

# Storage Capacity for Grains, Forages and Liquids

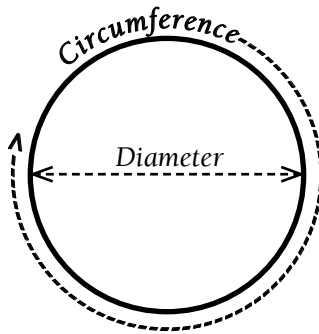
**Terms:**

**Diameter** - distance across a round structure

**Circumference** - distance around a round structure

**Pi** - Constant with an approximate value of 3.1416

**Density** - pounds of grain, forage or liquid contained in one cubic foot of storage space



**1. Round Grain Bin or Crib**

**Bushels** = Pi x 1/2 diameter x 1/2 diameter x average depth of grain (all in feet) x density, or

**Bushels** = (1/2 circumference / Pi) x (1/2 circumference / Pi) x average depth of grain (all in feet) x Pi x density

**Average depth of grain** = height of grain on the outside wall of the bin plus one-third the height of the grain "cone" (from the top of the grain on the outside wall to the highest tip in the center)

**Density** = 0.8 bushels per cubic foot for *corn or soybeans*

**Density** = 0.628 bushels per cubic foot for *ear corn*

Short versions:

**Bushels** = 0.628 x diameter x diameter x average depth of grain (all in feet) for *shelled corn or soybeans*

**Bushels** = 0.314 x diameter x diameter x average depth of grain (all in feet) for *ear corn*

**2. Rectangular Bin or Crib**

**Bushels** = width x length x average depth of grain (all in feet) x density (same values as previous)

**3. Upright Silo**

**Bushels** = Pi x 1/2 diameter x 1/2 diameter x depth of grain (all in feet) x density x (1 - % moisture) / .845, for *number 2 shelled corn or ground ear corn*

**Tons of dry matter** = Pi x 1/2 diameter x 1/2 diameter x depth of (all in feet) x density / 2,000, for *corn silage or haylage*

**Tons of wet silage or haylage** = tons of dry matter / (1 - % moisture)

**Density** = 0.8 bushels per cubic foot for *corn or soybeans*

**Density** = 0.515 bushels per cubic foot for *ground ear corn*

**Density** = 8.0 + (0.15 x depth of silage) (in feet) = tons of dry matter per cubic foot for *corn silage* (density increases with the depth of the silage)

**Density** = 5.90 + (0.1 x depth of haylage) (in feet) = tons of dry matter per cubic foot for *haylage* (density increases with the depth of the haylage)

Short versions:

**No. 2 Bushels** = 0.7436 x diameter x diameter x average depth of grain (all in feet) x (1 - % moisture) for *shelled corn*

**No. 2 Bushels** = 0.4787 x diameter x diameter x average depth of grain (all in feet) x (1 - % moisture) for *ground ear corn*

**Tons of dry matter** =  $0.000393 \times \text{diameter} \times \text{diameter} \times \text{average depth of silage (all in feet)} \times (8.0 + (0.15 \times \text{depth}))$  for *corn silage*

**Tons of dry matter** =  $0.000393 \times \text{diameter} \times \text{diameter} \times \text{average depth of silage (all in feet)} \times (5.90 + (0.1 \times \text{depth}))$  for *haylage*

**Tons of wet silage or haylage** = tons of dry matter / (1 - % moisture)

#### 4. Bunker (Trench) Silo

**Tons of dry matter** = Length x width x depth of *corn silage* (all in feet) x density / 2,000

**Density** =  $7.5 + (0.4 \times \text{depth of silage (in feet)})$   
= tons of dry matter per cubic foot for *corn silage* (density increases with the depth of the *silage*)

**Density** =  $5.4 + (0.28 \times \text{depth of haylage (in feet)})$   
= tons of dry matter per cubic foot for *haylage* (density increases with the depth of the *haylage*)

**Tons of wet silage or haylage** = tons of dry matter / (1 - % moisture)

#### 5. Stack or Storage Shed, Small Square Bales

**Tons** = length x width x height (all in feet) x density / 2,000

**Density** = 6 to 8 pounds per cubic foot for *hay*

**Density** = 4 to 5 pounds per cubic foot for *straw*

#### 6. Large Round Bales

**Pounds** =  $3.1416 \times (\frac{1}{2} \text{ diameter} / 12) \times (\frac{1}{2} \text{ diameter} / 12) \times (\text{width} / 12)$  (all in inches) x density

**Density** = 10 to 12 pounds per cubic foot for *hay*

**Density** = 5 to 7 pounds per cubic foot for *straw*

**Density** = 9 to 11 pounds per cubic foot for *corn stover*

Short version:

**Pounds** =  $0.0004545 \times \text{diameter} \times \text{diameter} \times \text{width}$  (all in inches) x density

#### 7. Large Square Bales

**Pounds** =  $(\text{length} / 12) \times (\text{width} / 12) \times (\text{height} / 12)$  (all in inches) x density

**Density** = 10 to 14 pounds per cubic foot for *hay*

**Density** = 6 to 8 pounds per cubic foot for *straw*

**Density** = 10 to 12 pounds per cubic foot for *corn stover*

Short version:

**Pounds** =  $0.0005787 \times \text{length} \times \text{width} \times \text{height}$  (all in inches) x density

#### 8. Water and Fuel Tanks

**Cylindrical: Gallons** =  $3.1416 \times \frac{1}{2} \text{ diameter} \times \frac{1}{2} \text{ diameter} \times \text{length}$  (all in feet) x 7.5 gallons per cubic foot

**Rectangular: Gallons** = length x width x height (all in feet) x 7.5 gallons per cubic foot

**Weight** = gallons x pounds per gallon

**Weight** = 8.33 pounds per gallon for *water*

**Weight** = 7.15 pounds per gallon for *diesel fuel* (at room temperature)

**Weight** = 6.15 pounds per gallon for *gasoline*

Reference: American Society of Agricultural and Biological Engineers Yearbook.

Decision Tool C6-82, [Estimated Storage Capacity for Grains, Forages, and Liquids](#) can be used to estimate storage capacity.

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