Tools for Performing a Feed Inventory

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Feed Inventory:

Determine How Much Feed Is Present at a Given Time

Why Do A Feed Inventory?

Project Future Needs
Allocate Feeds Over the Year
How Much To Sell
How Much To Buy
What to Plant
Planning Storage Needs

Projecting Feed Needs

1. Calculate Feed Available
2. Calculate Herd Daily Feed Need
3. Calculate Number of Days Feed Will Last
4. Determine Days of Excess/Deficiency
5. Determine Quantity to Sell/Buy or
   How to Change Ration

Some Tools

Equations for Geometric Shape Volumes
(Cylinders, Cones, Pyramids, Prisms, etc.)

Tables (Tower Silo, Bin, Bunker Silo Tables etc.)

Software

Basic Principles

Measure the stored crop

Calculate the volume

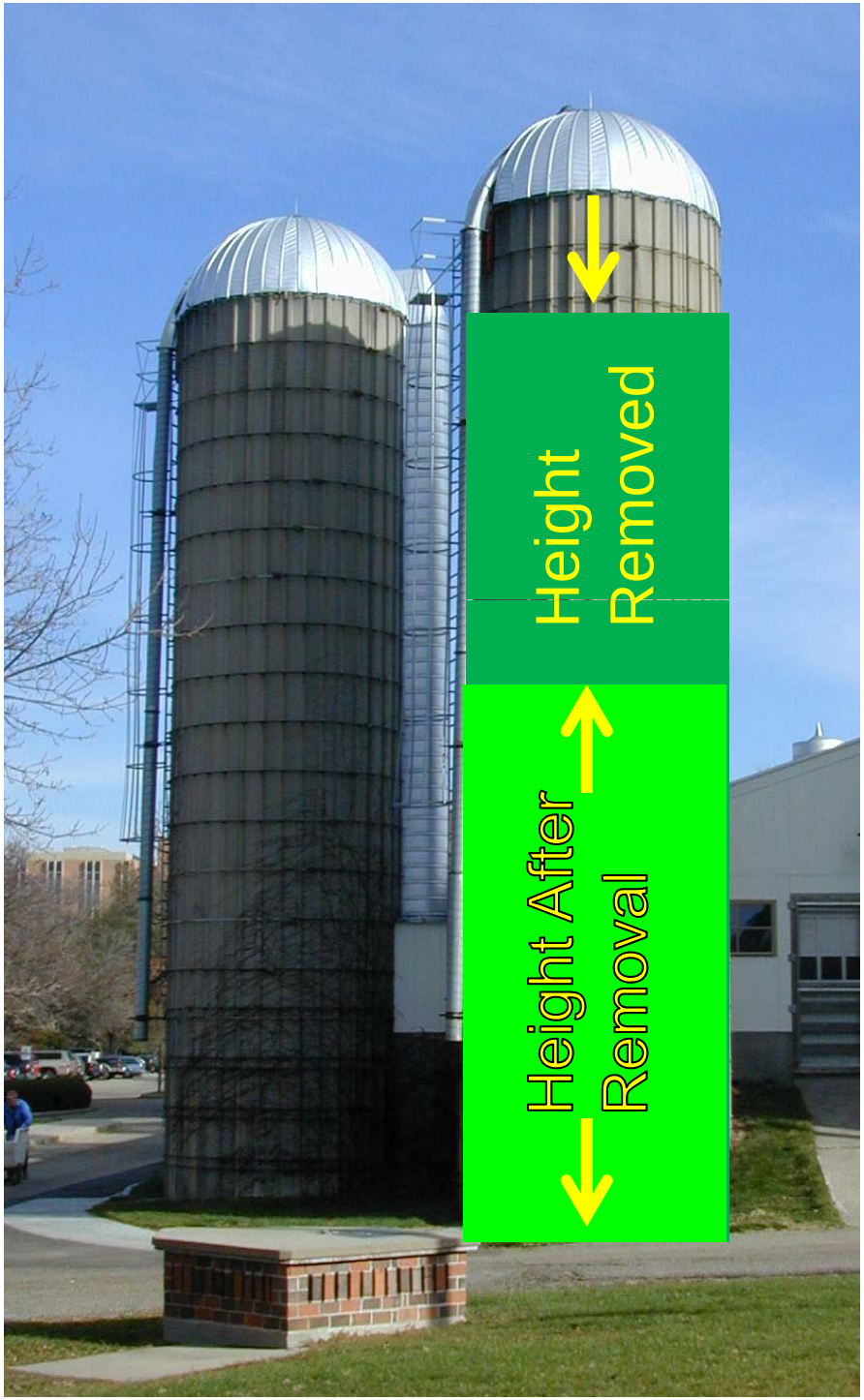
Estimate /determine the density of crop

Calculate the Capacity = Volume x Density

Quantity Placed into Silo =

Table Value based on Diameter and Height After Settling

Density varies with depth.



Quantity Remaining in Silo =

Quantity Placed into Silo –
Quantity Removed from Silo

Use Silo Table

Example

20 ft diameter silo
Filled 60 ft high
20 ft remain

Filled Height = 60 ft

Depth (ft)	Quantity Stored (T DM)
10	12
20	33
30	59
40	89
50	123
60	**152**
70	182

Quantity When Filled = **152** T DM

Example

20 ft diameter silo
Filled 60 ft high
20 ft remain

Filled Height = 60 ft
Height Removed = 60-20
= 40 ft

Depth (ft)	Quantity Stored (T DM)
10	12
20	33
30	59
40	**89**
50	123
60	152
70	182

Quantity Removed = **89** T DM

Example

20 ft diameter silo
Filled 60 ft high
20 ft remain

Filled Height = 60 ft
Height Removed = 60-20= 40 ft

Depth (ft)	Quantity Stored (T DM)
10	12
20	33
30	59
40	**89**
50	123
60	**152**
70	182

Quantity Remaining = **152** T DM – **89** T DM = **63 T DM**

The Truth About Silo Tables

Silo Table Capacities Are Estimates.
Research Shows As Much as 20% More
Feed Can Be Placed In Tower Silo If a
Good Distribution System is Used

"When You Have a Silo Table, You Know How Much Feed You Have. When You Have More Than One Silo Table, You Are Not So Sure."

B. J. Holmes

Example - Hay Bale Storage (Method #1):

Stacked Density:

Small Square Bales =

6.7 lbs AF/cu ft x 0.85 = 5.7 lbs AF/cu ft

Large Round Bales =

10 lbs AF/cu ft x 0.85 = 8.5 lbs AF/cu ft

Large Square Bales =

14 lbs AF/cu ft x 0.9 = 12.6 lbs AF/cu ft

Example:
Hay Storage = 40’ x 10’ x 100’

Gross Volume = 40’ x 10’ x 100’ = 40,000 cu ft

Stacked Volume (Method #1):

Small Square Bales = 9.34 ft High

Volume = 9.34’ x 40’ x 100’ = 37,360 cu ft

Large Round Bales = 10 ft High

Volume = 40,000 cu ft

Large Square Bales = 8.85 ft High

Volume = 8.85’ x 40’ x 100’ = 35,400 cu ft

HAY CAPACITY (Method #1):

Small Square Bales = 5.7 lbs AF/cu ft x 37,360 cu ft
= 186,800 lbs AF x 0.85 = 158,780 Lbs DM

Large Round Bales = 8.5 lbs AF/cu ft x 40,000 cu ft
= 340,000 lbs AF X 0.85 = 289,000 Lbs DM

Large Square Bales = 12.6 lbs AF/cu ft x 35,400 cu ft
= 446,040 lbs AF x 0.85 = 379,134 Lbs DM

Alternative Hay Storage Capacity (Method #2)

5,184 Small Square Bales x 40 lbs/bale = 207,360 lbs AF
207,360 lbs AF x 0.85 = 176,256 Lbs DM

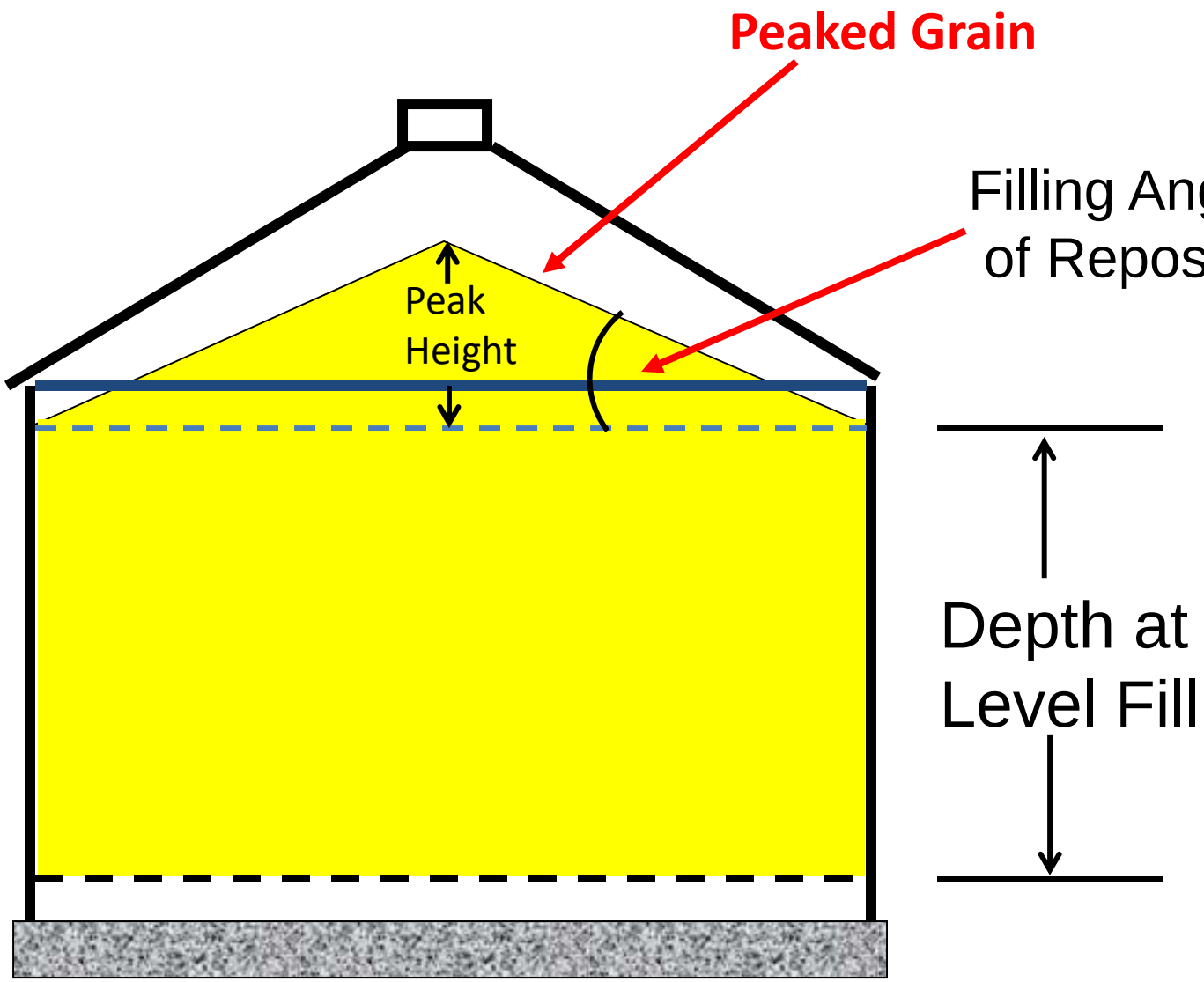
576 Large Round Bales x 550 lbs/bale = 316,800 lbs AF
316,800 lbs AF X 0.85 = 269,280 Lbs DM

324 Large Square Bales x 1,300 lbs/bale = 421,200 lbs AF
421,200 lbs AF x 0.85 = 358,020 Lbs DM

Comparing Methods

Bale Type	Stacked Density	Bale Count
	===== Lbs DM======	
Small Square	158,780	176,256
Lg. Round	289,000	269,280
Lg. Square	379,134	358,020

Grain Bin Capacity



Level Full Grain Bin Example

Diameter = 30 ft
Grain Depth = 20 ft

Volume = Pi x (D^2 / 4) x H
= 3.14 x (30^2 /4) x 20
= 14,130 cu ft

Volume = 14,130 cu ft/ 1.245 cu ft/Bu
= 11,350 Bu

Grain In Peak Cone Example

Diameter = 30 ft

Corn Filling Angle of Repose = 23^{o}

Peak Height = D/2 x Tan (Angle) =

= 15xTan(23) = 6.4 ft

Volume = (Pi x D^{2} / 4) x H / 3

= (3.14 x 30^{2} /4) x 6.4 / 3

= 1,508 cu ft

Volume = 1,508 cu ft/ 1.245 cu ft/Bu

= 1,211 Bu

Grain In Peaked Bin Example

Volume = Volume in Level Bin + Volume in Cone

Volume = 11,350 Bu + 1,211 Bu = 12,561 Bu

Weight = 12,561 Bu x 56 lbs/Bu = 703,416 lbs AF
at 15% moisture
Weight = 703,416 lbs AF x 0.85 = 597,904 lbs DM
= 299 T DM

Worksheets

1. Managing Dairy Feed Inventory (A2945)

Software

1.Spreadsheets for storage capacity

2.Spreadsheets for storage capacity and projecting needs

3. Commercial software that integrates with feed weighing system

Spreadsheets for storage capacity

1. Harvesting and Storage Page-Team Forage

Tower Silo Capacity (Top & Bottom Unload)
Tower Silo (Multiple Fills)
Silage Bag Capacity Calculator
Bunker Silo Volume & Weight Calculator
Silage Pile Capacity Calculator
Bunker Silo Density Calculator
Silage Pile Density Calculator
Storage Density Calculator
Bunker Silo Sizing Spreadsheet
Grain Bin Capacity Calculator

Spreadsheets for storage capacity

2. Crop Storage Institute

(Towers, Bunkers, Bags)

Spreadsheets for storage capacity and projecting needs

FEEDINV-Michigan State

Penn State Cash Flow Analyzer

WARNING:

Inventory calculations are adequate for on farm use.

Using estimates of capacity for establishing sale value creates a winner and a loser and can result in conflicts.

Let’s try some spreadsheet tools

QUESTIONS?