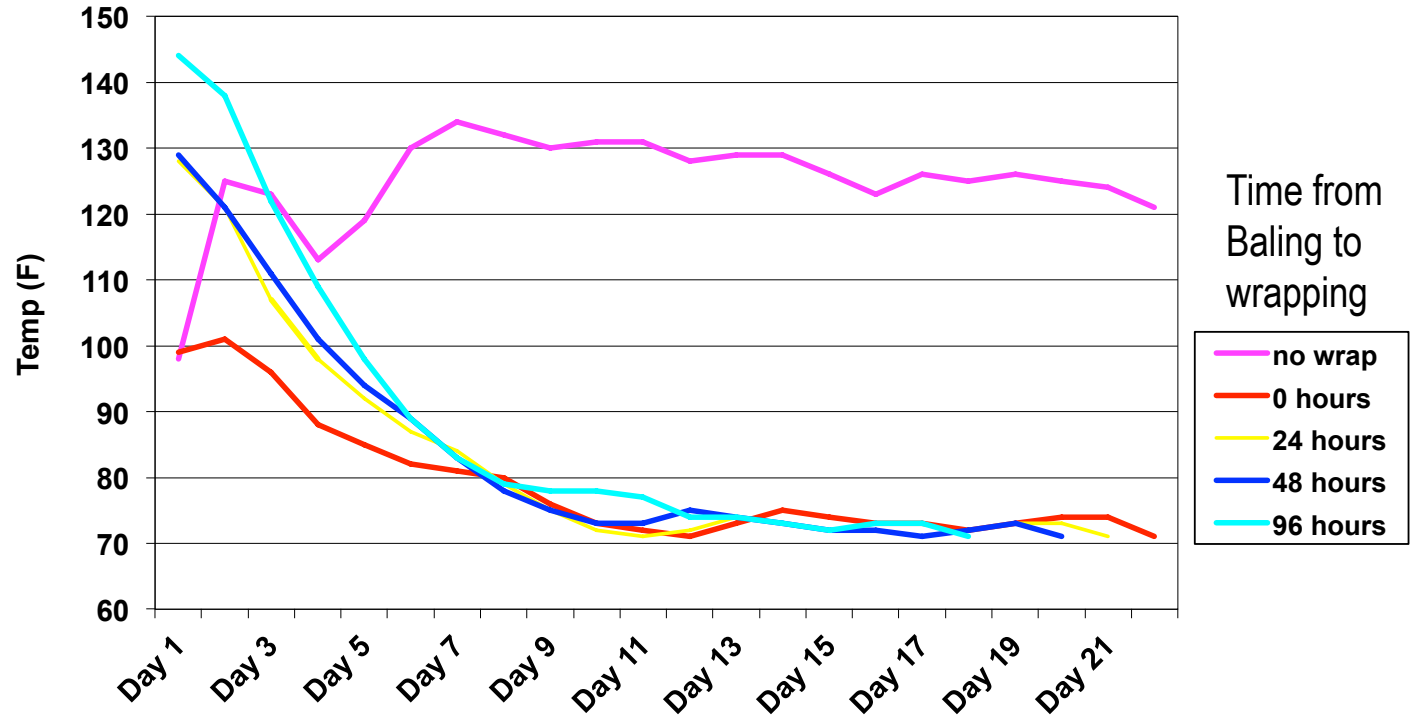
- Not recommended due to lack of coverage

Apply inoculum to chopped forage at chute

Apply inoculum to windrow
as entering bale chamber

How to make baleage:
Wrap Quickly after baling

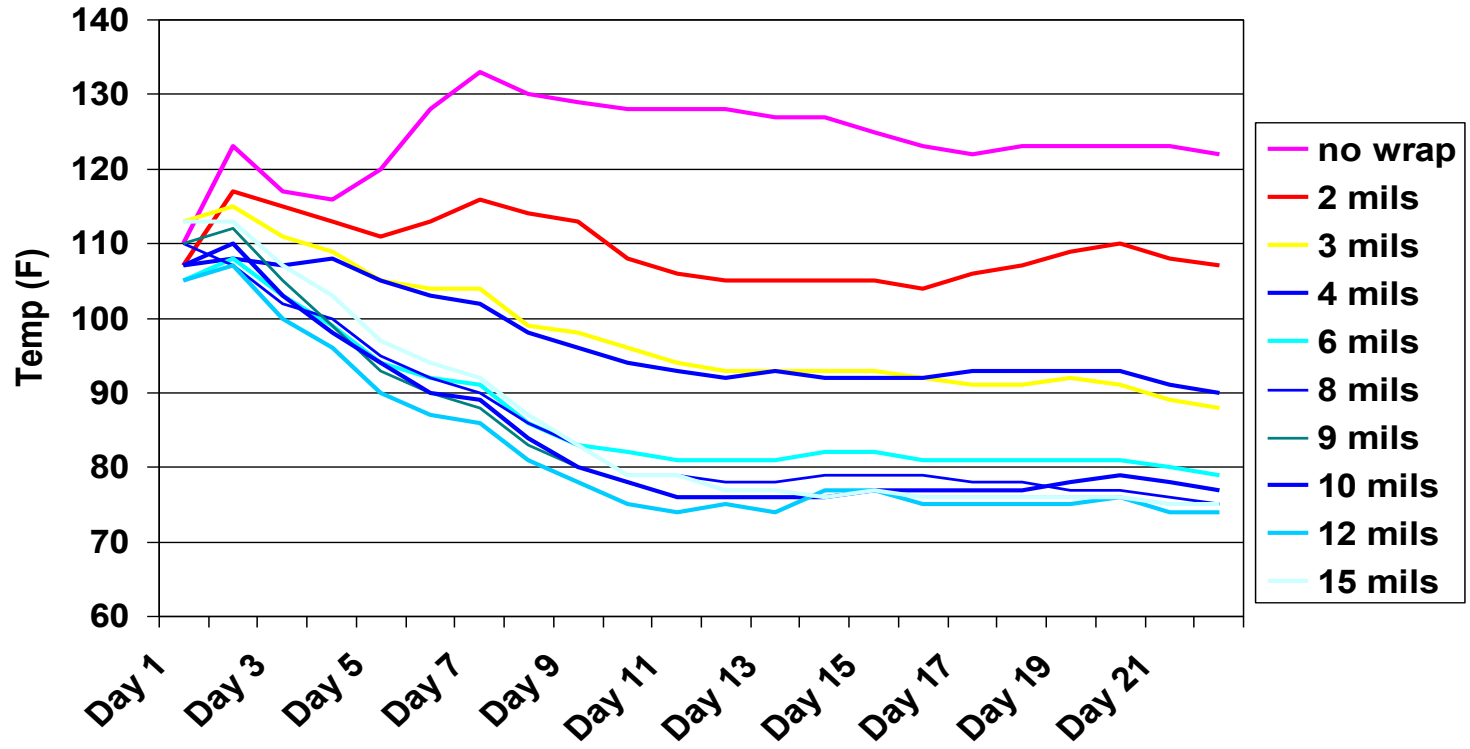
Timing of Bale Wrapping effect on Internal Temperature of Bale over Time,



Lancaster, WI 1998 dry bales (36% moisture)

How to make baleage:
Wrap with 6 layers of plastic

Effect of Plastic Wrap Thickness on Internal Temperature of Bale over Time,



Lancaster, WI 1998 (30% moisture)

Wrap in plastic

- ✓Preserves by excluding oxygen
- ✓Need at least 6 wraps

In-Line Wrappers

Must have uniform adjacent bales
Seal ends of rows

- ✓ Use 40% less plastic than individually wrapped
- ✓ Must feed sufficient forage to stay ahead of spoilage when removed end bales.

Avoid UV Degradation of Plastic

- Buy good plastic
- Avoid oiled sisal twine
- Plastic, untreated sisal, netwrap

In-Line vs individually wrapped

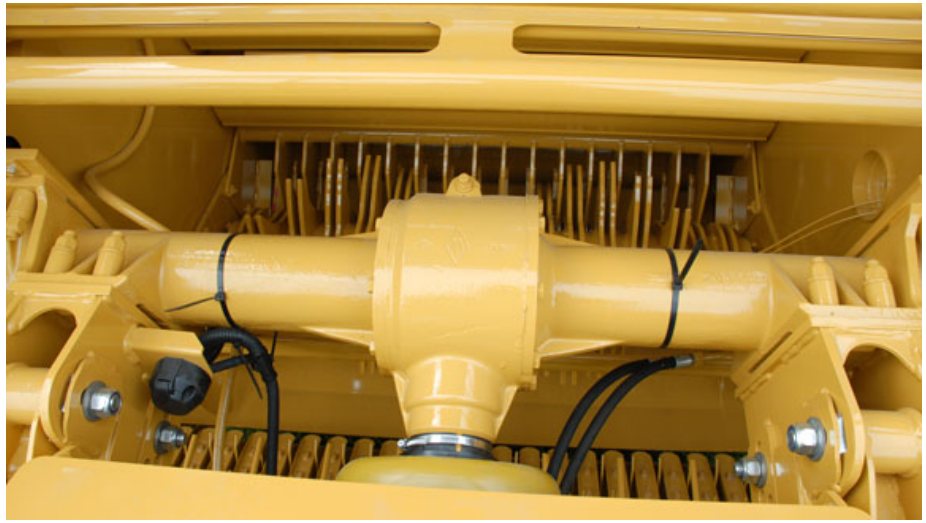
As a rule of thumb -

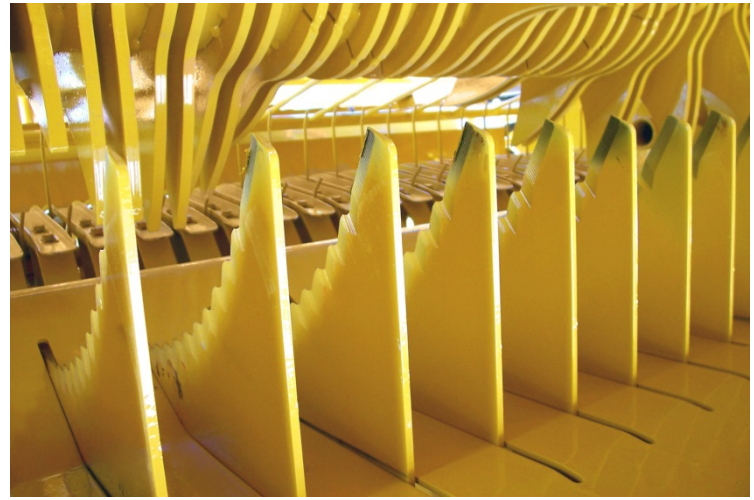
- individually wrapped bales is most appropriate for less than ~50 head of cattle
- above 50 to 75 head, consider in-line wrapping to reduce plastic use.

Baling

Cutting forage for hay/haylage

- Higher initial machinery cost
- Higher energy requirement
- Stones cause knife damage





Baling

Cutting forage for hay/haylage

- Higher initial cost
- Higher energy requirement
- Stones cause knife damage

✓ Greater bale density
✓ Better feed intake
✓ Better animal gain
✓ Less feeding loss

Summary

- Cut alfalfa for high yield and needed quality
- Bale to minimize heating
- Use baler with cutter
- Wrap within 24 hours after baling
- Wrap with at least 6 layers of plastic

Questions

For additional Information:

http://www.uwex.edu/ces/crops/teamforage/index.html

www.uwex.edu/ces/forage

UW Publications

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