



Minnesota Agriculture in the Classroom

Meadow Star Dairy Pre-teaching Guide

Virtual Field Trip: Meadow Star Dairy
May 18, 2017 10 AM

Lessons that relate to the Virtual Field Trip

K-2

[Milk or Meat? Dairy or Beef?](#)

Students will identify the differences between beef and dairy cattle and determine the commodities produced by each type of cattle.

3-5

[Cowabunga! All About Dairy Breeds](#)

In this lesson, students will understand breed characteristics and countries of origin for five different breeds of dairy cattle. Students will discover why dairy farmers choose individual breeds for specific purposes. **(Meadow Star Dairy has Holstein and Jersey cows.)**

[Milk Makin Math](#)

In this lesson, students will learn about the numerous career opportunities involved in the dairy industry. They will also practice real world math problems related to specific careers within the industry. **(Meadow Star Dairy employs all of these careers!)**

6-8

[FoodMaster: Cheese](#)

Students will learn about the Law of Conservation of Mass by exploring environmental factors that can impact protein coagulation in milk (cheese-making process). By making qualitative and quantitative observations they will test three possible methods of making curds and whey.

Resources that relate to Virtual Trip

[Dairy Commodity Page on AgMag website](#)

[Winter AgMag Spread](#)

Vo-cow-bulary:

Dry Cow- cows are not milked for the last 2 months of their pregnancy

silage- a mixture of chopped hay and corn

teat- one of the 4 nipples on the cow's udder where milk comes out

udder- part of the cow where milk is stored

milker- machine that sucks the milk out of the cows teats

parlor- a building where cows are milked

TMR- (or Total Mixed Ration) the blending of all feedstuffs into a complete ration to meet the nourishment needs of dairy cows

manure- barnyard animal feces



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fertilizer- special nutrients put into the ground to feed and make plants grow

heifer- a young female cow

Breeds of Cows

90% of the milk in the U.S. comes from Holstein cows- Meadow Star Dairy has more Jersey cows than Holsteins. Find out why during the Virtual Field Trip.

The most common breeds are:

- Holstein (black and white)
- Jersey (yellowish-brown)
- Guernsey (tan & white)
- Brown Swiss (dark brown or gray)
- Ayrshire (white with reddish spots)

Vital Statistics

Gender	Female
Height	5- 5 1/2 ft
Weight	1400 lbs
Body Temp.	101.5
Amt. of Milk	70-100 lbs/day

Cow Eating Habits

Cows eat a Total Mixed Ration (TMR). This ensures that each bite consumed contains the required level of nutrients (energy, protein, minerals and vitamins) needed by the cows. Dairy nutrition is a complex science. Feeding cows a TMR ultimately increases production, reproduction, and herd health. With this diet a more uniform milk is produced. Dairy cows are creatures of habit. Feeding consistency, quality of feed, timing and method of delivery, and feeding facilities all have a major influence on milk production. Each day a cow that is milking will eat about 100 lbs of feed.

A 4-Part Stomach

Cows have a unique digestive system:

- Cows swallow food quickly without chewing it well.
- The food goes into the first and second stomachs- the rumen and the reticulum.
- When the cow has eaten her fill, she burps up a small amount of food- cud- to chew again.
- After chewing her cud thoroughly, she swallows it and it goes into the 3rd stomach- the omasum.
- From there it moves on to the 4th stomach- the abomasum- where digestion actually occurs.
- Cows spend 6-7 hours a day eating.
- A cow's body uses part of the food to grow and stay healthy. Her body uses another part of the food to make milk in the udder.
- It takes the cow's body about 2 days to process her food into milk.

Circle of Life



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Now that you know how much a cow eats you can just imagine how much manure one cow can make! One cow can produce about 80 pounds of manure per day. All that manure can be used to grow feed for the cows. The manure from the cows can be used to fertilize corn, hay and soy beans that will one day be food for the cows!

Cows as Milk Producers

- All cows are female. Like humans, they cannot produce milk until they give birth.
- Cows usually have their first calf when they are 2 years old. The gestation time for a calf is 9 months. 95% of the pregnancies result in one calf.
- Cows are usually milked for 305 days (10 months) after giving birth.
- Then they are allowed to "dry off" for about 2 months until their next calf is born.
- To dry off a cow, the farmer stops milking her. This gives her body the cue to stop producing more milk.
- Most cows are milked for about 5 or 6 years.
- Dairy Cows produce an average of about:
 - 40 pounds of milk in one milking.
 - 80 pounds of milk per day.
 - 26,000 pounds of milk per year.

Milking Cows

Cows respond best to patient, kind handling and regular, routine procedures. Cows are milked at Meadow Star Dairy 24 hours a day.. Cows enjoy being milked- they are uncomfortable when their udder is too full.

First, the cows udder and teats are washed before she is milked. This is done to:

- Keep the milk clean.
- Send a signal to her brain to "let down" the milk. Then a milker is attached to the cow's 4 teats.
- The milker doesn't hurt the cow.
- The vacuum of the milker gently squeezes out the milk- similar to the sucking calf or a baby sucking its thumb.
- Cows at Meadow Star are milked for 6 minutes and spend 8 minutes total on the carousel.
- Meadow Star uses computers to keep track of how much milk a cow produces at each milking.
- The first milker machine was patented in 1894. With milkers farmers can milk about 100 cows an hour.
- Before then, cows were milked by hand. A farmer could milk about 6 cows an hour by hand.

Storing Milk

Once outside the cow, milk is never exposed to air because it has no protection from contaminants. That is why clean equipment and sanitation are so important.

Pump It



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1. Sanitized pipelines carry milk straight from the cow and milker to the cooler.
2. Milk is never touched by human hands.

Cool It

- Milk comes out of the cow warm- at the cow's body temperature.
- It is quickly cooled in refrigerated storage tanks to 45° F or cooler to keep it fresh and good tasting.
- Milk is stored in the refrigerated tank until the milk truck comes.
- Milk trucks come to to pick up the milk.
- Milk is pumped into the insulated milk truck- which is like a giant refrigerator on wheels.
- The milk truck keeps milk fresh and cold on its way to the dairy processing plant. All of the milk from Meadow Star cows goes to Litchfield to make cheese.