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Documentation
Silage Bag Sizing Spreadsheet

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Purpose:

This spreadsheet was developed to determine the number and size of silage storage bags and a pad upon which to place them for hay crop, whole plant corn crop and ground high moisture corn.

Software Requirements:

This spreadsheet requires Microsoft Excel.

Inputs:

User changeable values can be entered into spreadsheet cells with a yellow background color. The output cells have a pink background color with black text. Intermediate values are displayed in cells with green background. Only yellow background cells should be changed by the user. The other cells are protected from being changed. A warning message will be printed in red when the removal rate falls below 1.5 ft/day for silage and 2 ft/day for high moisture corn.

The following variables must be entered by the user:

1. **Quantity of Silage Dry Matter fed per day** (cells E15, F15, G15, H15, I15) is the total amount of dry matter of each feed ingredient fed to the whole herd on each day. The units are pounds of dry matter per day. If a particular feed is not to be stored in bags, enter zero.

2. **Dry Matter Density** (cells E16, F16, G16, H16, I16) is the density of feed packed into the bag. Average values for forage can be in the range of 8-16 lbs of dry matter/cu ft for forages and high moisture corn values are not well known.

3. **Bag Diameter** (cells E17, F17, G17, H16, I16) is the diameter (feet) of the silo bags used to store the feed.

4. **Bag Plastic Length** (cells E18, F18, G18, H18, I18) is the length of the bag as

delivered to the farm measured in feet.

5.   **Storage Period** (cells E20, F20, G20, H20, I20) is the length of time feed is to be stored. nits are days of storage.

6.   **Distance Between Bags** (cells E21, F21, G21, H21, I21) is the space (feet) left between each bag to allow the bag to squat as the contents settle and to minimize damage by equipment maneuvering to fill or empty an adjacent bag.

7.   **Buffer On Ends of Each Bag** (cells E22, F22, G22, H22, I22) is the length (ft) of storage pad that extends beyond each end of the bags. This buffer allows equipment to operate beyond the end of the bag and still be on the pad. The buffer can also discourage vermin from approaching the bags.

8.   **Dry Matter Loss** (cells E23, F23, G23, H23, I23) is the loss of feed occurring during storage and feed out. This value can vary from 5-20% of the total forage placed into the bags depending on management. Lower feedout rates increase the loss.

Intermediate Output (cells with green background)

1.   **Bag Storage Length** (cells E19, F19, G19, H19, I19) is the calculated length of bags after they have been filled and sealed.

Output (cells with pink background)

1.   **Daily Volume Removed** (cells E24, F24, G24, H24, I24) is the calculated volume removed from each bag per day at the density specified for each bag.

2.   **Daily Removal Rate** (cells E25, F25, G25, H25, I25) is the rate of feed removal from the bags each day. This is the rate each bag is shortened per day. A warning message will be printed in red in rows 26 and 27 when the removal rate falls below 1.5 ft/day for silage and 2 ft/day for high moisture corn.

3.   **Total Bag Storage Length** (cells E28, F28, G28, H28, I28) is the sum of all bag storage lengths for each feed. The total of all bags is provided in cell K28.

4.   **Number of Silo Bags** (cells E29, F29, G29, H29, I29) is the total number of silo bags for each feed rounded to the nearest whole number. The total of all bags is displayed in cell K29.

5.   **Total Volume Stored** (cells E30, F30, G30, H30, I30) is the volume of feed in all bags for each feed and for the storage period.

6.   **Total Weight Placed into Storage** (cells E31, F31, G31, H31, I31) is the quantity (Tons of Dry Matter) of feed placed into bags for the specific feed.

7.   **Total Weight Removed from Storage** (cells E32, F32, G32, H32, I32) is the quantity (Tons of Dry Matter) of feed removed from bags for the specific feed following losses.

8.   **Storage Pad Length** (cells E33, F33, G33, H33, I33) is the length (feet) of the storage pad upon which bags of each feed are placed. It is the sum of storage bag length plus the end buffers at the ends of the bags. The length of the maximum storage pad is provided in cell K33.

9.   **Storage Pad Width** (cells E34, F34, G34, H34, I34) is the width (feet) of the storage pad upon which bags of each feed are placed. It is the sum of storage bag diameters plus the spaces between the bags. The sum of all pad widths is provided in cell K34.

10. **Storage Pad Area** (cells E35, F35, G35, H35, I35) is the area (ft^2) occupied by the storage pad upon which the bags are place. It is the product of Storage Pad Length by Storage Pad Width. The sum of all pad areas is provided in cell I35.