

Adjusting Equipment to Minimize Field Losses

Tedding Raking

Mowing Packaging

Storage Feeding



Jordan Milewski
North American, Crop Preparation Products



Philip Eby
Global Product Manager, Crop Preparation Products

Adjusting hay equipment to minimize field losses
March 3rd 2021 - 2021 Alfalfa and Stored Forage Conference



1

Preservation begins with the harvest

Forage quality is never higher than when a crop is standing.



QUALITY

TIME



Adjusting hay equipment to minimize field losses
March 3rd 2021 - 2021 Alfalfa and Stored Forage Conference



2

Let's Talk...

Its wetter than years ago, and harder to dry hay. I have really struggled making good hay the last few years.

It seems like the quality just isn't there anymore, and I feel like I am just not getting the yield I once did.

Hay has always and always will be a challenge. Since you can't change the weather; lets talk about the things you can.

Let's talk about cutting for a little bit if you have the time.



Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

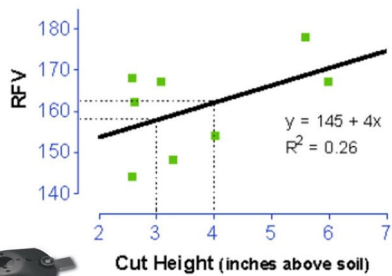


3

Let's Talk Cutting

Average Relative Feed Value


Marshfield, WI - 1999



$y = 145 + 4x$
 $R^2 = 0.26$


RECOMMENDED CUTTING HEIGHT

2"




ALFALFA OR CLOVER

3"




COOL SEASON GRASSES

2.5"




MIXED STANDS



Cutting Height

- Total Tons Harvested
- Forage Ash Content
- Regrowth / Future Yields
- Blade Change Frequency
- Disc and Skid Shoe Wear

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



4

Let's Talk Cutting

Cut too high = Yield left behind
Cut too low = Stunt the regrowth

- Cutting low in grass and mixed grass stands will damage the stand and reduce regrowth ultimately reducing the total tons harvested.
- Adjustable raised skid shoes allow producers to quickly optimize cutting height from less than one-inch to nearly five.
- Ideal for producers of mixed grasses they provide the flexibility to cut as low as standard and as high as fixed raised skids.




Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



5

Let's Talk Cutting

Cows do not like sand in their salad

- All crops have ash, the trick is to reduce it as much as possible to harvest quality .
- New modern designs provide that high-speed machines can react to changing ground contours better so they scalp less, cut cleaner and help to reduce soil inclusion.



Quick-change knives

- Allow producers to choose alternate knives and change in seconds to ensure a clean cut and minimal soil disturbance when mowing.
- Allow producers to change a dull or damaged knife improving the quality of cut and leaving less valuable forage behind.



Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



6

Let's Talk Cutting

Wow - When it comes to mowing there is **WHOLE BUNCH** more that I control than I realized.

You caught my attention with, "Quick change knives". Can I use them on my current 1411?

I don't recommend the Quick Max knife change system for prior models.

Lets take a look at the condition and settings of your mowing equipment.



Adjusting hay equipment to minimize field losses
March 3rd 2021 - 2021 Alfalfa and Stored Forage Conference



7

Worn Cutting Parts

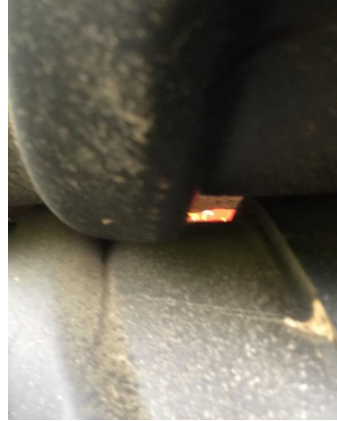


Adjusting hay equipment to minimize field losses
March 3rd 2021 - 2021 Alfalfa and Stored Forage Conference



8

Worn Conditioning Parts



Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



9

Worn Conditioning Parts



NEW



USED-POORLY MAINTAINED

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



10

Let's Talk Conditioning

I have always had rubber rolls and they always wear out.

The other brand was here yesterday. They told me rubber rollers fall apart. They said steel rolls just don't wear out.

I liked the sound of that.

- It's true that rubber rollers are a wearing part; New Holland introduced a new rubber roll compound that offers increased wear resistance.
- Years ago roll-delamination was a struggle; manufacturing processes have all but eliminated it.
- Adjustment is key for any conditioner, flail tine, steel or rubber.

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

11

Let's Talk Conditioning

- Adjustments
 - Roll pressure
 - ✓ Squeezing force
 - ✓ More crop = more pressure
 - Roll gap
 - ✓ Vertical clearance between rolls
 - ✓ Determined by crop stem size
 - Roll timing
 - ✓ Relationship of the rolls to each other
 - ✓ Lugs centered in valleys

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

12

Adjusting Conditioning Rolls



Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



13

Adjusting Conditioning Rolls

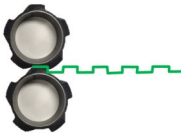


Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



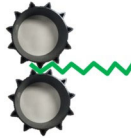
14

Let's Talk Conditioning




Rubber Chevron Roll

- ❑ Provides significantly greater conditioning area vs. steel
- ❑ Able to obtain a smaller clearance/roll gap adjustment compared to steel rolls
- ❑ Uniform crimping and crushing of legumes stems
- ❑ 10.4 inch roll diameter / 5 lug



Steel Chevron Roll


- ❑ Lug design provides a pinch & squeeze without a broad lug.
- ❑ Alfalfa dried similar to flail conditioned samples.
- ❑ Ideal for cane type forage crops, grasses and abrasive conditions.
- ❑ 10.4 inch roll diameter / 11 lug



LeaningEdge™ Flail

- ❑ Highest rate of alfalfa leaf losses among samples.
- ❑ Ideal for fast drying of grass hay, flail times strip the waxy cuticle layer of grass blades.

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference





15


Conditioning Choices & Crops

Quantifying Mechanical Leaf Loss

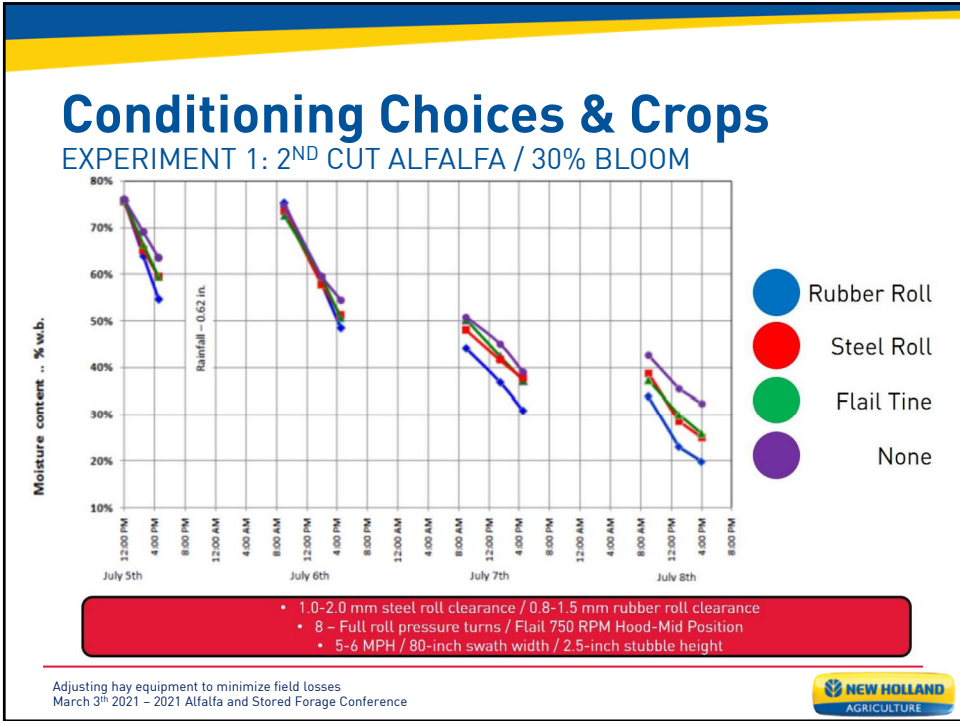
Conditioning Method	Leaf loss - % of total DM
Rubber Rolls	5.6%
Steel Rolls	5.5%
Flail	9.4%

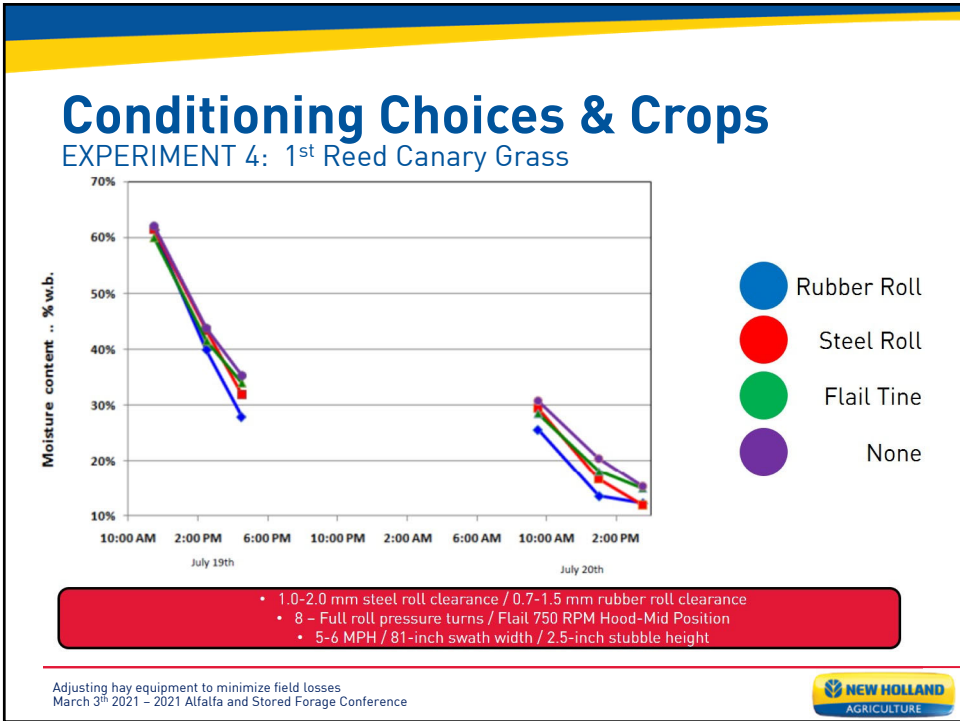
Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



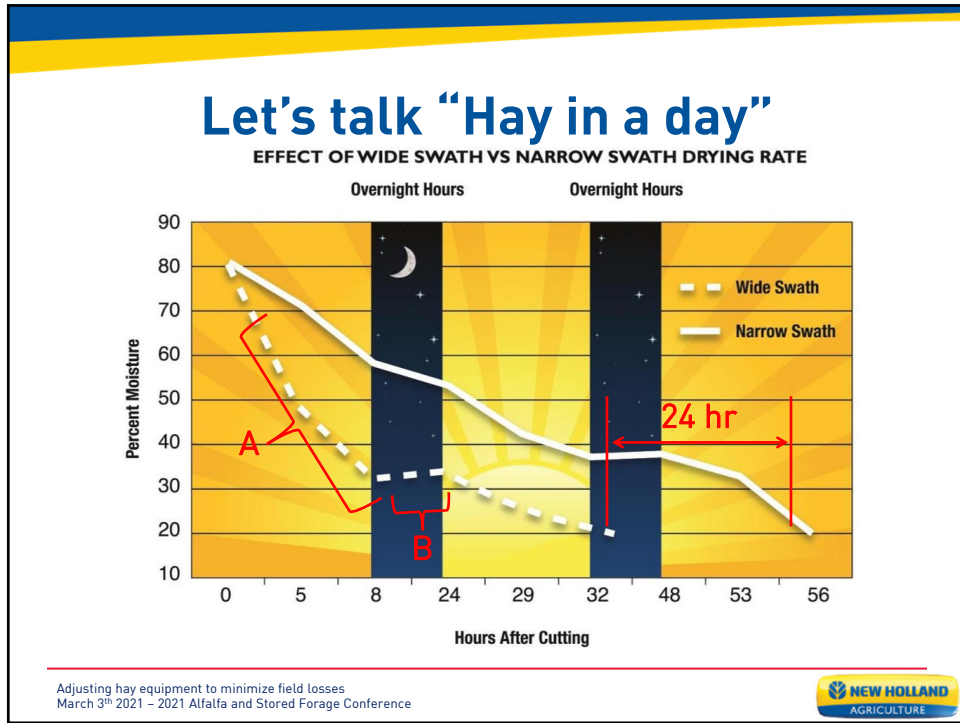
16



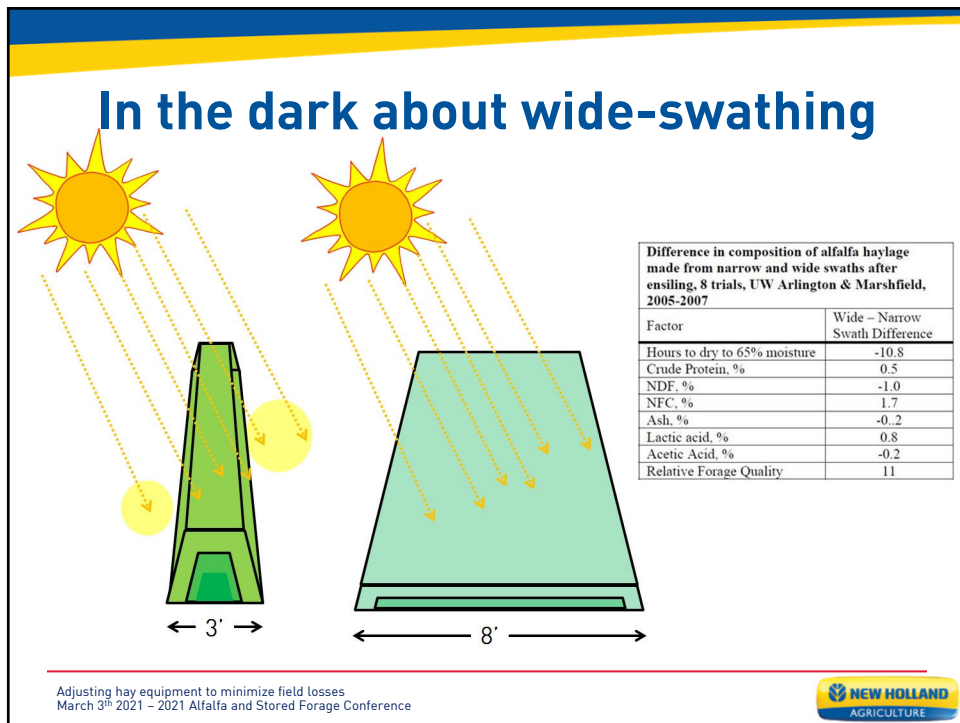
17



18



19



20

Rotary Tedders

Help dry alfalfa & grass hay faster

Time of day	Narrow Swath	Tedded Narrow Swath	Unconditioned Wide Swath	Conditioned Wide Swath
08:00:00	78	78	78	78
10:00:00	75	72	74	74
12:00:00	70	62	68	68
14:00:00	55	38	48	48

Figure 1. Alfalfa-grass dried very quickly, resulting in silage moisture levels in one day, even in narrow swaths. Tedding resulted in faster drying than other treatments. The pattern above for the four treatments was consistent for all three fields tested.

Northern NY Agricultural Development Program 2006 Project Report
Evaluation of Wide Swathing of Haylage in Northern NY

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

21

Rotary Tedding Alfalfa Crops

- Tedding can be applied at any time with positive drying results. However losses can become significant when the crop is too dry increase leaf losses & shatter.
- Never ted a delicate crop below 40% moisture.
- Never ted a partially cured and rained on crop at any moisture or accept the substantial leaf losses.

EFFECTIVENESS OF EQUIPMENT TO SPEED HAY DRYING
 by **C. Alan Rotz**, Agricultural Engineer
 ARS, Pasture and Watershed Management Research Unit
 University Park, PA 16802

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

22

Hay Rake Considerations

	Wet Hay	Dry Hay	Speed	Capacity	Handling	Windrow Quality	Dirt and Stones in Windrow	Fast Drying
Rotary Rakes								
Wheel Rakes								
Bar Rakes								
Belt Merger								

Best Overall

Recommended

Limited
Not Recommended

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

23

Let's Talk Silage Hay

The graph plots Relative Level on the y-axis against Time in days on the x-axis. The x-axis is divided into four phases: Aerobic Phase (0-1 day), Lag Phase (1-2 days), Fermentation Phase (2-14 days), and Stable Phase (14+ days). Three data series are shown: pH (green line), Anaerobic bacteria (blue line), and Temperature (red line). pH starts high, drops during the aerobic phase, and remains low through the fermentation phase. Anaerobic bacteria levels rise during the lag phase and peak during the fermentation phase. Temperature peaks during the aerobic phase and then gradually declines through the fermentation phase.

The 3 Phases of Making Baleage



1. Aerobic Phase (Bad) – requires Oxygen, robs from the sugars needed for anaerobic phase (acid production) leading to spoilage
2. Anaerobic Phase (Good) – Oxygen Free and produces acids for better / longer storage
3. Stable Phase – (Result) – Oxygen Free with low pH allows for long term feed preservation

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference


24

Let's Talk Silage Hay

Moisture (%)	Fermentation	Management Practice
← 30%	Possible, but not ideal for fermentation. Some mold growth could occur	Let hay dry down if possible to produce dry bales
30-45%	Possible, but not ideal for fermentation. Some mold growth could occur	Add at least 2 more layers of wrap to ensure oxygen exclusion
45-60%	Ideal for baleage production and fermentation	Wrap bales with at least 6 layers of 1 mil polyethylene plastic film
60-70%	Possible, but the high levels of moisture can result in spoilage and low palatability	Add at least 2 more layers of wrap to ensure oxygen exclusion
→ 70%	Too wet for proper fermentation; baleage production is not recommended	Wait for the forage to dry down further before baling


Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

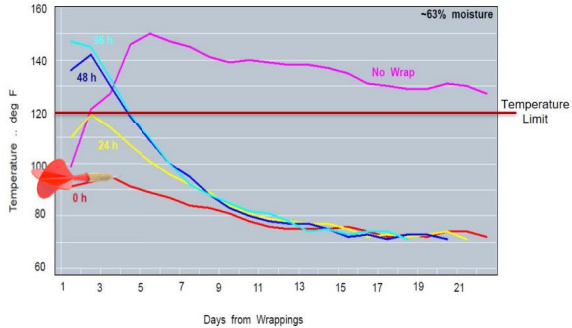


25

Let's Talk Silage Hay

Wrap Timing






Alter Undersander et al., 1998


47¢ PER HEAD PER DAY

IMMEDIATE WRAPPING
MAXIMIZES CRUDE
PROTEIN, SAVING
UP TO 47 CENTS PER
HEAD PER DAY IN
SUPPLEMENTAL FEED.*



Bale temps must stay below 120F or protein will be bound to the fiber. The Magic Time is 0 Hours
– Wrap Immediately or Accept Reduced Feed Quality

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



26

Let's Talk Silage Hay



If temperature rise resulted in a 10% loss of a ration's available Crude Protein (1.7% on a 17% average Crude Protein ration), estimate the soybean meal cost needed to replace lost protein for a 100 and 500 cow herd?

47¢ PER HEAD PER DAY

Immediate weaning minimizes crude protein, leaving up to 25 cents per head per day in supplemental feed

500 cows 1 Yr. = \$86 K
100 cows 1 Yr. = \$17 K

General Rule of Thumb:
For every 20 deg. F increase in bale temp during fermentation, you lose 10% of the available Crude Protein.

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



27

Let's Talk Dry Hay?

92°



149°



Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



28

Let's Talk Cut Hay



BALE-SLICE™

What are the advantages of Bale-Slice™?

1. Increased bale density – up to 14% increase
2. Increased average daily gains – up to 23% more
3. **Reduced feed waste – less loose ends from the animal's mouth**
4. Reduced consumables – lower net consumption
5. Lower operator fatigue – fewer bales to make, handle and haul

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



29

Let's Talk Pickup Adjustments



Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



30

Photo Opportunity – or OOPS?




Crop moisture
Time in the chamber
Operator experience


Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



31


Let's Talk Bale Density






Feed Quality
Bale Bunk Life

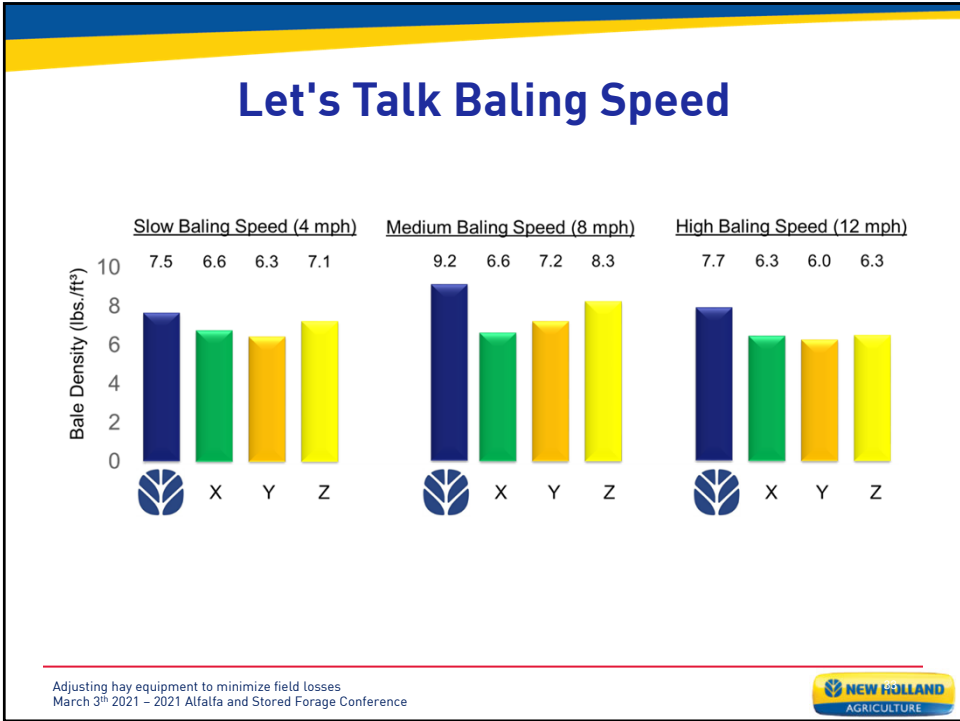
Consumables
Bale Handling
Supplements
Feed Waste
Labor & Facilities



Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference



32



33

Thank you

Questions

Adjusting hay equipment to minimize field losses
March 3rd 2021 – 2021 Alfalfa and Stored Forage Conference

34