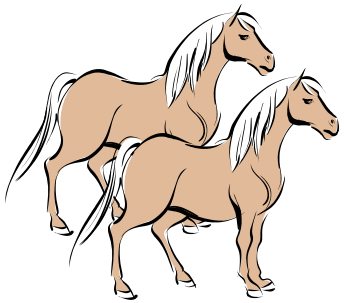
STORAGE STRATEGIES:
FEED AND FORAGE STORAGE

2015 Stateline Equine Conference

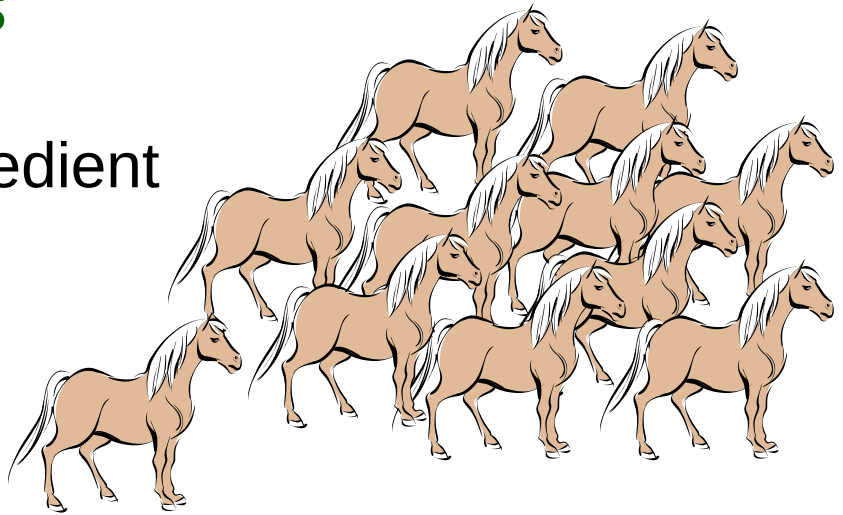
UW Extension
Cooperative Extension

Determining Storage Needs

- What is being fed?
  - Hay, grain, supplements
- Who is being fed what?
- How many are being fed?
- Other items
  - Bedding, equipment, medicines, pesticides, etc.

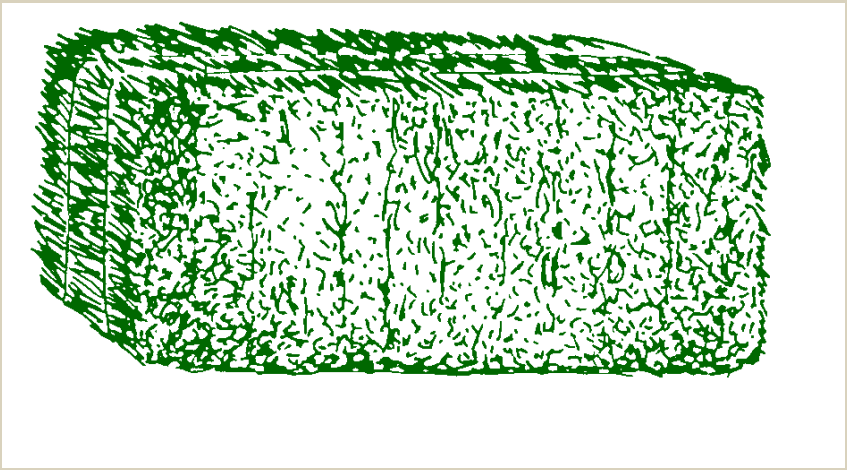


- Determining Storage Needs
  - Purchased feed materials
  - Required amount of each ingredient
  - Delivered volume?
  - Bulk, bags, pallets, liquid?



TOPICS

- **Hay Storage**
  - Indoors
  - Outdoors
  - Safety concerns
    - Pests
    - Fire
    - Quality
- Feed Storage
  - Containers
  - Safety concerns
- Medicine Storage
  - Safety concerns
  - Records
- Pesticides
  - Safety concerns
  - Records



Hay storage

- Goal is to keep stored hay as fresh and palatable as possible
  - Prevent heating and possible combustion
  - Preserve nutrient content
  - Prevent mold development

How much hay?

1100-pound riding horse

- = eats 2 % body weight/day as forage - 9 months
- = 3 T of hay = 600 cubic feet of storage
- = 10 foot by 10 foot stall that is 7 feet high
- Density
  - 10 pounds per cubic foot for hay
  - 26 pounds per cubic foot for grain
- Space considerations
  - provide at least 25 percent more space than the required amount you calculate

Purchase by the ton, not bale

Price - per bale	Per ton	Per ton	Per ton
5.00	$250	$166.5	$125
4.50	$225	$150	$113
4.00	$200	$133	$100
3.50	$175	$117	$88
3.00	$150	$100	$75
	40#	60#	80#

Bale Weight, lb.

*Weekly Hay Price Summary (2-13-15)

Hay Price Summary

Hay Grade	Bale type	Price ($/ton) Average	Minimum	Maximum
Prime (> 151 RFV/RFQ)				
	Small Square	260.00	240.00	280.00
	Large Square	191.30	150.00	272.50
	Large Round	126.75	95.00	180.00
Grade 1 (125 to 150 RFV/RFQ)				
	Small Square	152.80	90.00	215.00
	Large Square	155.20	120.00	200.00
	Large Round	111.25	75.00	150.00
Grade 2 (103 to 124 RFV/RFQ)				
	Small Square	No reported sales		
	Large Square	97.35	70.00	125.00
	Large Round	83.55	50.00	125.00
Grade 3 (87 to 102 RFV/RFQ)				
	Small Square	73.00	50.00	96.00
	Large Square	77.50	70.00	90.00
	Large Round	75.80	70.00	90.00

*** http://fyi.uwex.edu/forage**

“Long-term” storage needed

- Year long storage
  - Guaranteeing hay delivered from the same lot of hay
  - Lower cost
  - Consistent quality

Large Volume

Small facilities

Monthly storage

-Less hay

-Higher cost per bale

-Transitioning between lots of hay

Hay storage

- Hay is highly combustible
  - don’t store in same barn that animals are housed in
- Insurance companies
  - often charge higher rates if > 1 week’s hay is stored in the barn

Store hay at proper moisture content

- When cut, around 80% moisture
- Storage moisture is around 16-20% moisture
  - Higher – microbial activity generates heat, and reduces hay quality both through reduced DMD and spore caused respiratory problems
- Hay heated to 150-175°F may spontaneously combust

Bale Condition

- Depends on type of hay
  - grass hay is looser
- Difficult to move
- May not stack well

Hay storage considerations

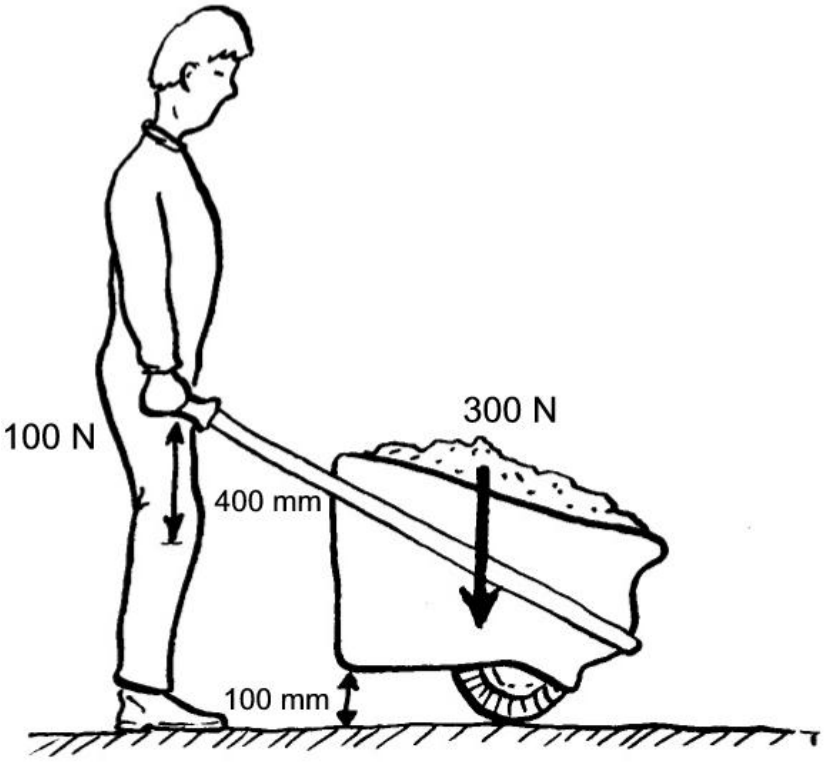
- Good Ventilation
  - Always place bales in the direction of prevailing winds
  - Use a minimum of 3 feet between bale rows for air circulation. The more space the better.
  - If bales are stored side by side, leave > 24” between bales
- Alternate stacking with strings up and strings to the side to increase ventilation
- Stack with cut side up to increase evaporation
- Leave space between stacks

Hay storage considerations

- Don’t stack bales higher than can be safely moved
- Stack new inventory behind the old or separate different types/ lots of hay
  - Helps transitioning horses from one type of forage to another
- Use barns for high quality forage
- Hay stacked on bare ground or on concrete will wick moisture
- Limit access by critters

Your back! Your energy!

- Cart/ wheelbarrow/ tractor access
- Height vs. lifting
- Distance to where it will be used



Consider Large Bales

- Larger door openings
- Equipment needs

Bale Size and Storage

- Small bales
  - Easiest to move and feed
  - Most expensive
- Large bales are less expensive per ton, but
  - Require equipment to move
  - Large round bales should be fed in a feeder to avoid waste

Hay storage outside?

- Store inside if possible
  - Sunlight bleaches hay
  - Loss of vitamin A and proteins

Large bale considerations for storage outside

- Store on twine or wrapped side
- Tractor or skid loader necessary to move
- Cover with tarp or other thick material if possible
  - Loss can be prevented up to 10 % by covering
- Slope the tarp so that water can run off smoothly
- Proper feeders to minimize loss
- Bales not touching to avoid pooling of water between bales

Storage time vs. quality

- Losses after 12 to 18 months can be twice as great as losses after nine months of storage. (Oklahoma State University)
- As hay is stored it loses both dry matter and moisture
- Fibrous carbohydrates increase
- Protein decreases at a slower rate than carbohydrates

Longevity of Stored Hay

Hay Storage Options	Storage Longevity (Years)	Dry Matter Loss (%)
Conventional Shed	20	4 to 7
Tarped on Pallet	5	4 to 7
Net Wrap on Ground	1	15 to 25
Twine on Ground	1	25 to 35

www.extension.umn.edu/agriculture/horse/nutrition/selecting-and-storing-horse-hay

Hay Storage Concerns

- Black Patch Mold
  - second-cutting red clover
  - sometimes other legumes
  - toxin that stimulates the salivary glands, the lacrimal glands.
- Hay Mold, dust

- EPM- Equine Protozoal Myeloencephalitis
  - Opposum

Mold in Hay

- Heavily molded hay
  - put up moist
  - possible heat damage
- Presence of mold
  - does not necessarily mean that the feed quality is lower
  - lower palatability
- Testing is possible
- Hay preservative
  - Hay desiccants
  - Mower conditioners
  - Bacterial inoculants
  - May reduce palatability
  - Hard on equipment (acidity)

Birds

- Can consume feed, contaminate feed and water with feces, damage equipment
- Some Considerations:
  - Keeping them out of the barn, while providing good ventilation
  - Clean up any spilled grain
  - Consider covered feeders
  - Water levels
  - Most bird species are protected
    - But not pigeons, starlings, house sparrows
  - You are liable if you kill nontarget species

Think F-E-E-D-S **

- **•Flexibility**
  - changes; expansion
- **•Economy**
  - low cost; effective; minimal waste
- **•Ease of operation**
  - Feeding steps; mechanization
- **•Dependability**
  - Simple is best
- **•Safety**

- ** Dan F. McFarland, M.S., Agricultural Engineering Educator , Penn State

Feed Storage

- Containers with lids
- Labeling/ Dates
- Keeping rats/ mice out
- Monitoring traps for rodents

Bagged Feed

- Convenient but costly
- Makes transport and storage easy
- Timely purchasing to minimize feed from going stale
- Can buy bags by the ton for a volume discount
- Do not store on concrete
- Not rodent proof

Medicines

- SAFETY! Recordkeeping
- *Separate measuring tools from feed*
- Refrigeration?
- Locked cabinet
- Cleanliness
- Discard outdated veterinary supplies

Pesticide Storage

- SAFETY! Recordkeeping
- *Do not store in same area as feed and forage*
- *Insecticide Sprays – don't spray by feed/ forage*
- Locked cabinet, especially with children present
- Clean equipment immediately to minimize exposure to others
- Worker Protection – everyone should be aware of safety concerns

SUMMARY

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  - Indoors
  - Outdoors
  - Safety concerns: Pests, Fire, Quality
- Feed Storage
  - Containers
  - Safety concerns
- Medicine Storage
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  - Records
- Pesticides
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Questions?

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