

# The Roots of Agriculture

Name: \_\_\_\_\_

## Directions:

Underline a fact you thought was interesting

**Circle** a fact you would like to know more about

Label with a **?** a fact that you have a question about

Label with a **+** a fact about something positive in our history

Label with a **-** a fact about a challenge in our history

**Agriculture** means working with the soil, producing crops, and raising livestock. The word agriculture is the English adaptation of the Latin word agricultura, from ager, a “field,” and cultura, “cultivation,” meaning “tillage of the soil.”

The earliest known cattle to set foot in Wyoming came in 1830 with a party of mountain men led by William Sublette. They drove several beef cattle and a milk cow to the fur trader’s rendezvous on the Wind River in what is now Fremont County. In 1842, John Fremont, an explorer, noted the countryside around Ft. Laramie was well suited to grazing. Seth Ward, a **sutler**, at Ft. Laramie, provided a much needed supply of fresh oxen that pioneers could trade out for their weary livestock.

In the early 1860s, the western half of the United States was open territory, which was sparsely populated. Most of these **inhabitants** were Native Americans from the many different tribes that lived in Wyoming. In an effort to encourage more settlement in the west, President Lincoln signed The Pacific Railroad Act and The Homestead Act in 1862. These laws led to the distribution of over 80 million acres of the country’s public ground by 1900. Many of the successful homesteaders became farmers and ranchers.

The development of the railroad provided opportunities for farmers and ranchers to **export** their cattle. The railroad was also used to export coal and timber. The increased sale of cattle brought enormous wealth, as well as conflict to Wyoming. Cattlemen, sheepmen, settlers, and Native Americans endured much conflict over land use.

In 1890, when Wyoming became the 44<sup>th</sup> state, the **census** showed 3,125 farms and ranches in Wyoming. That was an increase of 2,668 in 10 years. In the early 1900s, the sheep industry **surpassed** the cattle industry. By 1910, there were 11,000 farms and ranches in Wyoming. Small family farms and ranches began to decline just before 1920 when **modernization** of farm equipment encouraged larger **commercial** operations. By the 1950s, there were fewer and fewer farms and ranches. The farms and ranches that did survive became larger. Many are still family owned and operated today.

In the late 1900s, several events occurred that affected farming and ranching in Wyoming. As technology continued to advance, production increased and the need for manual labor decreased. There was a massive movement from **rural** to **urban** areas, which caused some cultural changes.



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# The Roots of Agriculture

For example, instead of going out to milk the family cow or gather eggs from the chickens each morning, people used grocery stores to supply everyday needs.

Wyoming is still one of the few states in the country with agriculture at its core. Approximately 90% of land in Wyoming is described as rural. About a third of the population lives in rural communities, and their primary source of income is from farming and ranching. Wyoming has over 30 million acres of agricultural land consisting of 11,000 farms and ranches. The average farm and ranch size is 2,621 **acres**. The population of livestock far exceeds the amount of people in the state. Recent estimates suggest over one million cattle and more than 350,000 sheep. The production of beef cattle is

the biggest part of Wyoming's agriculture industry. Other important **commodities** include hay, barley, wheat, corn, and sheep. Farmers also grow sugarbeets and raise hogs, horses, and honeybees. It's one of the top three main industries along with minerals and tourism.

The primary natural resources in Wyoming agriculture are water, soil, and rangeland. Farmers and ranchers carefully steward these renewable resources to ensure they are available for future generations.

## Terms to Know:

**Acre** - a unit of land area (about the size of a football field)

**Agriculture** - cultivating of the soil, producing of crops, and raising of livestock

**Census** - the official process of counting the number of people in a country, city, or town, and collecting information about them

**Commercial** - buying and selling of goods and services

**Commodities** - something of use, advantage, or value

**Export** - to send a product to be sold

**Inhabitant** - a person or animal that lives in a particular place

**Modernization** - to make something modern and more suited to present styles or needs

**Rangeland** - land used for livestock and/or wildlife grazing

**Rural** - living outside of a city

**Stewardship** - As Wyoming citizens, we are stewards entrusted with the responsible development, care, and use of our resources to benefit current and future generations.

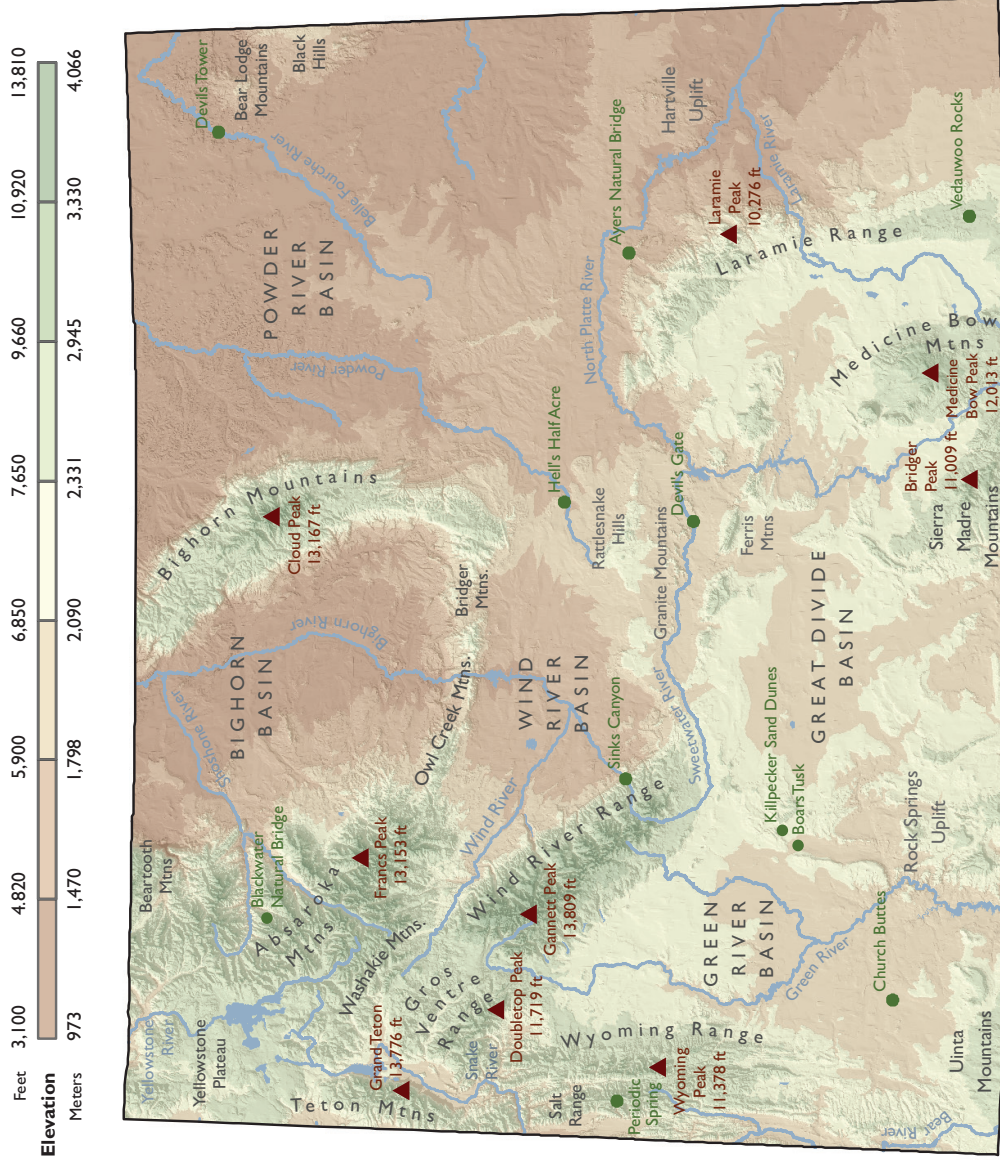
**Surpassed** - to be better or greater than someone or something

**Sutler** - a person who followed an army or maintained a store on an army post to sell to soldiers

**Urban** - living in a city



# Physiographic features



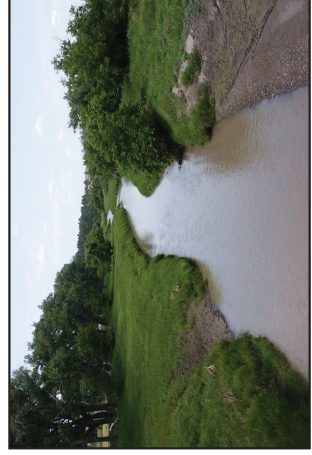
The eastern part of Wyoming is dominated by high plains. The middle and western parts of the state have several distinct ranges of the Rocky Mountains, divided by large basins. Even the basins have relatively high elevations, averaging 6,200 feet (1,890 meters). Wyoming's basins include many remarkable natural features such as the Killpecker Sand Dunes, one of the largest active dune systems in North America.

- ▲ Highest peak in each mountain range
- Other natural landmarks

The highest point in Wyoming is Gannett Peak at 13,809 feet (4,209 meters), in the Wind River Range. There are more than 40 other named peaks taller than 13,000 feet in the Wind River Range, including many near the Titcomb Basin, pictured below.

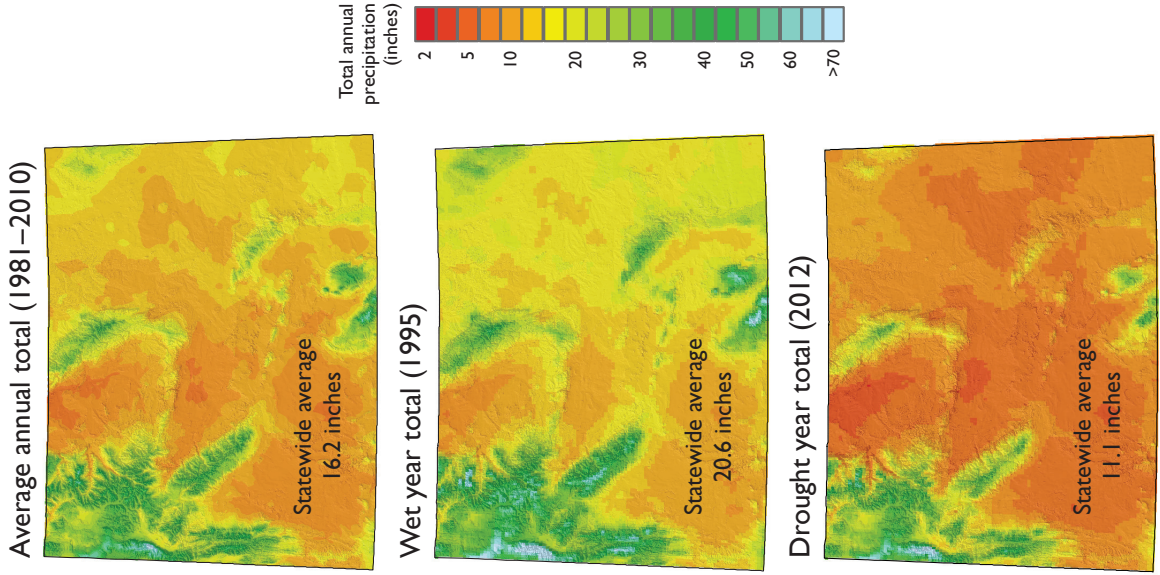
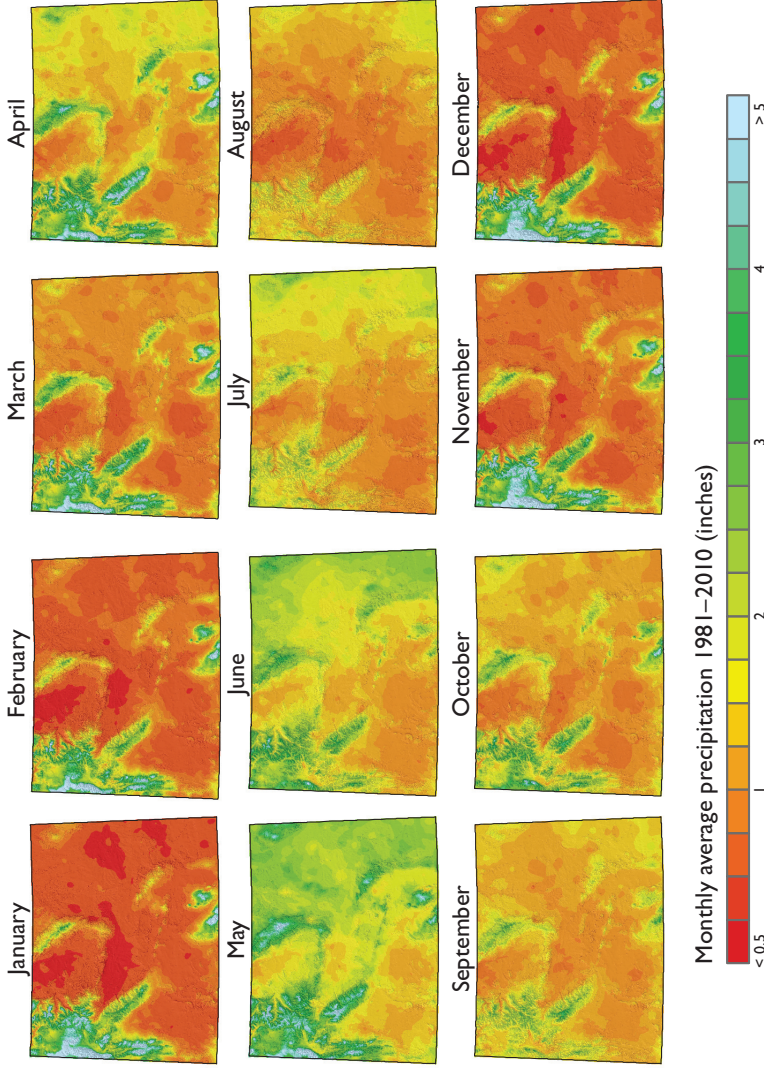


The lowest point in the state is where the Belle Fourche River flows out of Wyoming into South Dakota, at 3,099 feet (945 meters).



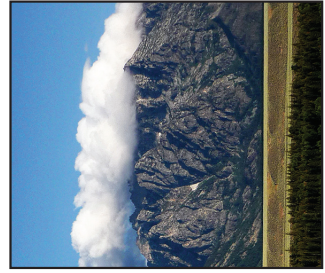
\*reprinted from the Wyoming Student Atlas





### Wyoming's mountains: Islands of moisture

When air masses encounter barriers like mountain ranges the air is forced up and over them in a process known as orographic lift. As air rises it cools and cannot hold as much water, so precipitation falls. This explains why Wyoming's lowlands are dominated by shrubs and grasses, but its mountain environment supports trees such as conifers and aspens.



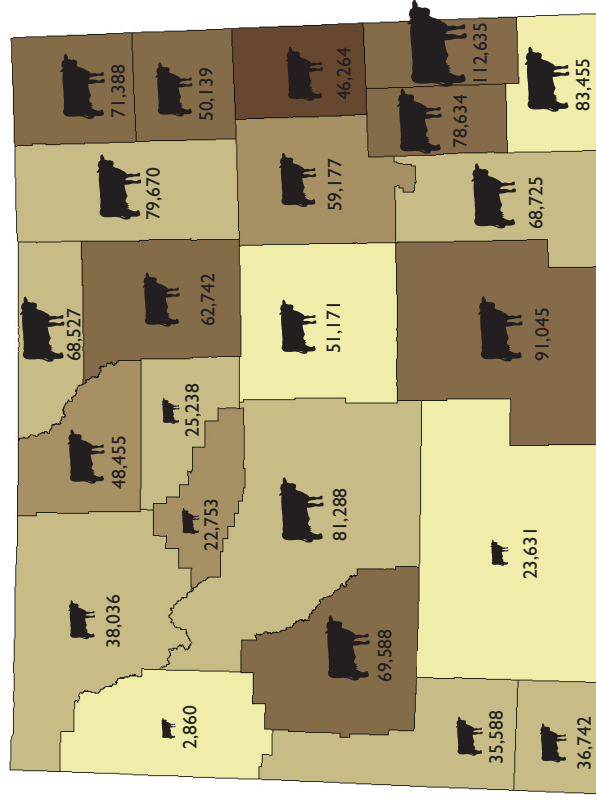
### Annual precipitation

The threshold for growing most non-irrigated crops is 20 inches of precipitation per year. Most western states, including Wyoming, fall well below this average even during wet years. Droughts in Wyoming occur with some regularity. In 2012, Wyoming experienced its driest year on record with an increase in wildfires and economic hardship for the state's ranchers and hay producers.

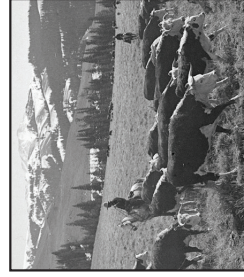
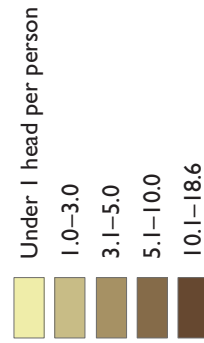
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### Number of cattle (2012)

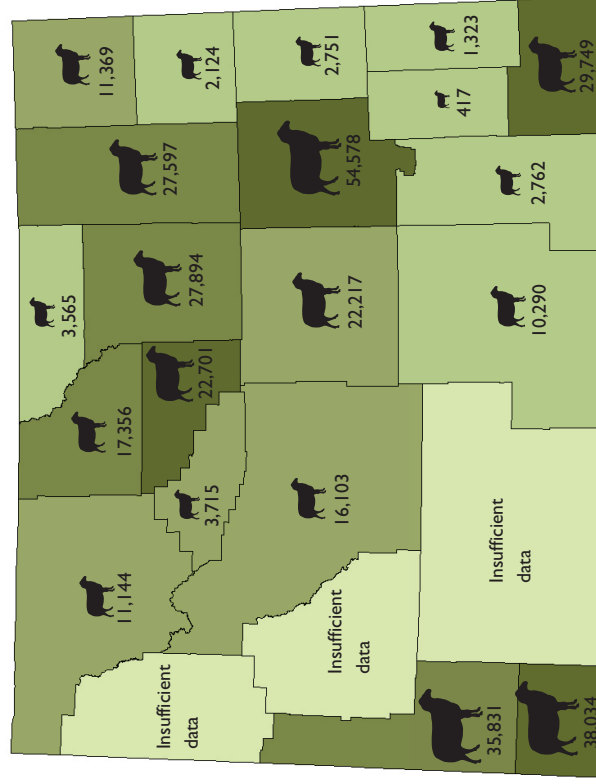


### Cattle-to-human ratio

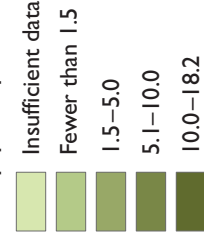


Much of Wyoming's agricultural land is too dry and cold for crop production but can support grazing animals. The expansion of the railroad to western states in the 1860s allowed cattle to be produced in Wyoming and shipped back east. Today the total cattle population in Wyoming is over 1.3 million, outnumbering people by more than two to one.

### Number of sheep (2012)



### Sheep per square mile



Though Wyoming's sheep totaled only 350,000 in 2012, the state has a long history of wool and meat production. During the mid-to-late 1800s, several ranchers purchased cheap land and struck it rich by raising sheep. As late as World War II, the state was home to four million sheep. Historically, sheep herders lived in horse-drawn wagons like the one pictured.

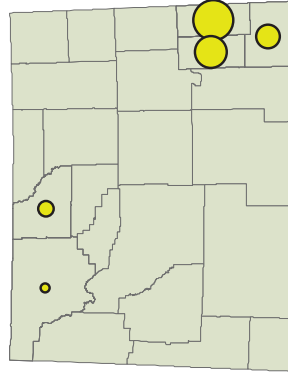
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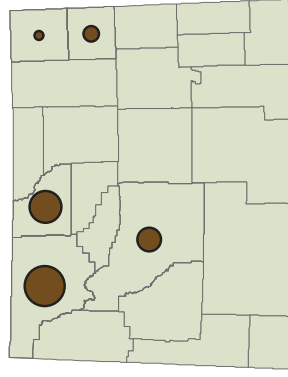


## Crop production (2012)

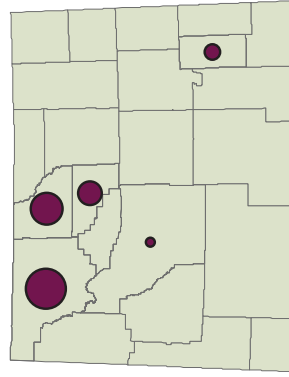
Top five producing counties for each major Wyoming crop



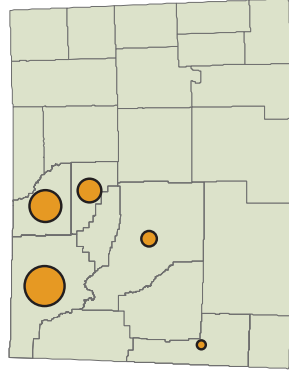
County	(bushels)
Goshen	4,185,288
Platte	1,149,935
Laramie	1,097,886
Big Horn	761,569
Park	587,736



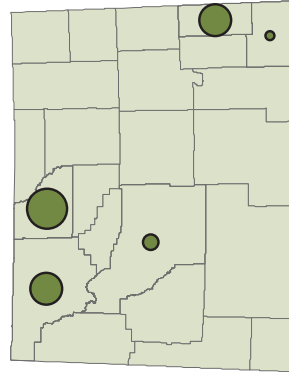
County	(bushels)
Park	74,638
Big Horn	61,587
Fremont	36,692
Weston	22,700
Crook	21,889



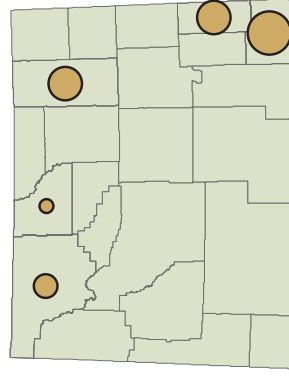
County	(tons)
Park	364,368
Big Horn	206,850
Washakie	164,297
Platte	55,763
Fremont	33,672



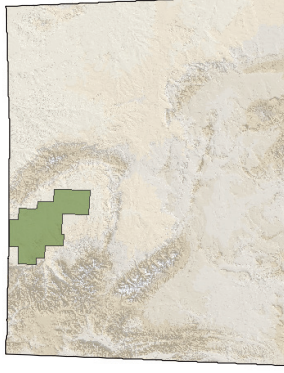
County	(bushels)
Park	1,892,657
Big Horn	1,194,746
Washakie	1,170,672
Fremont	413,290
Lincoln	373,967



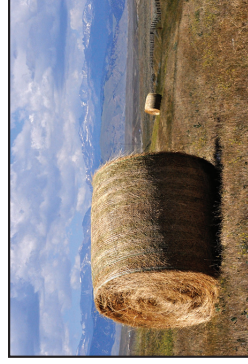
County	(tons)
Big Horn	12,252
Park	10,257
Goshen	8,872
Fremont	7,173
Laramie	6,623



County	(bushels)
Laramie	2,223,584
Goshen	607,785
Campbell	184,676
Park	152,209
Big Horn	136,500



Twenty-seven percent of the state's crops are grown in the Bighorn Basin, which includes sections of Big Horn, Washakie and Park counties. This area is relatively low in elevation and receives fewer days of frost, resulting in a longer growing season. It is also heavily irrigated with water from Buffalo Bill Reservoir.



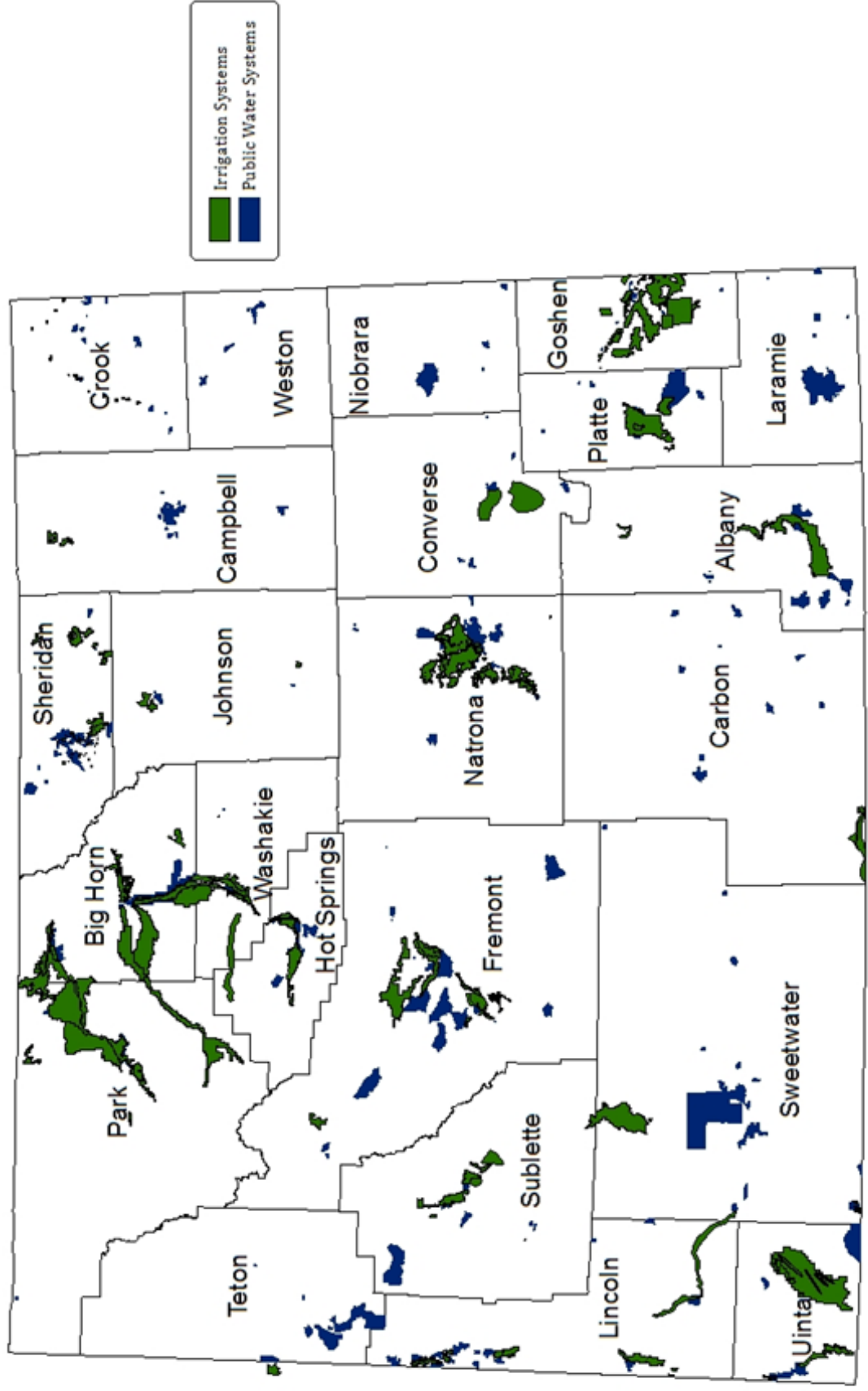
Though Wyoming produces a diverse variety of row crops, the most common "crops" are animal forages such as hay and alfalfa. These forages are suited to the dry, cool climate of Wyoming and are produced in every county of the state.

\*reprinted from the Wyoming Student Atlas



# Irrigation Map

## Wyoming public water and irrigation systems



Produced by the Water Resources Data System (<http://www.wrds.uwyo.edu/>), April 2017

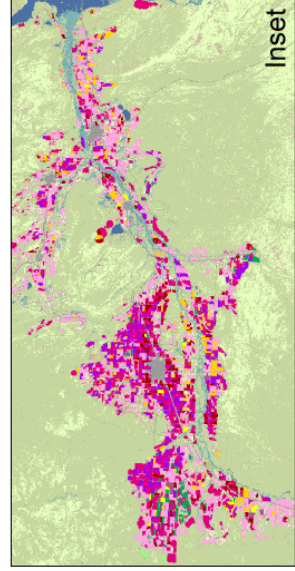
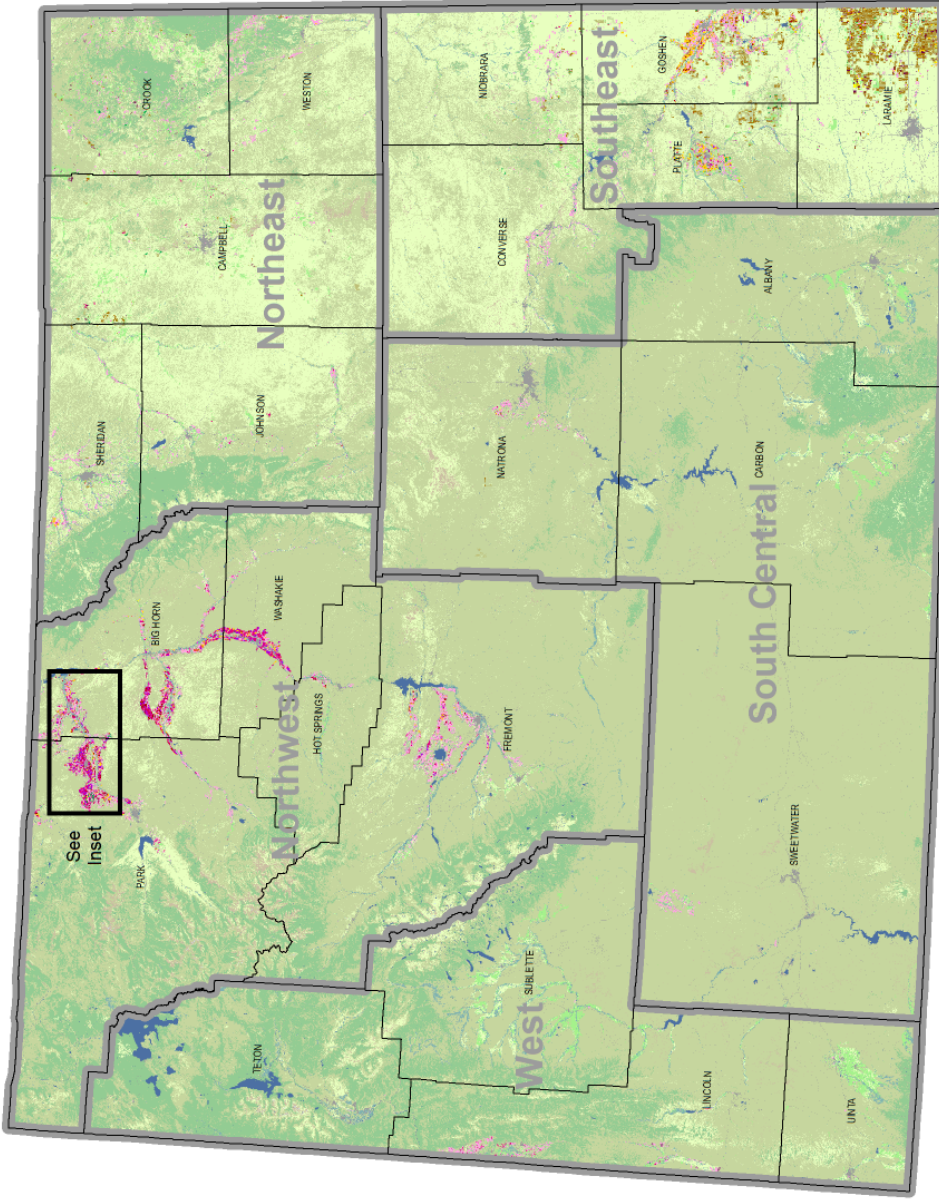
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# 2015 Wyoming Cropland Data Layer



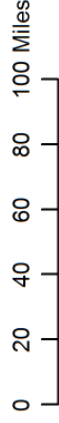
## Land Cover Categories (by decreasing acreage)

### AGRICULTURE

- Grassland/Pasture
- Other Hay/Non Alfalfa
- Alfalfa
- Fallow/Idle Cropland
- Winter Wheat
- Barley
- Corn
- Sugarbeets
- Dry Beans
- Other Crops
- Millet
- Oats
- Sunflower

### NON-AGRICULTURE

- Shrubland
- Forest
- Wetlands
- Barren
- Developed
- Water
- Perennial Ice/Snow
- County Boundary
- ASB Boundary



Produced by: U. S. Department of Agriculture, National Agricultural Statistics Service, Research and Development Division, Spatial Analysis Research Section  
 Cropland Data Layer CropScape Website: <http://nassprod01a.ams.usda.gov/CropScape/>  
 Data Sources: Landsat 6OLI/TIRS, Dimos-1\*, UK-DMC2\* (Courtesy of USDA Foreign Agricultural Service)  
 Image Processing: Rulequest See5 and ERDAS Imagine  
 Ground Truth: The Farm Service Agency Common Land Unit for crops classes; 2011 National Land Cover Dataset (NLCD) for non-agricultural classes  
 Ancillary Data: NLCD Impervious Surface, NLCD Forest Canopy, National Elevation Dataset, NASS Crop Mask  
 Disclaimer: Small area crops may be less accurate, see CropScape metadata  
 Cartographic Generalization: Smaller categories combined with larger categories.  
 Projection: UTM zone 13, WGS84 datum.  
 Map Production: ESRI/ArcGIS 10.3.

\*reprinted from Wyoming Agriculture Statistics 2016



## 3-2-1 Exit Ticket

List three factors that impact where crops are grown.

- 1.
- 2.
- 3.

List two facts about which livestock are the most common in Wyoming.

- 1.
- 2.

Write a one sentence summary about how the topography of Wyoming effects where livestock and crops are raised.

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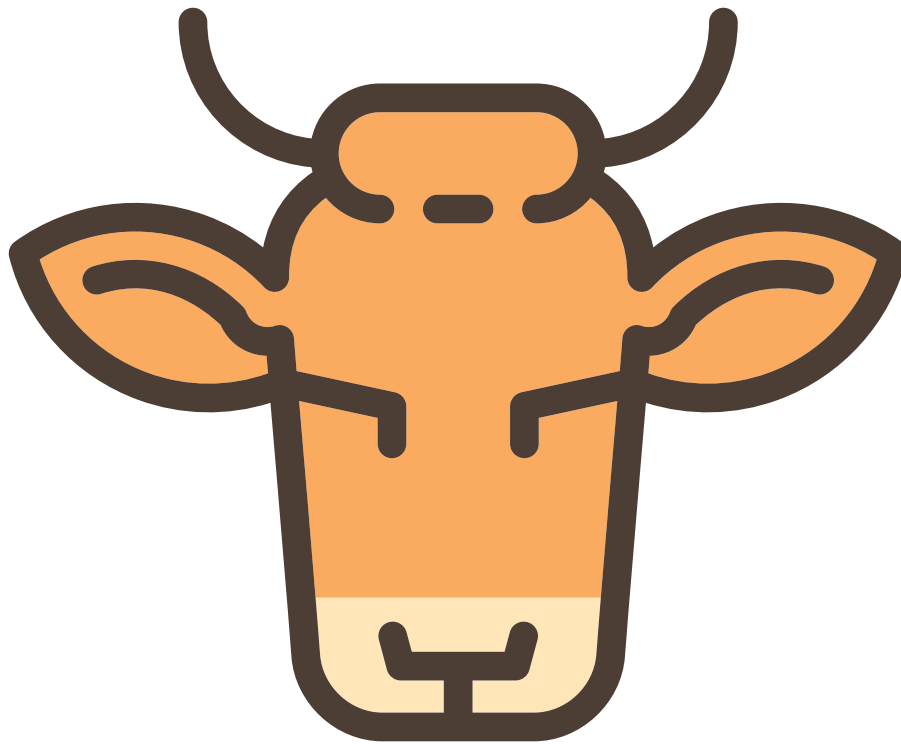
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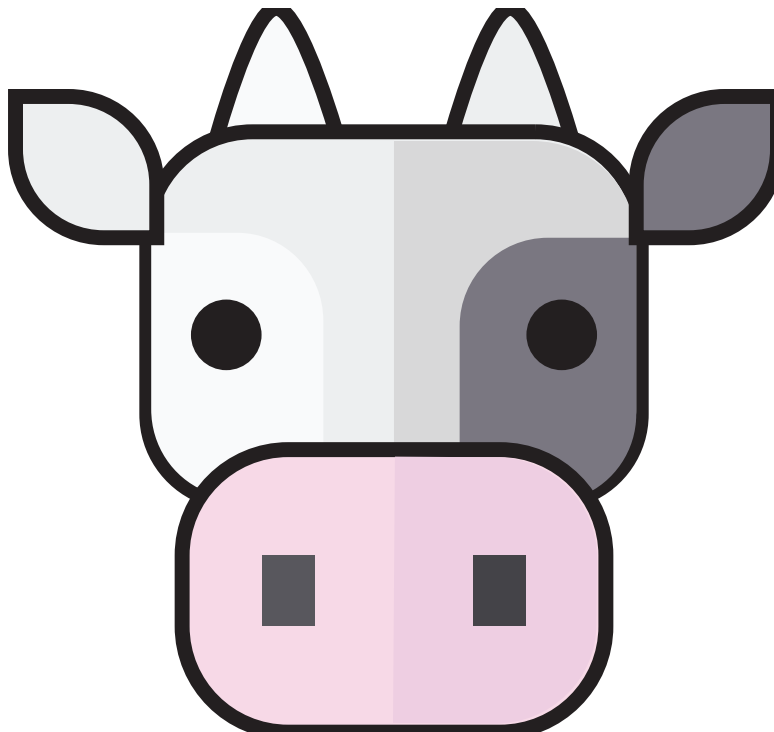
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## All About Beef

### Beef By-Products:

- Different cuts of beef:
  - Steak
  - Ground Beef
  - Roasts
- Gelatin
- Shampoo
- Marshmallows
- Footballs
- Furniture
- Make-up
- Gum
- Insulin

**A 1150 pound market steer yields about 500 pounds of beef!**

### What Kind of Work Do Cattle Ranchers Do?:

- Oversight and Maintenance
- Cow-calf raising
- Cowboying
- Wrangling

### Cattle Benefit the Environment:

- Grazing helps plants grow strong and healthy.
- Cattle aerate the ground by breaking it up with their hooves.
- Controlled and rotational grazing limit soil erosion while promoting grass and plant growth.

### Adapting for Their Environment:

- Cattle stay warm by eating more.
- Some cattle have a thicker hide and coat that regulate body temperature during hot summers and harsh winters.
- Cattle are even-toed, hooved mammals.
- Cattle are adapted for grazing with a wide mouth and specialized teeth for eating tough vegetation.
- Cattle have 32 teeth but no incisors or canines. Instead they have a gummy pad that is used to rip up grass.
- Cattle are ruminant animals, with 4 chambered stomachs that help them quickly eat and digest large quantities of tough grass.
- Breeds of cattle raised in Wyoming have bigger lungs to prevent heart failure in high altitudes.

## All About Dairy Cows

### Dairy By-Products:

- Milk
- Cheese
- Yogurt
- Ice cream
- Sour cream
- Cottage Cheese
- Condensed milk
- Meat - mostly ground beef when the cows no longer produce milk
- Gelatin
- Leather
- Cosmetics
- Paint
- Margarine

**A typical Dairy Cow produces about 7 gallons of milk each day!**

### What Kind of Work Do Dairy Farmers Do?:

- Oversight and Maintenance
- Herdsman
- Tanker Driver
- Milk Parlor Manager

### Dairy Cows Benefit the Environment:

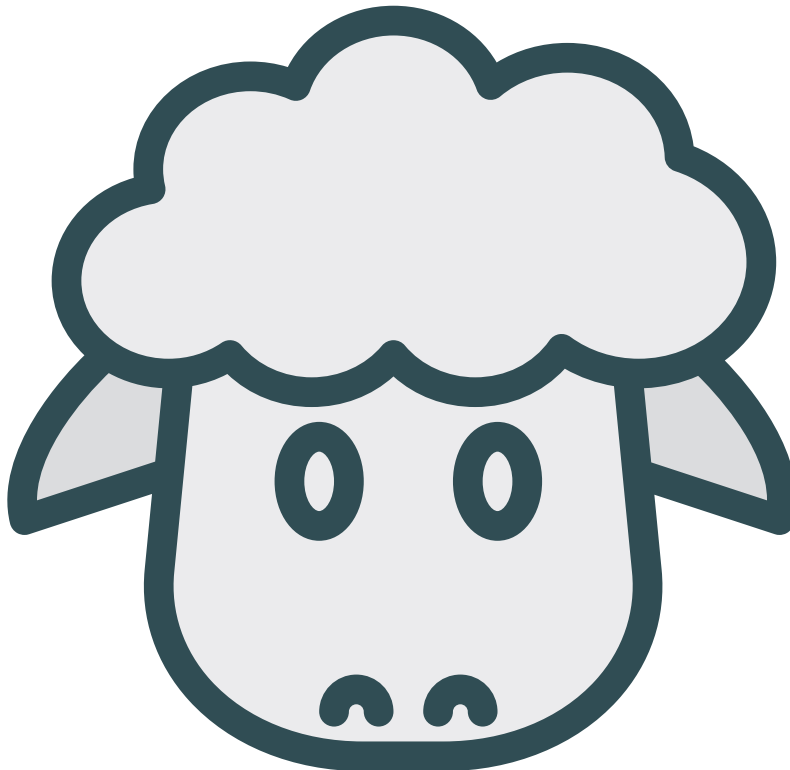
- New technology called a methane digester has been developed to collect methane gas. This methane is converted to electricity that can power the dairy and some homes.
- Manure is used to fertilize crops and grow nutritious food.

### Adapting for Their Environment:

- Dairy cows have the ability to sweat and regulate body heat through changing their respiration rate.
- Cattle are even-toed, hooved mammals.
- Cattle are adapted for grazing with a wide mouth and specialized teeth for eating tough vegetation.
- Cattle have 32 teeth, but no incisors or canines. Instead they have a gummy pad that is used to rip up grass.
- Cattle are ruminant animals, with 4 chambered stomachs that helps them quickly eat and digest large quantities of tough grass.



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## All About Goats

### Goat By-Products:

- Fiber (angora, mohair, cashmere)
- Milk
- Cheese
- Meat
- Hides (leather)
- Soap
- Baby Formula

**Goats are related to Pronghorn Antelope!**

### What Kind of Work Do Goat Ranchers Do?:

- Oversight and Maintenance
- Goat handler
- Milker
- Creamery Assistant

### Goats Benefit the Environment:

- Grazing goats can control invasive plants and noxious weeds, as well as helping with fire prevention.
- Goats aerate the ground by breaking it up with their hooves.

### Adapting for Their Environment:

- Goats can feed on weeds that are toxic to other animals.
- Goat's jaws are specially adapted to chew weeds and grasses.
- Goats are even-toed, hooved mammals.
- As herd animals, goats have a higher chance of survival.
- Horns help regulate a goat's body temperature.
- Due to their low body mass, goats have low metabolic requirements so they can survive where there is scarce food and/or water.
- Goats store water in their rumen for times when water is scarce.
- Goats are ruminant animals, with 4 chambered stomachs that help them quickly eat and digest weeds and tough grass.

## All About Sheep

### Sheep By-Products:

- Meat (lamb, mutton)
- Wool
- Lanolin
- Clothing
- Tennis Ball Covers
- Leather
- Chamois
- Tape
- Brushes
- Pet Food
- Milk
- Cheese

**Wyoming ranks 4<sup>th</sup> in the United States for sheep production!**

### What Kind of Work Do Sheep Ranchers Do?:

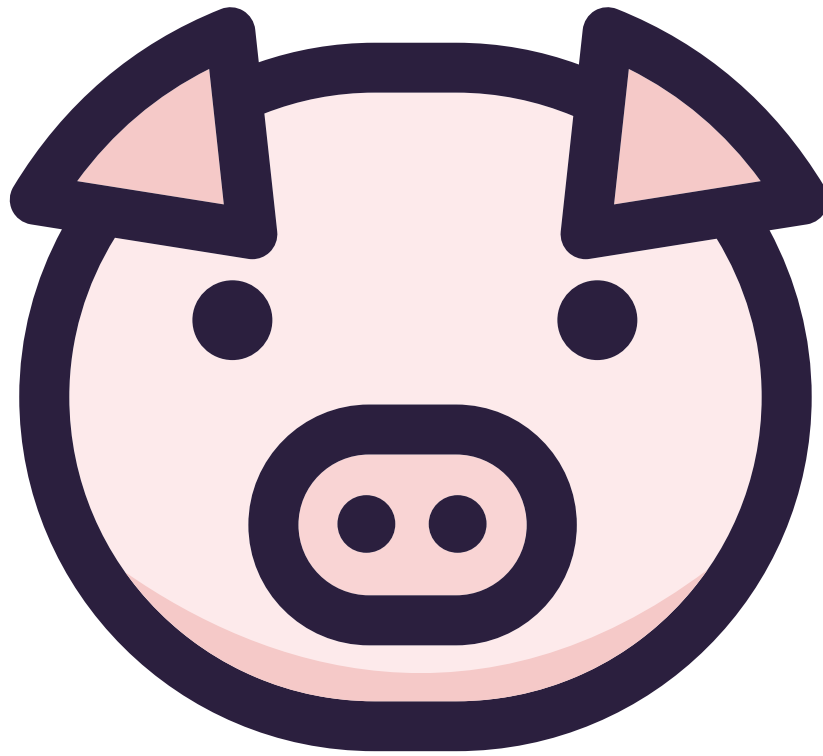
- Oversight and Maintenance
- Herding
- Shearing
- Breeding Livestock Guardian Dogs

### Sheep Benefit the Environment:

- Grazing sheep can control invasive plants and noxious weeds, as well as helping with fire prevention.
- Sheep aerate the ground by breaking it up with their hooves.

### Adapting for Their Environment:

- Sheep have wide-spaced eyes and rectangular pupils, giving them a large field of vision and helping them to see predators.
- Each sheep grows between 20 and 30 pounds of wool per year, which helps keep them warm in the winter.
- Sheep have a split upper lip and no teeth on their upper jaws to help them pull leaves of plants.
- Sheep are even-toed, hooved mammals.



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# All About Hogs & Pigs

## Hog & Pig By-Products:

- Different cuts of pork:
  - Sausage
  - Ham
  - Pork Chops
  - Bacon
  - Ribs
- Dog toys
- Lard
- Heart valves for humans
- Medicine
- Suede for clothes and shoes
- Gelatin
- Water filters
- Anti-freeze
- Make-up

**A 250 pound hog yields about 150 pounds of pork!**

## What Kind of Work Do Hog Farmers Do?:

- Oversight and Maintenance
- Farm Laborer
- Swine Herdsmen
- Swine Breeder

## Sheep Benefit the Environment:

- Hog manure contains a high amount of organic matter that helps fertilize soil.
- Hog manure and bedding can be mixed with the soil to improve organic matter content over time.

## Adapting for Their Environment:

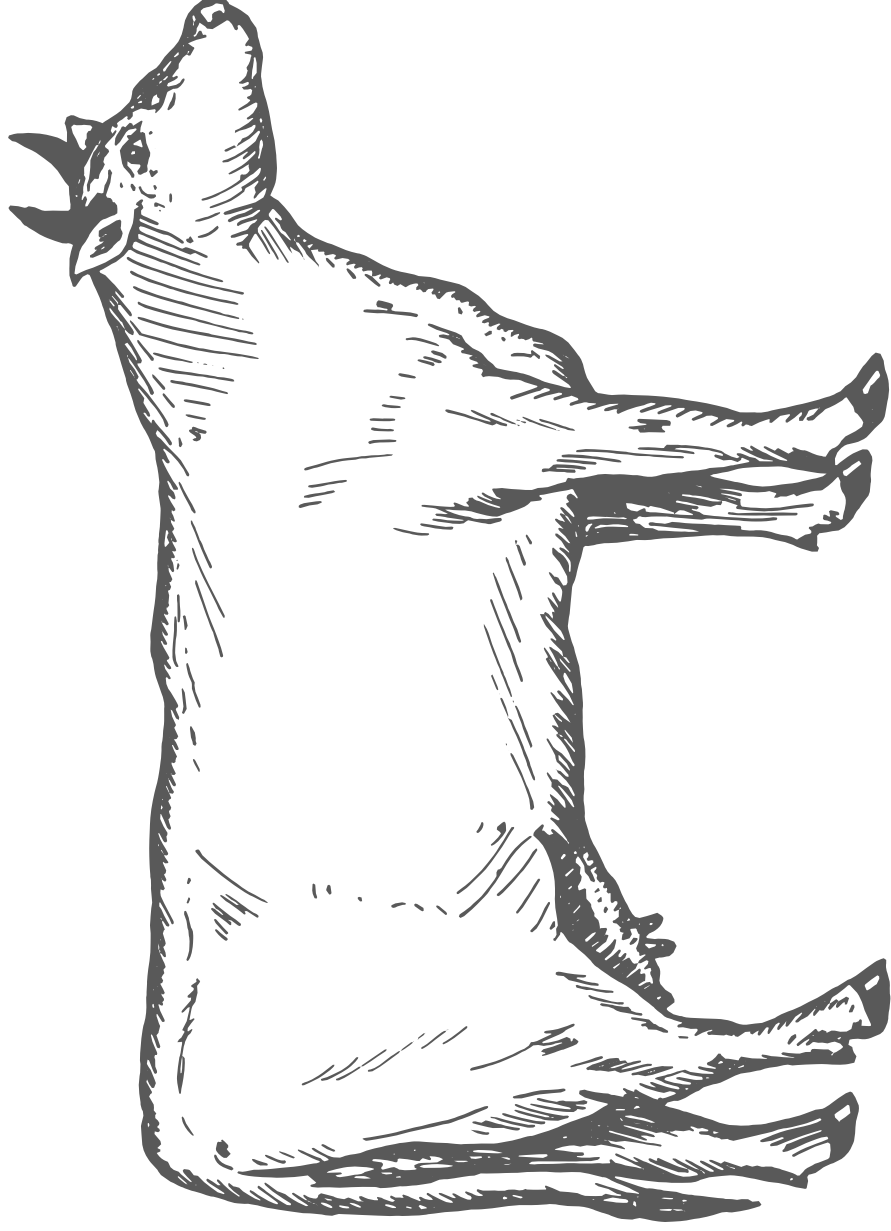
- Hogs' diet is composed mainly of corn, wheat, soy and barley; however, hogs are omnivores.
- Hogs raised in Wyoming have sparse, bristled hair, rather than the thick, woolly hair found on some breeds.
- Hogs are even-toed, hooved mammals.
- Hogs have a single-chambered stomach, and require more nutrition than grass or hay can provide.
- Hogs wallow or roll in mud to cool off, prevent sunburn, remove parasites, and prevent bug bites.
- Hogs have a unique bone in their nose for digging. They have a blunt upper lip which is a flexible disc that is made of cartilage, covered in skin, and has lots of tactile receptors.
- The few sweat glands pigs have are in their noses.

# Livestock Characteristics

## Beef Cattle

Group Members: \_\_\_\_\_

Directions: Label one internal or external structure that is important to this animal for survival in Wyoming, or a by-product and its use. Your response cannot be the same as another. All structures need to be labeled.







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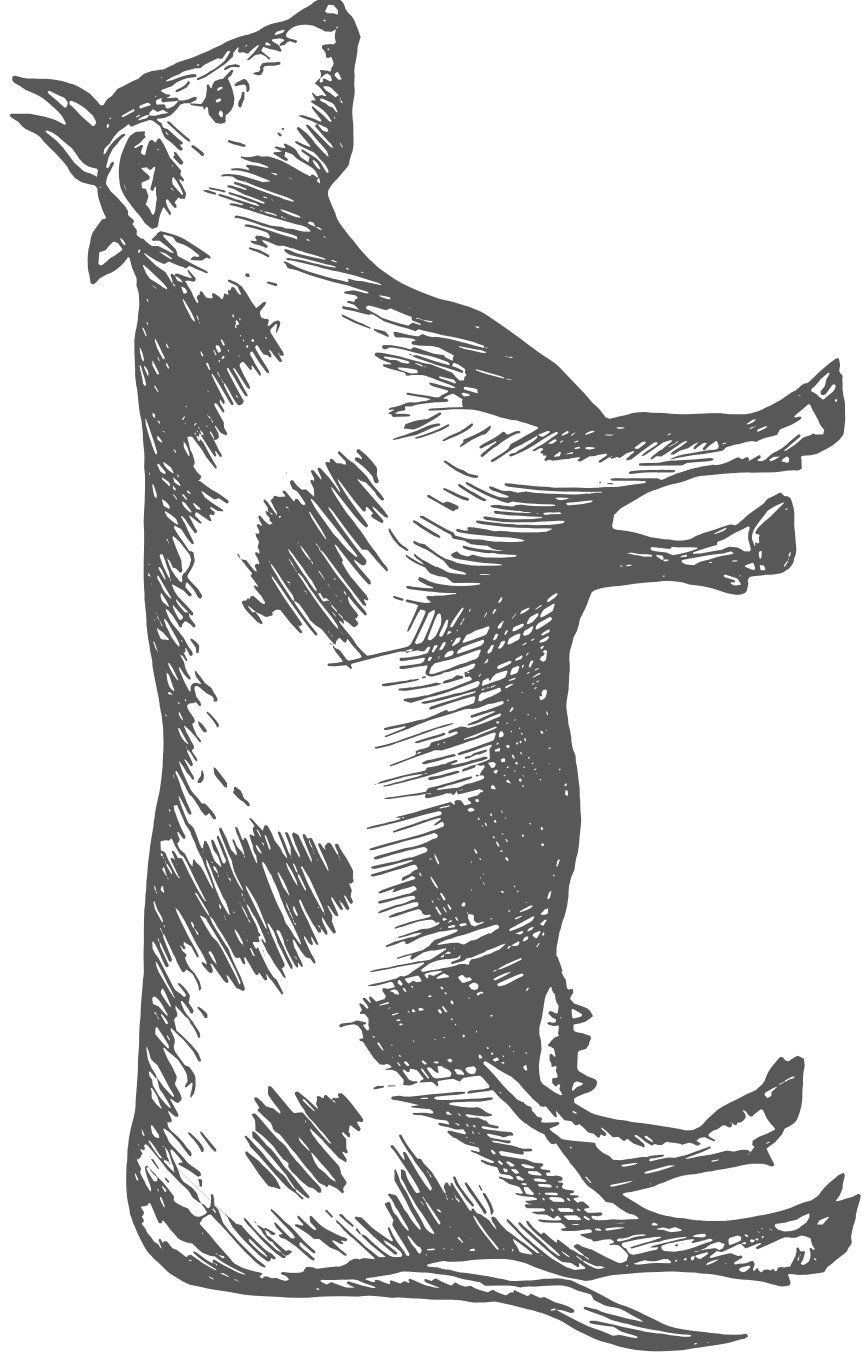
# Livestock Characteristics

## Dairy Cattle

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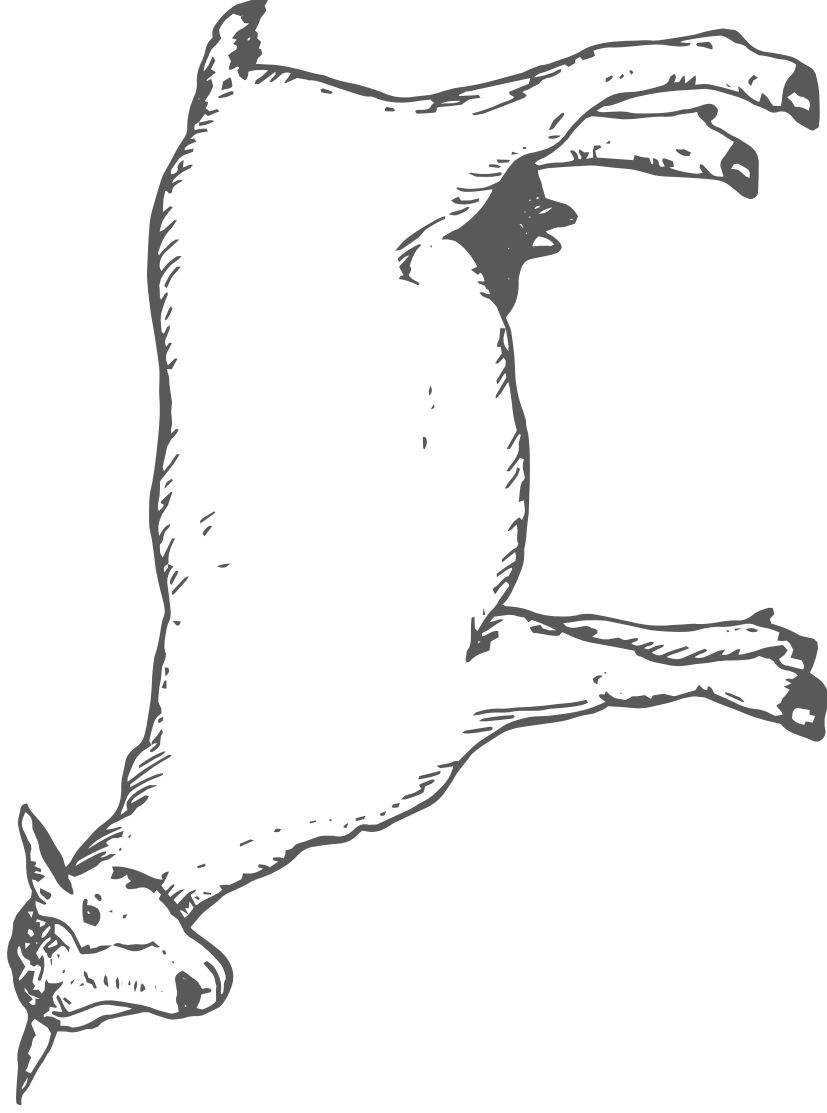


# Livestock Characteristics

## Goats

Group Members: \_\_\_\_\_

Directions: Label one internal or external structure that is important to this animal for survival in Wyoming, or a by-product and its use. Your response cannot be the same as another. All structures need to be labeled.



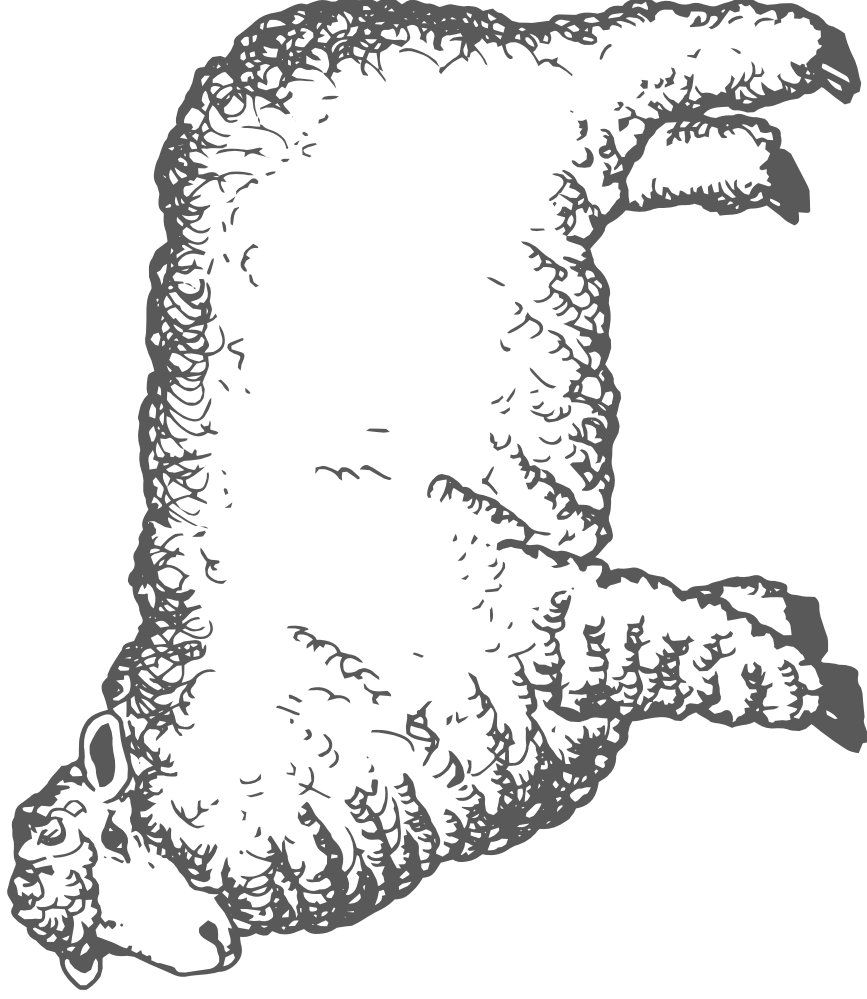


# \_\_\_\_\_ Livestock Characteristics \_\_\_\_\_

## Sheep

Group Members: \_\_\_\_\_

Directions: Label one internal or external structure that is important to this animal for survival in Wyoming, or a by-product and its use. Your response cannot be the same as another. All structures need to be labeled.





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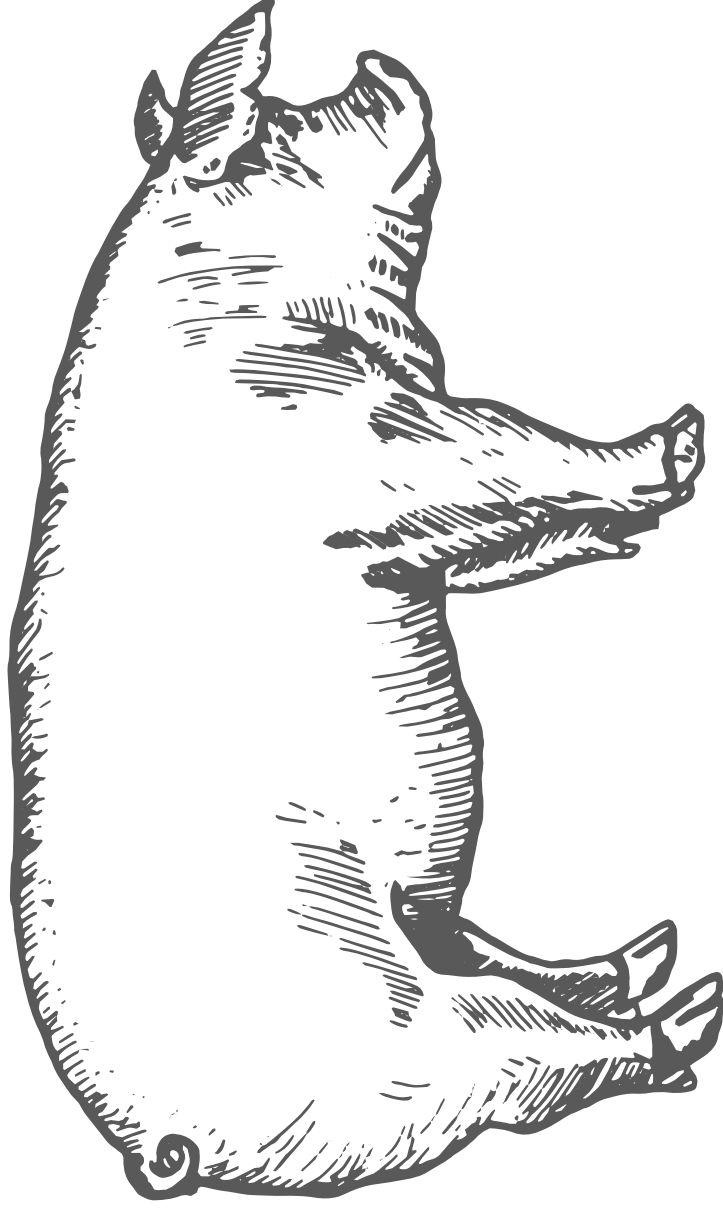
# Livestock Characteristics

## Hogs & Pigs

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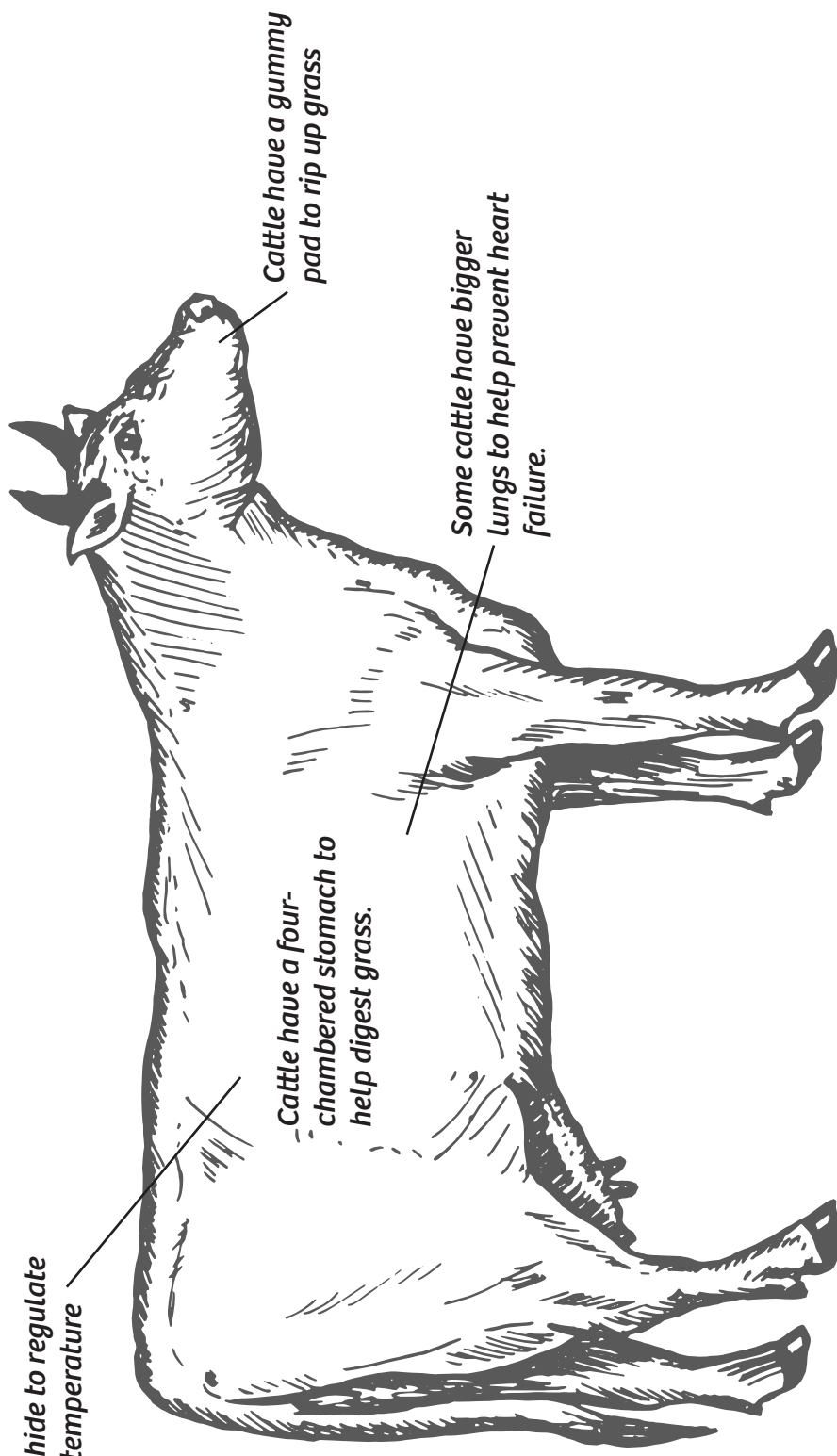


# Livestock Characteristics

## Beef Cattle

Group Members: Teacher Sample

Directions: Label one internal or external structure that is important to this animal for survival in Wyoming, or a by-product and its use. Your response cannot be the same as another. All structures need to be labeled.



**Cattle produce several cuts of beef like steak, roast and ground beef.**

**Marshmallows are a by-product of beef cattle.**

**Football is a by-product of beef cattle.**

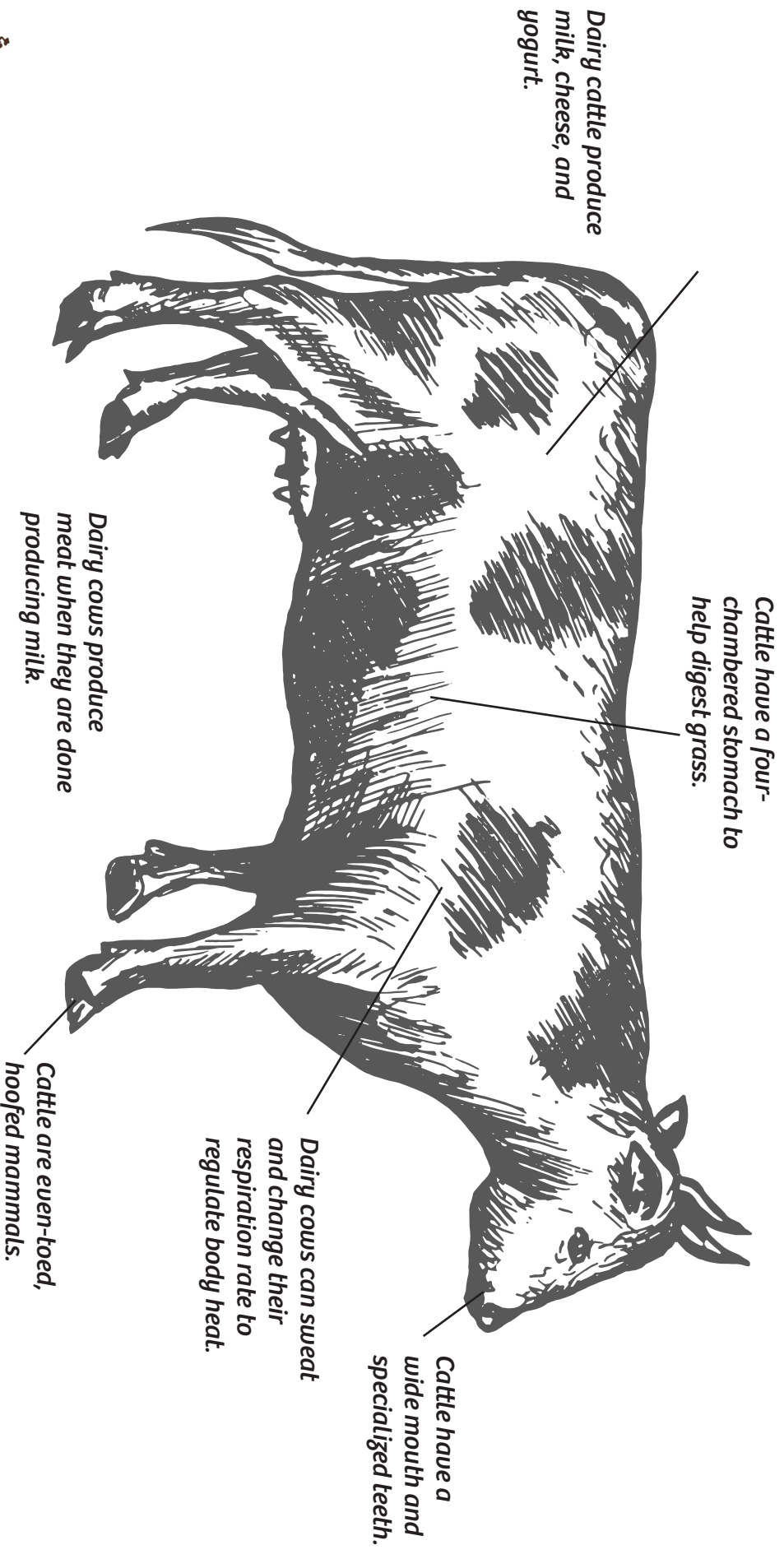


# Livestock Characteristics

## Dairy Cattle

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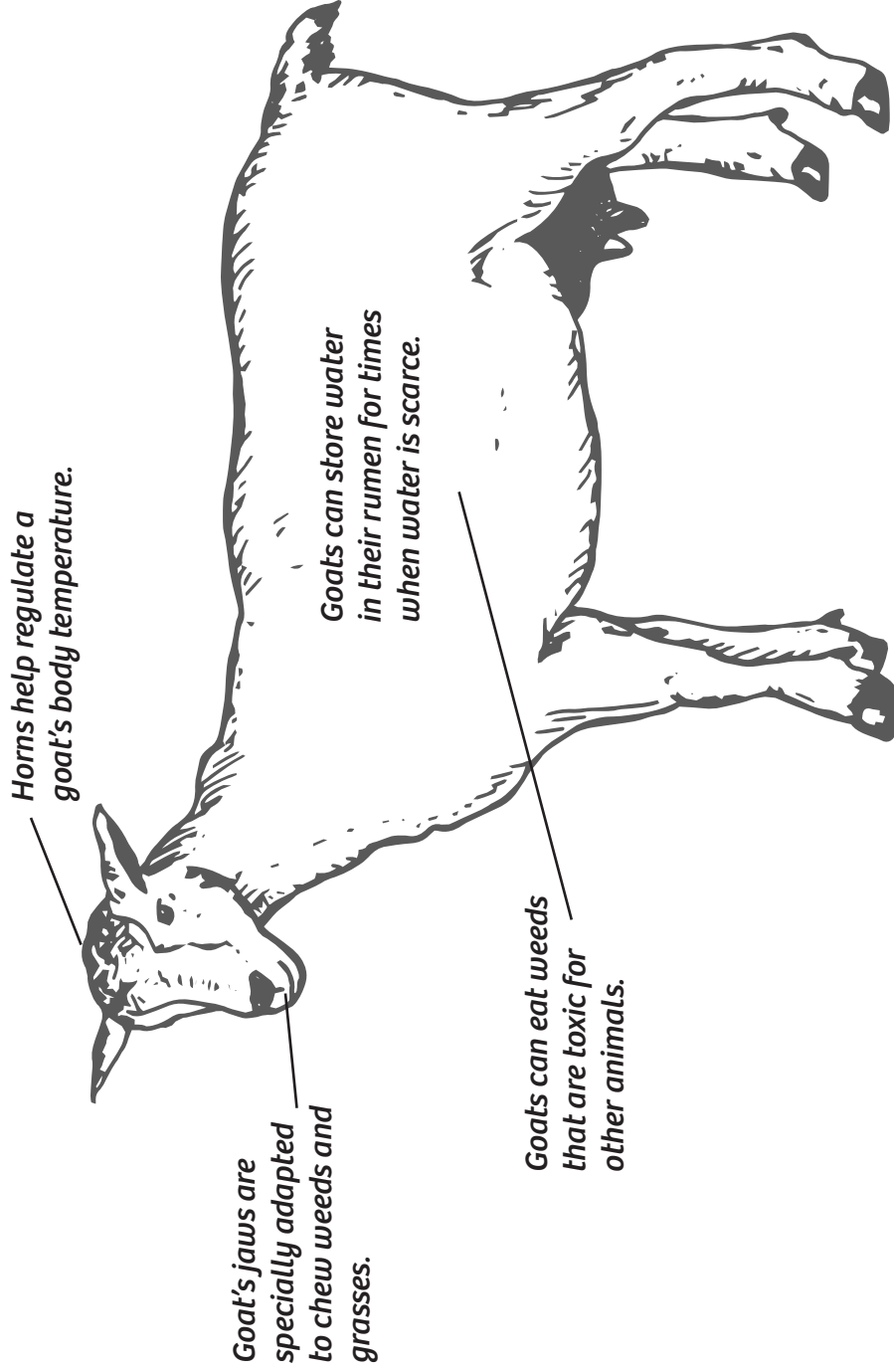


# Livestock Characteristics

## Goats

Group Members: Teacher Sample

Directions: Label one internal or external structure that is important to this animal for survival in Wyoming, or a by-product and its use. Your response cannot be the same as another. All structures need to be labeled.

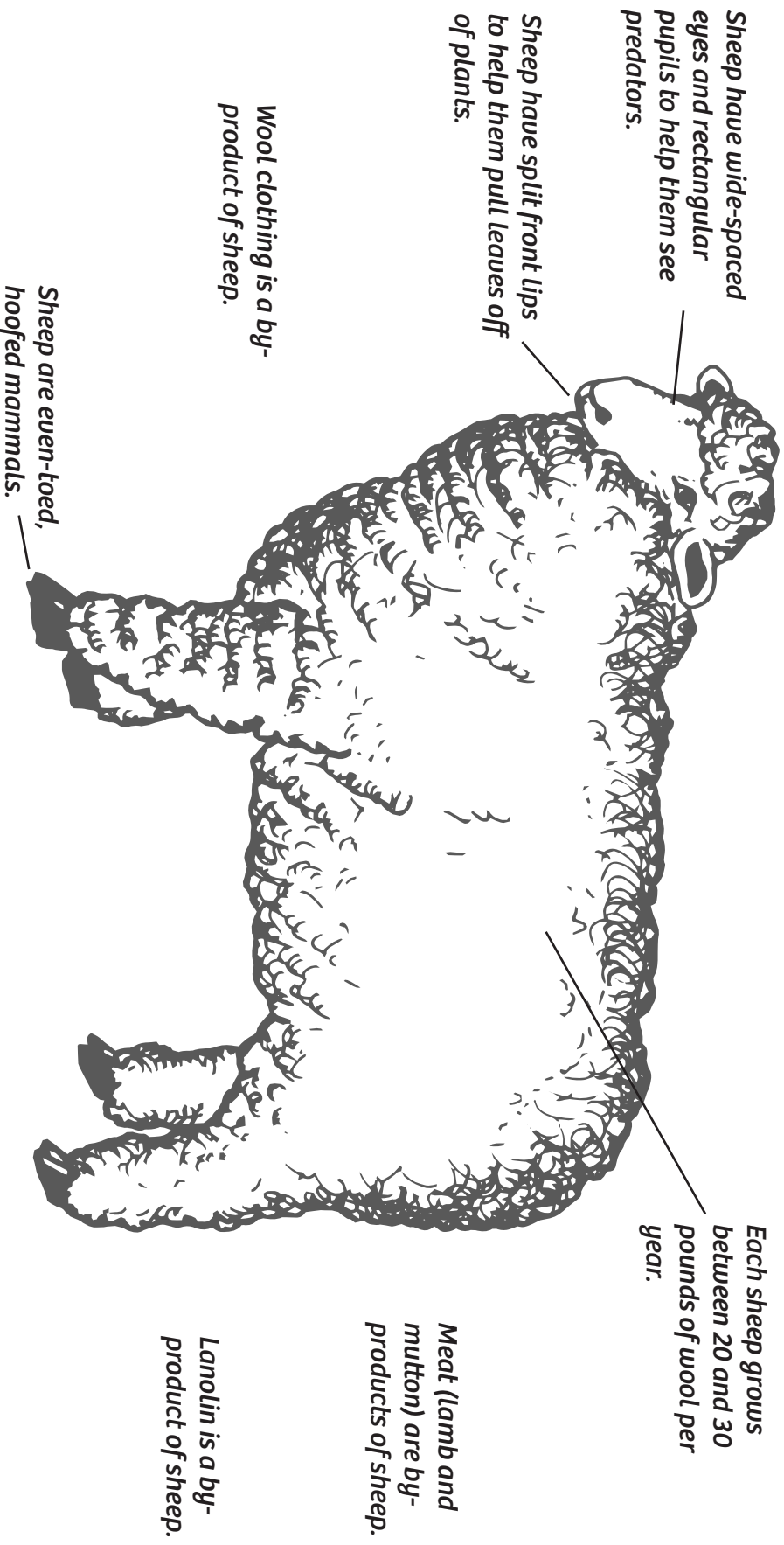


# Livestock Characteristics

## Sheep

Group Members: Teacher Sample

Directions: Label one internal or external structure that is important to this animal for survival in Wyoming, or a by-product and its use. Your response cannot be the same as another. All structures need to be labeled.



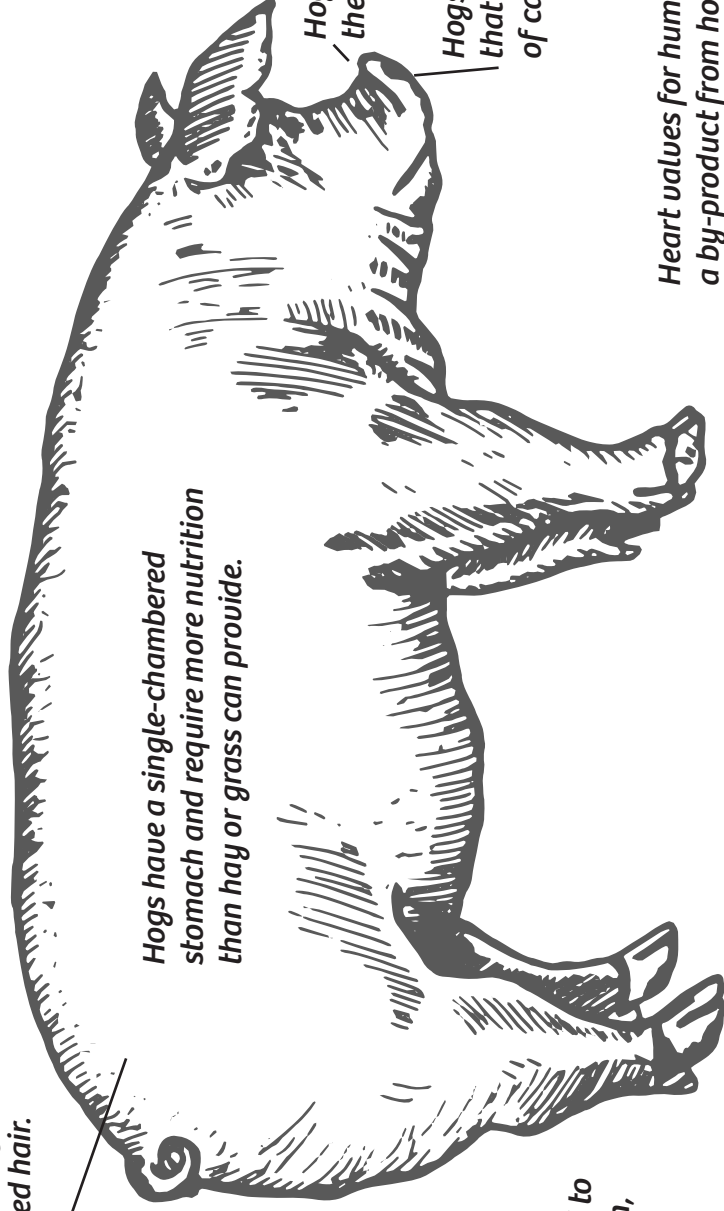
# Livestock Characteristics

## Hogs & Pigs

Group Members: Teacher Sample

Directions: Label one internal or external structure that is important to this animal for survival in Wyoming, or a by-product and its use. Your response cannot be the same as another. All structures need to be labeled.

*Hogs raised in Wyoming have sparse, bristled hair.*



*Hogs have a single-chambered stomach and require more nutrition than hay or grass can provide.*

*Hogs have a unique bone in their nose for digging.*

*Hogs have a blunt upper lip that is a flexible disc made of cartilage.*

*Hogs wallow in the mud to cool off, prevent sunburn, remove parasites, and prevent bug bites.*

*Heart valves for humans are a by-product from hogs.*

*A few by-products from hogs are: sausage, ham, pork chops, bacon, and ribs.*





## Make A Claim

Select an animal from the cards and make a claim about a structure it has that is important for survival. Support your claim with at least one valid reason.



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## Make A Claim

Select an animal from the cards and make a claim about a structure it has that is important for survival. Support your claim with at least one valid reason.



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# All About Crops



# All About Crops



# All About Crops

## Corn

Corn, a crop that is also known as maize, grows best when temperatures are warm and the days are long and full of sun. Once planted, corn takes 86-92 days before harvesting, growing in rich moist soil. Farmers wait until soil temperatures are between sixty and sixty-five degrees Fahrenheit before planting. A mixture of sand, silt, and clay, known as sandy loam, is the preferred soil used for growing corn. A better crop is produced with irrigation but is not the only way corn has to be watered. The crop does, however, need to be well drained during the growing season.

Corn is a tall, annual grass with a very stout, erect, solid stem that supports the weight of the corn cob as it grows. Two large, narrow leaves grow and spread alternately on opposite sides of the stem with a fibrous root system, with the majority of the roots growing two feet into the soil.

The majority of corn grown in the United States is also known as field corn. It is used to make cornmeal, and corn chips, but is primarily grown to feed livestock. Other corn is grown for human consumption and also used to produce biofuel.



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# All About Crops

## Sugarbeets

Sugarbeets grow in temperate to cool climates. They can grow in a wide variety of soils from sandy loam to clay as long as the soil is deep and loose. After planting in the spring, farmers care for the sugarbeets for 8-10 weeks until they are ready to harvest. Harvest usually happens in late September to October. Part of caring for sugarbeets is ensuring that they have water through irrigation.

Sugarbeets grow close to the ground, with the top of the beet being level with the ground or sitting slightly above the soil. They have large leaves that produce sugar through photosynthesis, which is then stored in the beet. The beet itself is the root of the plant and is a tap root. A tap root is a straight tapering root growing downward from the center of a plant. Sugarbeets also have a flowering stalk that aids in reproduction. Sugarbeets are used for sugar (sucrose), livestock food (silage), and sugarbeet syrup which is similar to molasses.



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# All About Crops



# All About Crops



# All About Crops

## Beans

Beans are planted in mid-June when the climate is arid, with warm days and cool nights. They have a growing period of 85-115 days depending on the type of bean being planted. Beans grow in many different soil types and do not need soil with a high content of nitrogen. Bean plants actually are nitrogen-depositing plants and are often grown in rotation with other crops that are high nitrogen using plants. This prevents disease, insects, and weed problems that could destroy the crop. Farmers practice pre-irrigation when growing beans. The soil is irrigated before the bean is planted and then not again until a month later.

Bean plants grow as a bushes or climbing plants. They have weak fibrous root systems, as they grow very shallow into the soil. Pinto bean plants produce better results because their pods are stronger and won't shatter before harvest. Some beans grown in Wyoming include dark and light kidney beans, black beans, navy beans, and pinto beans. Beans are used for consumption by both humans and livestock. In the past, beans were used as ways to vote and even as a type of currency, or money.



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# All About Crops

## Wheat

Wheat is a type of grass that grows and thrives in cooler climates. Winter wheat is usually planted in September and harvested at the beginning of winter after a 4-month growing season. Spring wheat is planted between March and May, depending on the weather, and is harvested between September and August. Wheat grows in a wide range of soils that are sufficiently fertile and well-aerated. Wheat will require more water through irrigation the more mature it becomes. Irrigation does not have to be used for wheat except in arid areas.

Wheat grows between two and four feet tall and is made up of a head, stem, leaves, and roots. It has long skinny leaves and parallel veins. Wheat has a fibrous root system made up of numerous, fine branches all being close in length and a shallow growth. Wheat will develop flowers when it reaches full height where reproduction will take place and produce seeds. Wheat is most commonly used to feed livestock and as a main ingredient in foods that humans consume, including, breads, cookies, cakes and cereals.



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# All About Crops



Stephanie Russell

# All About Crops



Liz Lauck

# All About Crops

## Hay

Hey, what's hay? Hay is an important agricultural crop that is used for both animal feed and to control erosion. All hay is not the same. Many different grasses can be considered hay. The type of hay depends on the climate of the area it is grown in. Some types of hay varieties are: Timothy, Alfalfa, Garrison, Brome, and clover. Even though there are different types, they all have similar characteristics. The plants are tall, measuring from 2 to 4 feet, with flat leaves. Finally, they all have fibrous roots, though the roots can be deep or shallow depending on the type.

How do farmers take care of hay? Hay needs to be grown in sandy or clay-rich soil. The plants must be irrigated but not too much. They thrive when they are living in a slightly dry state. Farmers harvest hay depending on the part of the state that they live in. Farmers in eastern Wyoming cut their hay in late June, while those who live in the western and central part of the state usually harvest through July.



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# All About Crops

## Barley

Barley is a crop that is perfect for Wyoming. It grows in arid climates, and it can withstand high elevations. Farmers plant barley in March or April. It has a short growing season and only needs 60 to 70 days before it can be harvested.

Farmers can plant barley in a wide variety of soils. The fibrous roots of the plant grow out in all directions and closer to the surface of the ground. Barley can be planted as a companion plant for alfalfa. Alfalfa has a tap root, which is a straight tapering root that grows straight down in the soil. The fine mat of branching roots in the barley keeps the soil around the alfalfa from eroding away.

Barley grows up to 80 centimeters tall. The main stem produces smaller, secondary stems. All the stems are covered in long, skinny leaves. The reproductive parts of the plant are found on structures that grow above the rest of the plant, which become the seeds of the plant. The seeds are the part of the plant that is harvested. Wyoming harvests about 8,000 bushels of barley each season. Barley can be used as animal feed, but humans also use barley bread, flour, crackers, and vinegars.



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# Crop Challenge Sheet

## Your Challenge

Construct a model of your crop using only the provided materials.

### Constraints:

#### **Materials:**

- Use only the materials provided by your teacher

#### **Time:**

- 15 minutes to build and plan

### Success Criteria:

- Include all structures of your crop
- Explain the purpose of each structure
- Completed within the time constraints
- Must resemble your crop



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- Completed within the time constraints
- Must resemble your crop



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# Video Note Sheet

## Teacher Copy

### Brandon Hessenthaller:

1. **(0:30)** By reducing some of your passes, what is the benefit for you guys? It saves **fuel**, it saves **time**, and money. It saves everything.
2. **(1:30)** This field just came out of beans and will go back into what next fall? It will go into **barley** next spring.
3. **(3:10)** So you're reducing your **tillage** in both your pivot-irrigated and flood-irrigated fields? Yes.
4. **(3:20)** There was a pivot that we brought in on some **new ground** that has really **helped** the soil health.
5. **(4:00)** So do you have any fields that you graze? We do. Anything with a significant amount of **crop** residue we will put **cows** on it and let them graze.
6. **(4:25)** It's encouraging to see that it's not **costing** you anything. So to make these changes, did it require investing in any new equipment? The only new piece of **equipment** was the disc ripper.

### Farming by GPS:

1. **(0:10)** Farmer Brad Usetess is tilling razor straight lines with a **GPS-guided tractor**. With the computer in control, he barely has to steer.
2. **(0:25)** Hoses deliver **precise** amounts of fertilizer right into the grooves that the tiller cuts.
3. **(0:48)** Placing seed and fertilizer together with **centimeter precision** means fewer loads of fertilizer goes on the fields. You're able to use less, so of course, you're saving the **money**, and you're getting the same **performance** out of the crop.
4. **(1:25)** Jimmy Messic also uses **GPS** when he sprays weed killer. Before, he says it was easier to miss spots or overlap.
5. **(1:40)** GPS technology is **guiding** large-scale farm equipment across the country. Some harvesters also **monitor** how much crop is produced in each part of the field.
6. **(2:15)** It's hands-free technology that's saving **money** and saving the **environment**.



# Video Note Sheet

## Teacher Copy

### King Ranch:

1. **(0:53)** Kendall Roberts is a **2nd** generation rancher at the King Ranch.
2. **(1:33)** Our open spaces have provided so much for those **animals** and that they continue to come back.
3. **(1:40)** We're like everyone else. We like clean **water**, clean **air**, and have a place to live. You can't **abuse** your resources and expect to sustain a family.
4. **(2:28)** We have lots of **conservation** practices at the ranch. We try to use the wind and the **sun**. We use **solar** generation to pump water. I think what's important when it comes to the water is not only the quantity but also the **quality**.
5. **(3:33)** New irrigation has saved them **60%** of their power bill, **20%** on their water and produces the same results with incredibly less **labor**.
6. **(3:40)** You can always work the land so that it's **smarter** and not harder.
7. **(4:48)** Ranching does provide a great opportunity for land conservation, and land preservation and managing all those important factors like **water**, **grass**, and **open spaces**.

### Technology catches up to cows:

1. **(0:15)** This bovine has Marlene's **constant attention**, even when Marlene is not by its side.
2. **(0:25)** It can check it's **internal temperature**, and the outdoor temperature, how many steps they've taken, how many times she's come into water, and how far out in the pasture she is going. How exactly? Using these **ear tags**.
3. **(0:40)** One day she was visiting some ranchers and they started talking about their **big problem** which was **gathering data** from the animals tags when the animals were out in pasture. It's nearly impossible. Not anymore. With the help of **bluetooth technology**, cattle owners can learn much more about their cows and steers activity and health.
4. **(1:15)** When it comes to livestock, **technology** is making its presence felt more and more.
5. **(1:35)** Rancher Mark Fraiser uses this device to **manage** his cattle and most importantly their weight. Now I have the ability to track back and find which animals grew well for use and which animals didn't. I can use that in making **purchasing decisions**. That's something that just simply wasn't possible **15** or **20** years ago.



# Video Note Sheet

## Brandon Hessenthaller:

1. By reducing some of your passes what is the benefit for you guys? It saves \_\_\_\_\_, it saves \_\_\_\_\_, and money. It saves everything.
2. This field just came out of beans and will go back into what next fall? It will go into \_\_\_\_\_ next spring.
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# Video Note Sheet

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## Four Corners

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# Farming





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## Four Corners

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# Ranching







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## Four Corners

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# Both





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## Four Corners

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# Neither





# Four Corners

## Example Sheet

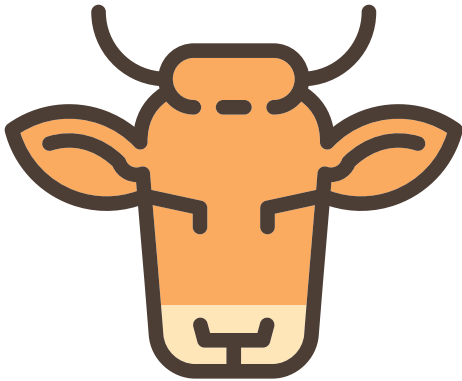
Ranching	Farming	Both	Neither
Solar power to pump water for livestock	Crop rotation: planting crops in different fields each year	Manage land for use by livestock	Cattle graze the same pasture all year
Use ear tags to gather data about animals	Use GPS tractor to plant fields	Provide an opportunity for land conservation and management	Grow the same crop in one field for 10 years
Use bluetooth technology to detect sick livestock	Use technology to precision plant seeds and apply fertilizer to use less of each	Water conservation	Focus only on making money
Use technology to track animal growth		Share space with wildlife	Use as much fertilizer as possible on a field at inconsistent times



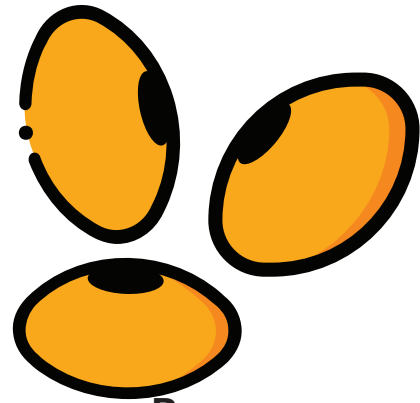


# Wyoming Agriculture

## Commodity Cards



Beef



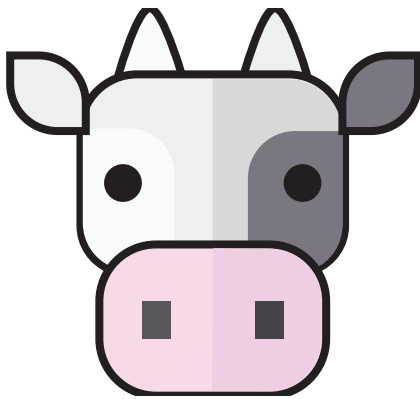
Beans



Sheep



Corn



Dairy



Goats



# Wyoming Agriculture

## Commodity Cards

Income of beans per acre:

**\$359**

Cost of beans per acre:

**\$124**

Source 1

Income of beef per head:

**\$736**

Cost of beef per head:

**\$577**

Source 1

Income of corn per acre:

**\$693**

Cost of corn per acre:

**\$332**

Source 1

Income of sheep per head:

**\$279**

Cost of sheep per head:

**\$164**

Source 1

Income of goats per head:

**\$96**

Cost of goats per head:

**\$91**

Source 1

Income of dairy per head:

**\$3,790**

Cost of dairy per head:

**\$3,610**

Source 1



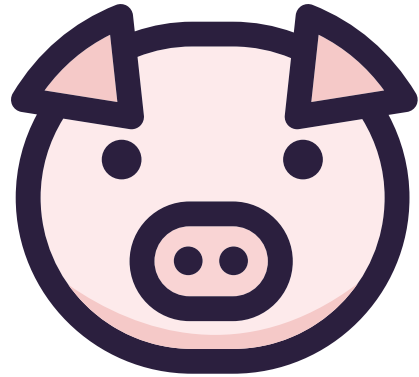


# Wyoming Agriculture

## Commodity Cards



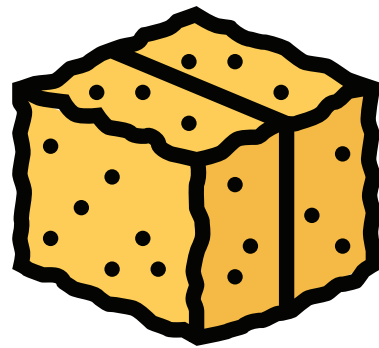
Grains



Hogs



Sugarbeets



Alfalfa Hay

# Wyoming Agriculture

## Commodity Cards

Income of hogs per head:

**\$90**

Cost of hogs per head:

**\$39**

Source 1

Income of grains per acre:

**\$800**

Income of grains per acre:

**\$380**

Source 1

Income of alfalfa hay per acre:

**\$350**

Cost of alfalfa hay per acre:

**\$312**

Source 3

Income of sugarbeets per  
acre:

**\$920**

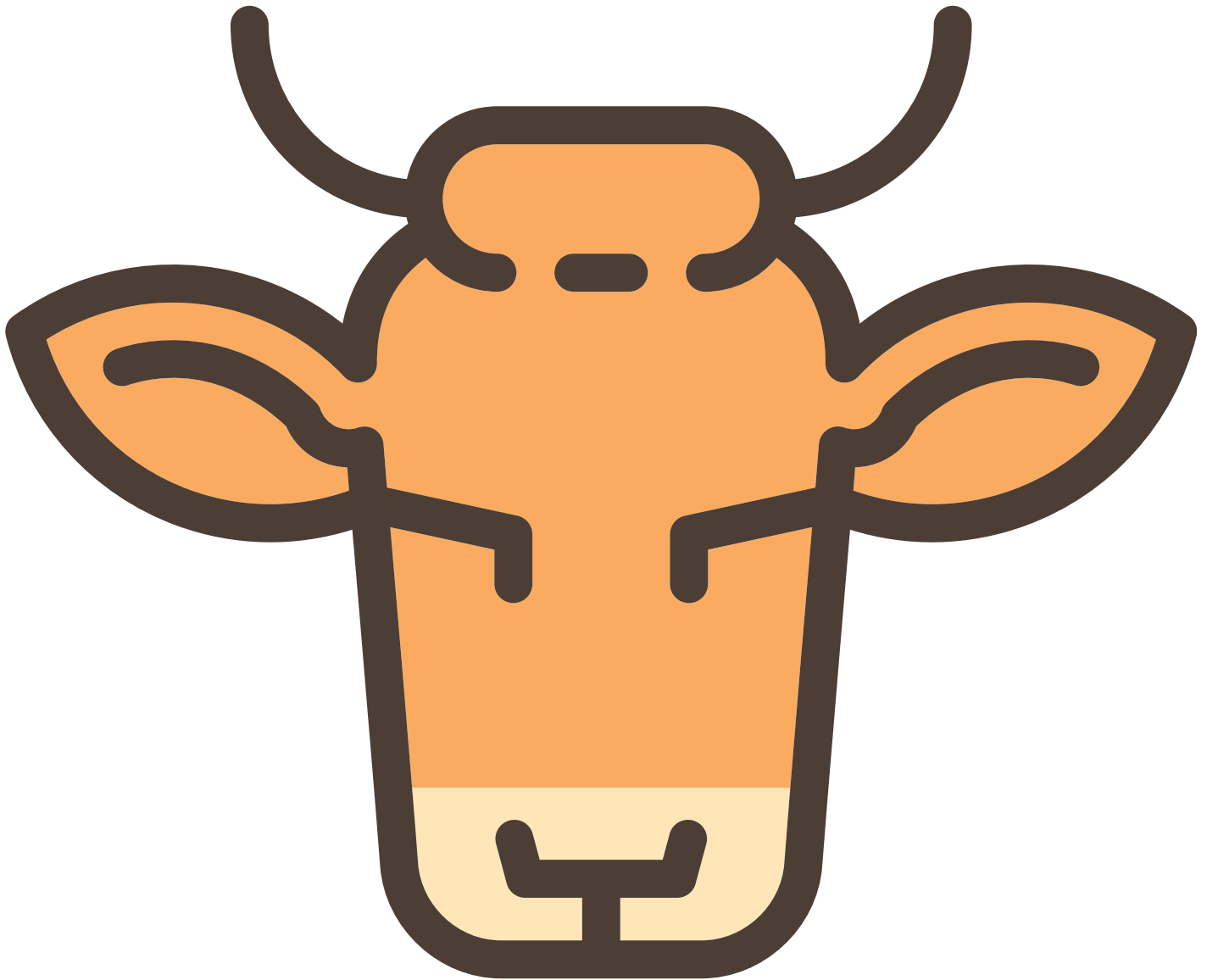
Cost of sugarbeets per acre:

**\$400**

Source 1



# Beef



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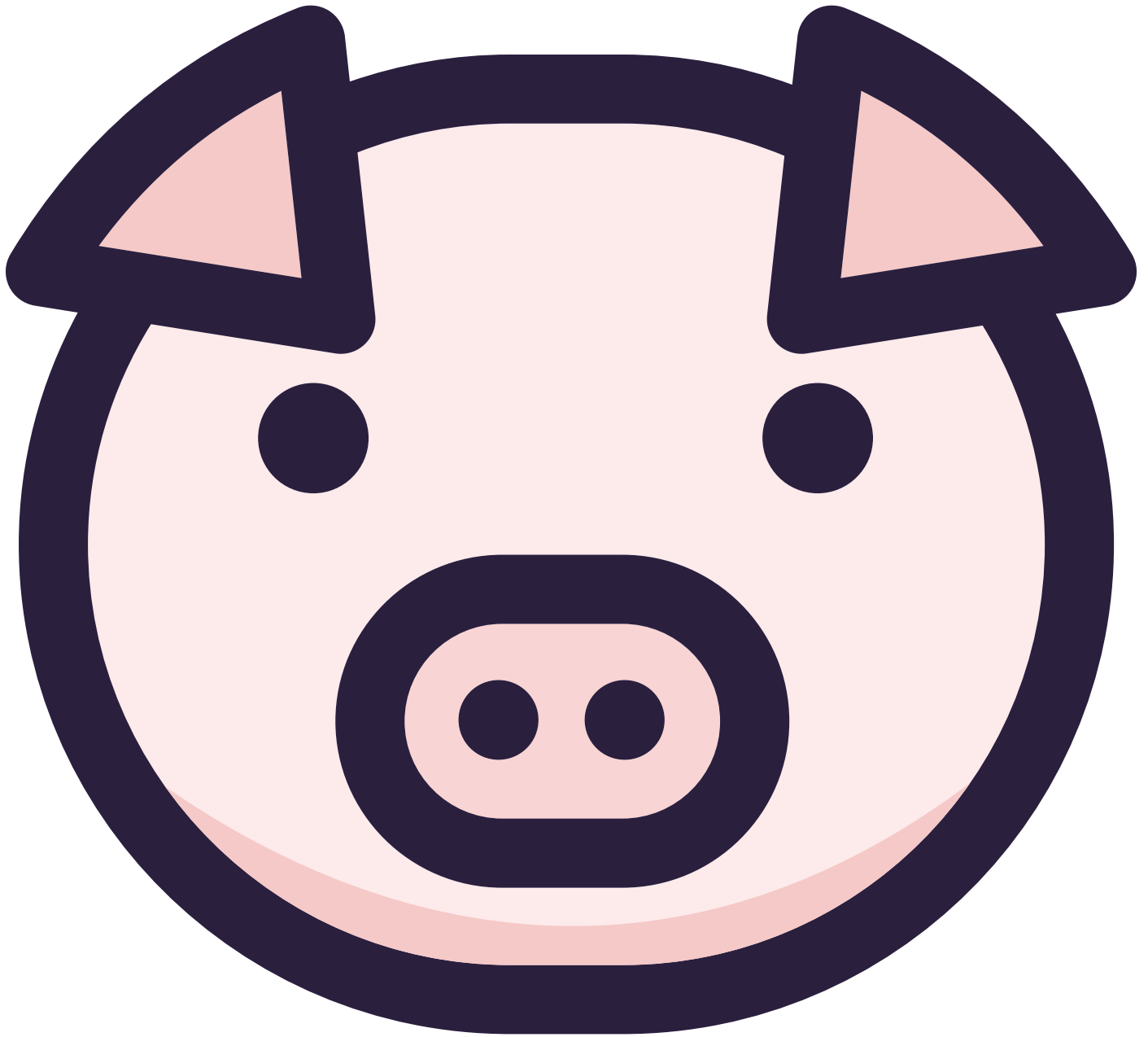


# Corn





# Hogs



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# Sheep



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# Goats





# Sugar Beets



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# Cost/Benefit

Name: \_\_\_\_\_

Name of Livestock/ Crop	Income of Crop per Acre Income of Livestock per Head	Cost of Crop per Acre Cost of Livestock per Head	Income - Cost = Profit
Beans	\$359	\$124	\$235
Beef			
Corn			
Dairy Cow			
Goats			
Grain			
Hay (Alfalfa)			
Hogs			
Sheep			
Sugar Beets			







# Cost/Benefit

Name: **Answer Key**

<b>Name of Livestock/ Crop</b>	<b>Income of Crop per Acre Income of Livestock per Head</b>	<b>Cost of Crop per Acre Cost of Livestock per Head</b>	<b>Income - Cost = Profit</b>
<b>Beans</b>	<b>\$359</b>	<b>\$124</b>	<b>\$235</b>
<b>Beef</b>	<b>\$736</b>	<b>\$577</b>	<b>\$159</b>
<b>Corn</b>	<b>\$693</b>	<b>\$332</b>	<b>\$361</b>
<b>Dairy Cow</b>	<b>\$3,790</b>	<b>\$3,610</b>	<b>\$180</b>
<b>Goats</b>	<b>\$96</b>	<b>\$91</b>	<b>\$5</b>
<b>Grain</b>	<b>\$800</b>	<b>\$380</b>	<b>\$420</b>
<b>Hogs</b>	<b>\$90</b>	<b>\$39</b>	<b>\$51</b>
<b>Hay (Alfalfa)</b>	<b>\$350</b>	<b>\$312</b>	<b>\$38</b>
<b>Sheep</b>	<b>\$279</b>	<b>\$164</b>	<b>\$115</b>
<b>Sugar Beets</b>	<b>\$920</b>	<b>\$400</b>	<b>\$520</b>





# Agriculture Scenario Sheet

Group Members:

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Congratulations! Your group has been selected to be managers of your own ranch/farm, a 10-acre property in Wyoming. You will need to plead a case for whether the land should be used for crop production, raising livestock, or both. In order for the land to be productive, yet ensure good stewardship practices, you will use all the information gathered from the previous lessons one through five.

Here are a few reminders when you are planning your ranch/farm. Use the checklist below to use as a guide:

- The 10 acres can be kept whole, or it can be broken into smaller sections that are each managed differently.
- Each acre may have only one type of crop or livestock grown or raised on it.
- If crops are grown on an acre, livestock cannot be raised in that acre.
- If livestock are raised in an acre, crops cannot be grown in that acre.
- To prevent overgrazing (good stewardship practices), there is a limit to how many head of livestock can be raised on each acre. The number of livestock that can be raised on each acre are listed in the chart at the bottom of this page.
- You have already determined the cost and profit of livestock per head. Now you will need to figure out how the total cost and income of livestock per acre.
- Crops can only be grown in a section for one year. Then, they must rotate to a new section to be farmed the following year (good stewardship practices). You will need to take this into consideration when planning how to use your land for the best profit. This means that you can grow each crop on no more than 5 acres.

<b>Livestock</b>	<b>Number of livestock allowed per acre</b>
<b>Beef</b>	<b>1</b>
<b>Hogs</b>	<b>25</b>
<b>Sheep</b>	<b>10</b>
<b>Dairy Cow</b>	<b>1</b>
<b>Goats</b>	<b>5</b>





# Acre Sheet

Choose which crop or livestock you will raise or grow on each acre. Create a color code or draw symbols to represent each crop or livestock in the key below, then fill in each acre with the symbol or color you have chosen.

**Key:**

**Acre 1**

**Acre 2**





# Acre Sheet

**Acre 3**

**Acre 4**

**Acre 5**

**Acre 6**







# Acre Sheet

**Acre 7**

**Acre 8**

**Acre 9**

**Acre 10**





# Livestock Cost/Profit Conversion

To determine the total cost and profit for livestock on each acre, you will need to multiply the number of livestock allowed per acre by the amount of profit they can earn. The profit per head can be found by looking at your Cost/Benefit sheet.

Livestock	Number of livestock allowed per acre	Profit per head	Total profit of all livestock for ONE acre (profit x number of livestock allowed per acre)
Beef	1	\$	\$
Hogs	25	\$	\$
Sheep	10	\$	\$
Dairy Cow	1	\$	\$
Goats	5	\$	\$

Livestock	Number of livestock allowed per acre	Cost per head	Total cost of all livestock for ONE acre (profit x number of livestock allowed per acre)
Beef	1	\$	\$
Hogs	25	\$	\$
Sheep	10	\$	\$
Dairy Cow	1	\$	\$
Goats	5	\$	\$



# Budget Summary

Record which crop or livestock you chose to grow or raise on each acre. Fill in the income and cost per acre by looking at your cost/benefit sheets, and your Livestock Cost/Profit Conversion sheets.

	Crop/Livestock	Income per Acre	Cost per Acre	Profit per Acre (Income - Cost)
<b>Acre 1</b>				
<b>Acre 2</b>				
<b>Acre 3</b>				
<b>Acre 4</b>				
<b>Acre 5</b>				
<b>Acre 6</b>				
<b>Acre 7</b>				
<b>Acre 8</b>				
<b>Acre 9</b>				
<b>Acre 10</b>				
<b>Totals:</b>		<b>Total Income per Acre</b>	<b>Total Cost Per Acre</b>	<b>Total Ranch/Farm Profit</b>



# Quick Write

Name: \_\_\_\_\_

When planning how to use your 10 acres, what things did you need to consider in order to be a good steward of your land in Wyoming?

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