Class Starters & Enders

Making the Most of Instructional Time
Five Minute Lessons

Class Starters and Enders help utilize the last minutes of class when a lesson ends but there is not enough time to start another, or for an interest approach at the beginning of class. Mini-lessons correlate to GPS in the programs areas below.

Freemartin Calves

Program Areas: Agriculture, Biotechnology, Healthcare Science

Instructions: Read the material and make notes of important points, answer questions, and be ready to discuss this topic.

What's the best way for a cattle producer to double his herd size? By getting his cows to produce twins, right?

Wrong – cows are not built to nurse twin calves. Though twins are an unusual occurrence in most breeds, when they do happen, they are a problem for most producers. Usually at least one of the calves is weak and does not grow well.

A freemartin is a sterile female calf born twin to a fertile male calf.

The biggest concern with twin calves, however, is the birth of a **freemartin** calf. A freemartin is an **infertile** female born twin to a **fertile** male.

The freemartin has masculine behavior and non-functioning ovaries. Genetically and physically the freemartin calf is female, but she is sterilized in the womb by male hormones obtained by mixing of the fetal blood. Freemartin calves behave and grow in a similar way to castrated male cattle, or steers.

In most cattle twins, the blood vessels in the **chorines** become interconnected, allowing blood from each twin to flow around the other. If both fetuses are the same sex this is of no significance, but if they are different, male hormones pass from the male twin to the female twin. The male hormones then **masculinize** the female twin, and the result is a freemartin.

The degree of masculinization is greater if the fusion occurs earlier in the pregnancy – in about 10 percent of all cases no fusion takes place and the female remains fertile. The male twin is largely unaffected by the fusion, although the size of the testicles may be slightly reduced. Because testicle size is associated with fertility, there may be some reduction in bull fertility. Freemartinism is the normal outcome of mixed-sex twins in all cattle species which have been studied. It can also occur in sheep, goats, and pigs. It does not occur in human twins because the arrangement of human fetuses in the placenta does not allow for hormone or fetal blood **intermingling**.

Though twin calves are usually considered a negative in the industry, some scientists are working to discover how freemartins can be beneficial to cattle producers. Freemartins are occasionally used in **stem cell** and **immunology** research. Up to 95 percent of the freemartin's blood cells can be derived from those of its twin brother. Male-derived cells and their progeny can be easily visualized in the freemartin tissues, as only they contain the male Y chromosome. The freemartin model allows scientists to analyze perfectly healthy and non-manipulated animals, without resorting to transplantation often used in stem cell research.

Review

1. What is a freemartin?
2. What are the effects of freemartinism on a male calf?
3. Why does freemartinism not happen in humans?
4. What percentage of twin pregnancies results in fertile male and female calves?
5. What are the characteristics of a freemartin calf?
6. Which gender of calf is normally considered to be a freemartin?
7. What is a steer?

Language Connection

Define the following terms.

Chorines
Fertile
Freemartin
Immunology
Intermingling
Infertile
Masculinize
Stem Cell

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