



# How Much Feed Do We Have?

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## **Overview:**

You are an employee of Green Valley Dairy and your job is to determine the mass of the company's corn silage pile. Your boss knows that this pile is the limiting factor as to whether or not he can add animals to the herd. He is contemplating adding 500 head of cattle and needs to make sure there is enough feed in storage before they make the expansion...don't mess up your measurements and calculations, as this is pivotal information.

## **Featured Externship Business:**

[Green Valley Dairy, Krakow, WI](#)

## **Subject:**

Physical Science, Physics, or High School Math

## **Grade Level:**

9-12

## **Learning objectives:**

*After doing this activity, students should be able to:*

- Relate mass, volume and density
- Apply volume calculations real life situation
- Develop problem solving skills both individually and collaboratively

## **Workplace Readiness Skill:**

x Social Skills

x Teamwork

Attitude and Initiative

Professionalism

x Communication

x Critical Thinking

x Planning and Organization

Media Etiquette

## **Type of Activity:**

x Individual

x Small group

x Whole class

## **Next Generation Science Standards:**

NGSS MS-PS1-Matter and its interactions.

NGSS HS-ETS1-2-Designs a solution to a complex real world problem by breaking it down into smaller more manageable problems that can be solved through engineering.

**Common Core State Standards - Math:**

CCSS.MATH.CONTENT.7.G.B.6

Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

CCSS.MATH.CONTENT.8.G.C.9

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

**Time:**

2 Class Periods as pre-field day organization

4 hours on site

1 class period to finish recommendation

1 class period to present recommendation and wrap-up with Green Valley Dairy affiliate

**Materials:**

- Trundle wheel
- Inclinator
- 100-300 foot tape measures
- Portable balance
- Plastic bags
- Small tape measure (25 foot)
- calculator

**Directions:**

Two class periods:

1. Assign problem and have class brainstorm ways to determine as well as simplify work when we get on site.
2. Break class into groups that will be responsible for determining volume of different portions of pile, ie rectangular center, triangular prism sides and ends, and the ever-difficult corners. There will also be one group responsible for determining the density of material. The final group is titled "Project Foreman," and all reporting and planning must pass this group's approval.
3. Each group must devise a plan to determine the volume of their sector as well as key points of communication needed between their group and neighboring sector groups. This must be reported to the foreman group for approval.
4. Once all plans are intact, the group is ready for onsite work.

Four-hour on-site visit:

5. Go to Green Valley Dairy and attain field measurements and complete all calculations.

One class period:

6. Take calculated volume and mass measurements and compare to daily demand per cow, present number of cattle, and proposed expanded number of cattle.
7. Create final written recommendation for expansion which would be presented to a Green Valley Dairy affiliate.

### **Wrap-Up:**

One class period:

8. Groups will present recommendation and wrap-up with a Green Valley Dairy affiliate.

### **Extension Activity:**

Determine the maximum surface load on pad from pile, including equipment at time of pile packing and suggest correct sub-strata and thickness of pad for feed-pile.



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