

# Genetics

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## Goal (learning objective)

Youth will learn beginning genetics concepts including terminology and the heritability of various traits.

## Supplies

- A chalkboard or dry erase board
- Chalk or dry erase marker
- Photocopies of the following handouts:
  - a. Handout 1 - “Inheritance of Horns” (enough for group)
  - b. Handout 2 - “Cow with Horns” (3 copies, cut out)
  - c. Handout 3 - “Cow without Horns” (5 copies, cut out)
- Paper (enough for group)
- Temporary adhesive or painter’s tape
- Computer
- Projector
- Screen (or wall to project on)

## Pre-lesson preparation

- Make photocopies of Handout 1– enough for group
- Make photocopies of Handout 2 and 3, cut diagrams out
- Read/review lesson
- Read/review terminology and concepts for each species

## Lesson directions and outline

Share the following information with the youth:

Understanding the basics of genetics and the principles of inheritance is important and necessary to improve livestock. Characteristics are passed from generation to generation, a process known as heredity (genetics). Each animal receives half of its inheritance from the male and half from the female. The differences between animals is a result of two factors, heredity (genetics) and environment. Both affect the performance of all animals.

Traits of economic importance:

- Reproductive performance - Fertility level, birthing ease, maternal ability
- Growth rate and feed efficiency
- Conformation traits
- Carcass traits

### Conducting the activity (DO)

1. Present PowerPoint supplement to group. Information included in the PowerPoint: terminology, dominant and recessive genes, traits of economic importance, and inherited defects. Have the group form into smaller groups - try to mix different species if possible.
2. Ask for a volunteer to distribute Handout 1.
3. Using the chalk board (or dry erase board) draw a Punnett square. Start with both the sire and dam being homozygous polled, showing that all offspring would be polled (sample of what square will look like below).

|      |  |    |     |    |
|------|--|----|-----|----|
|      |  | P  | DAM | P  |
| P    |  | PP |     | PP |
| SIRE |  |    |     |    |
| P    |  | PP |     | PP |

4. Repeat drawing squares with both horned, both heterozygous polled, the sire homozygous polled with the dam heterozygous polled, and sire homozygous polled and dam horned.
5. Have youth play the “game” Inheritance of Horns with the cow head diagrams. Use temporary adhesive (or tape) to adhere the drawings to a wall or board.

### What did we learn? (REFLECT)

- Ask: What is genetics?
- Ask: What are some genetics terms?
- Ask: How does genetics help us improve certain traits in livestock?

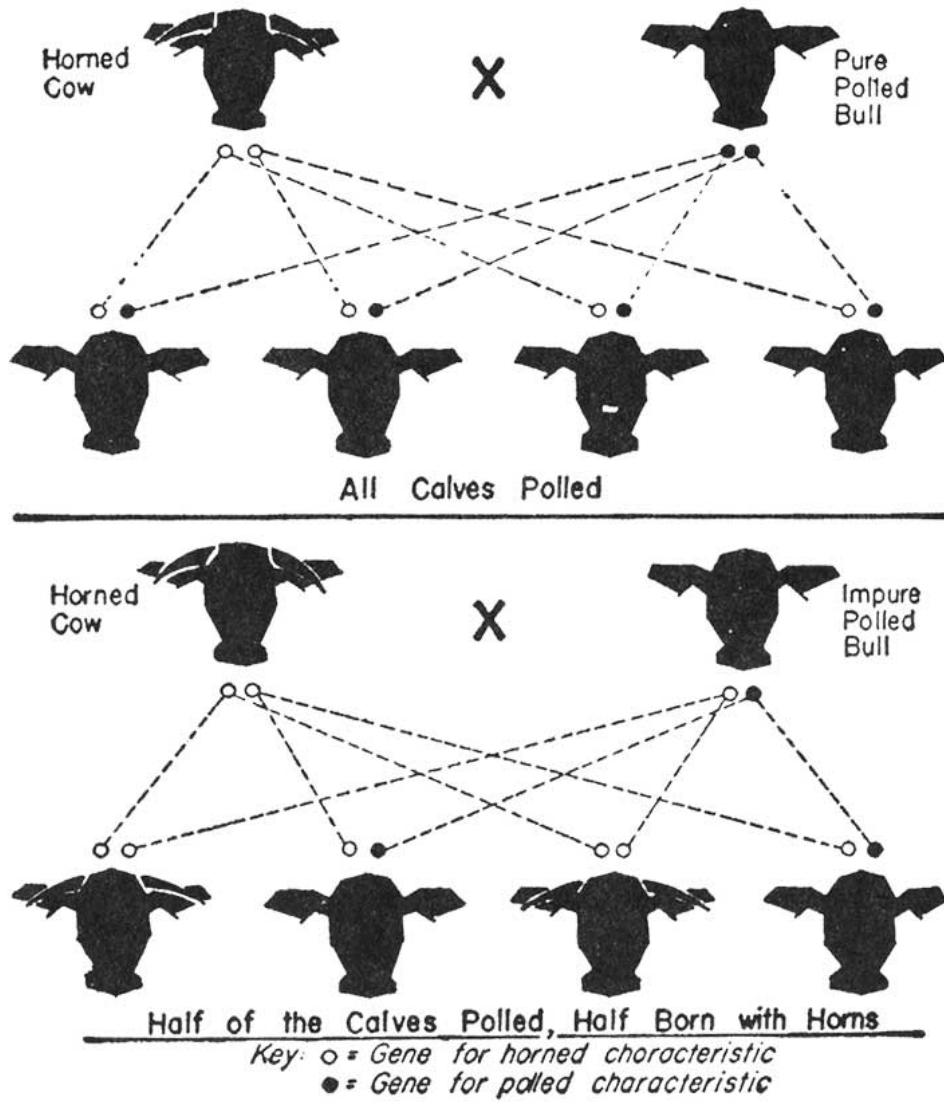
### Why is that important? (APPLY)

- Ask: Why is it important to understand the inheritance of certain genetic traits?
- Ask: How were your genetics inherited?
- Ask: How does understanding genetics help in human health?

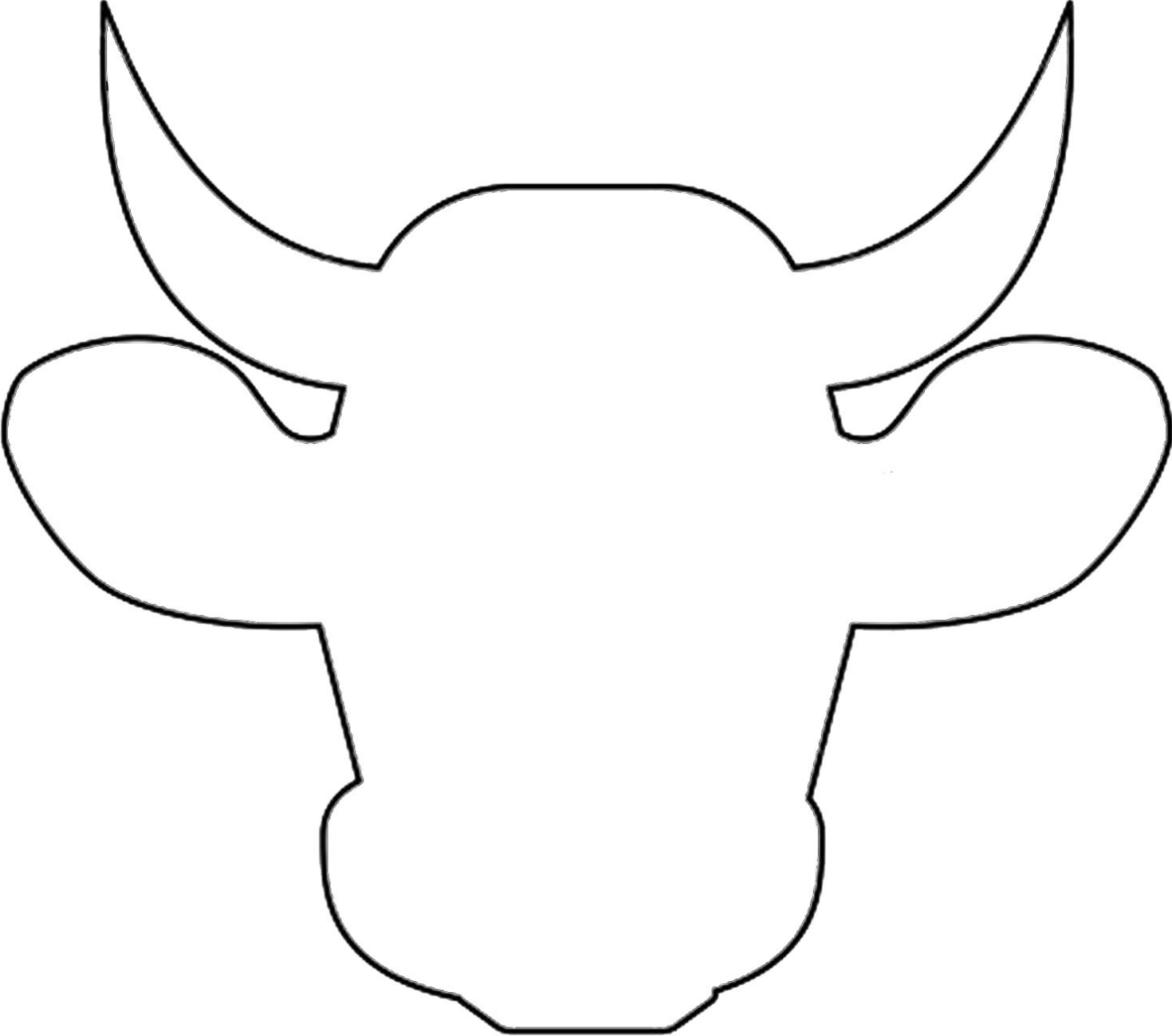
### Resources

- Ensminger, M.E. (1991). *The stockman's handbook*, 7th Edition. Prentice Hall.
- Moser, D.W. (n.d.). *Genetic defects in beef cattle: an update*. Retrieved from: <http://www.asi.k-state.edu/doc/agents/gendefects.pdf>
- Ohio State University Extension. (2011). Reproduction and Genetics. *Beef resource handbook* (pages 6-10 through 6-13).
- Ohio State University Extension. (2008). Reproduction. *Goat resource handbook* (pages 44-48).
- Ohio State University Extension. (2011). Reproduction and Genetics. *Sheep resource handbook for market and breeding projects* (pages 125-130).
- Ohio State University Extension. (2000). Genetics. *Swine resource handbook for market and breeding projects* (pages 17-1 through 17-6).

### Inheritance of Horns



REPRODUCTION: GENETICS – HANDOUT 2



REPRODUCTION: GENETICS – HANDOUT 3

