



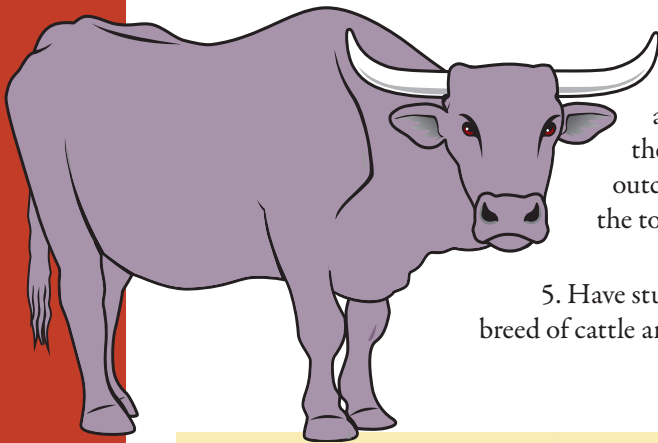
# Roll of the Genes

Predict the outcome of livestock breeding scenarios.

## Activity

By understanding how genes are passed on to offspring, scientists can help improve a wide range of economically important livestock traits. They can also decrease the likelihood of an animal receiving an undesirable trait which may affect the health and well-being of the animal. A trait is a physical characteristic or feature, which is inherited from one or more parent. Traits may be dominant or recessive. A dominant trait is expressed in offspring if *one* or *both* parents carry the dominant trait. A recessive trait is displayed in offspring if *both* parents carry the recessive trait. Dominant traits are represented with a capital letter and recessive traits are represented with a lowercase letter. If dominant and recessive traits are combined, the dominant trait will mask the recessive trait. Students will determine the probability of possible traits and create a drawing of the offspring they create.

1. Replicate the *Roll of the Genes* handout for each student.
2. Brainstorm physical features, such as eye and hair color, which makes each student look different. Explain that these characteristics are called traits.
3. Introduce the *Roll of the Genes* handout and explain the Punnett square process to the class. Explain that the traits used as examples are not necessarily real cattle traits, but these will help students understand the main concepts of heredity.
4. Have students use the Punnett square to create their own breed of cattle. Remind students that probability is the likelihood that a particular event, or outcome, will occur. It is expressed as a fraction with the numerator being the total number of one particular outcome and the denominator being the total number of possible outcomes.
5. Have students sketch a drawing of their own breed of cattle and share their artwork with the class.



## Materials

### Per Student

- Handout from [LearnAboutAg.org/agbites](http://LearnAboutAg.org/agbites)
- Colored pencils
- White paper
- Ten, four-sided dice

### Tip

Introduce genetics through an educational video on heredity. Select “Heredity” video on Brain POP at [BrainPop.com](http://BrainPop.com).

## California Standards

### Grade 3

ELA CC: RI.3.4, 7; W.3.2, 7

Math CC: 3.NF.1

NGSS: 3-LS3

### Grade 4

ELA CC: RI.4.4, 7; W.4.2, 7

Math CC: 4.NF.3b

NGSS: 4-LS1

### Grade 5

ELA CC: RI.5.3, 4

NGSS: 5-ETS1

## Classroom Activities

### Science

- Have students research and summarize the pea plant experiments by Gregor Mendel.

### English Language Arts/ History-Social Science

- Organize students into groups and instruct each group to select a breed of cattle to research. Groups should create a visual aid that illustrates the genetic history of the breed, including the country of origin, breed characteristics, and genetic selection over time.
- Ask student groups to develop a rhyme or song about the inheritance of traits in animals, plants or imaginary characters.