



On-Site Lesson: All in the Family Part 1 - Goat Genetics

Grades 6-8

Lesson Length

30 minutes

Learning Targets

- I can identify patterns of inheritance,
- I can identify the relationship between genetic variation and an organism's ability to adapt.
- I can present findings while using appropriate eye contact, adequate volume, and clear pronunciation.



Common Core State Standards

Speaking and Listening Standards

- Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation. CCSS.ELA-Literacy.SL.6.4
- Present claims and findings, emphasizing salient points in a a focused, coherent manner with pertinent descriptions, facts, detials, and examples; use appropriate eye contact, adequate volume, and clear pronunciation. CCSS.ELA-Literacy.SL.7.4
- Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. CCSS.ELA-Literacy.SL.8.4

North Carolina Essential Standard

Science

- Explain the relationship between genetic variation and an organism's ability to adapt to its environment. 8.L.4.2
- Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance, and external factors to potential variation among offspring. 7.L.2

Materials Needed

- Goat Certificate of Registry (one for each student)
- Geneology tree (one for each student)
- Identifier game pieces (enough for each student to complete his/her geneology tree)

Theme

Mrs. Sandburg's scientific breeding methods were a monumental contribution to the American dairy goat industry. Her motivation was not profit but a genuine desire to improve the quality and availability of goat's milk while publicizing its health benefits. Because of her expertise and

willingness to share her knowledge, she was a well-known figure and sought-after speaker in the dairy industry.

Program Description

“All in the Family” is an introduction to Mrs. Sandburg’s dairy goat operation and an introduction to the three dairy goat breeds at Connemara Farms: Nubians, Toggenburgs, and Saanens. The focus of this program will be on dairy goat breeding for increased milk production and Chikaming bloodline preservation.

In this program students will participate in pairs and will investigate the basic hereditary information of a particular goat. After the initial investigation, students will then discover genetic links between their goat and other student’s goats. Students will then go into the pasture and meet their goats’ families; they will also identify desirable genetic traits in the herd through a goat appraisal activity.

Procedure

Activating Strategy

Word Splash - The ranger will display a piece of chart paper with the word “genetics” written. The ranger will ask students to share the first thing that comes to their minds when they hear or see this word. Ranger or teacher can record words as students share.

Teaching Strategy

1. Students will listen to the ranger’s presentation on how Mrs. Sandburg bred her goats making sure to highlight Mrs. Sandburg’s philosophy, objectives for her dairy goat operation, and Mrs. Sandburg’s contributions to the American dairy goat industry, names of the breeds of dairy goats at Connemara, breeding points, and the importance of the genealogy tree.
2. In the horse barn students will sit at table and chairs. Each table will have various Certificates of Registry for the goats which we currently have at Connemara Farms (this will change each year).
3. Each table will have one of the specific breeds of goats at Connemara Farms: Saanen, Nubian, and Toggenburg.
4. Students will complete a genealogy tree using identifier activity pieces that correspond with the Certificate of Registry.
5. Upon completion of individual genealogy trees, students will compare and contrast their charts to determine which goats are related. For example, “My goat is a Nubian and her name is Thistle. Thistle’s mother is Tapestry. Does anyone else have Tapestry as their mom?”
“Yes! Thea does.”
“Great! What does that make Thea and Thistle?”
“Sisters”
6. Ranger will ask students, “Why would a dairy goat breeder like Mrs. Sandburg breed goats that were closely related?”
Answer – This links back to those characteristics that are beneficial to increased milk production...keeping those characteristics within the family.
7. Ranger will ask students, “What happens if goats are bred too closely within the family?”

8. Students will present their findings on their “goats” expressing common links of genetic backgrounds.

Summarizing Strategy

Acrostic Poem - Ranger/teacher led, students will complete an acrostic poem for the word genetic. Ranger or teacher will write G E N E T I C vertically on chart paper. Next, ranger or teacher will elicit responses from students that identify words that begin with each of the letters that correspond with the topic “genetics”. After completed, this chart can be given to the class to post in their classroom.

“All in the Family” Background Information

Introduction

Why do we keep the goats?

Mrs. Sandburg’s dairy goat operation was the center of activity here at Connemara. Goats were an integral part of the Sandburg’s daily lives. Goats visited in the house after dinner. Goats were nurtured in the basement during kidding time. Goat products were served at meal times.

The National Park Service keeps a token goat heard at Connemara in the interest of preserving this integral role the goats had in the lives of the Sandburg.

Why did Mrs. Sandburg keep goats?

In 1935, Helga Sandburg decided she wanted a pet and felt a cow was a good choice. Her dad thought otherwise and suggested a goat. So it was that Helga and her mom, Paula, went to buy a goat, came back with five goats that just happened to be a very fine dairy stock. Mrs. Sandburg’s decision to buy the goats was due to her love of the milk, which she tasted for the first time that day. Mrs. Sandburg felt she owed a debt to the dairy goat industry for when she began to drink goat’s milk, she no longer had any gall bladder problems and avoided surgery. It was from this point on that Mrs. Sandburg dedicated her life to the enhancement of milk and butterfat production through her breeding practices.

Philosophy and Objectives of the Chikaming Herd

“We would waste our time on stock without good family inheritance.” “A poor animal from a good family had more potential than a good animal from a poor family.” (“Poor” referring to characteristics leading to milk production).

Mrs. Sandburg believed she could improve the dairy goat industry by producing families of goats that could be depended upon for a consistently high production of milk and a consistent progeny or offspring. She believed if one did not breed for this purpose one could not be sure of what to expect in a breed. It would be a gamble. If families are consistent they are more reliable.

How did Mrs. Sandburg achieve a high consistency of milk production and of quality offspring in a breed?

- ✓ Goats were monitored closely by being put on “official test”. Goats were bred according to their ancestors’ milk production and their current milk production; too risky otherwise.
- ✓ Culling was a premier principal to prevent the “contamination” of the family.
- ✓ Only goats with strong bodies and high stamina were chosen; good conformation.

- ✓ Goats with certain “breed points” were chosen over others whose breed points were not as brilliant.
- ✓ Goats were registered with the American Dairy Goat Association and given a tattoo in their left ear for identification.

Breeds and Breeding Points

Nubians: came into existence in 1895 as a result of mating English and an Indian breed. Characteristics: “Roman” nose, the more convex the better; long, wide, and pendulous ears extending at least one inch beyond muzzle; hair is short, fine and glassy and may be any color, solid or patterned.

Saanen: originated in mountainous region of Switzerland. Characteristics: Larger structured animal than Nubians; Vigorous: white or cream in color (white preferred); hair is short and fine: ears are erect and alert, pointing forward, face is dished or straight, straight nose.

Toggenburg: originated in Toggenburg Valley of Switzerland. Characteristics: medium size, sturdy, vigorous; hair is short, soft, fine; color is solid varying from light to dark chocolate with distinct markings from above eye to muzzle; hind legs white from hock to hoof; forelegs white from knees downward; ears are erect and forward; face is dished or straight, nose straight.

BREEDING POINTS ARE TRAITS LOOKED FOR IN A DAIRY GOAT, WHICH WILL INDICATE TO THE DAIRY BREEDER THAT THE GOAT WILL BE A QUALITY MILK PRODUCER AND BUTTERFAT PRODUCER.

High production milkers will have the majority of these “points”:

- Hand between front legs;
- Forelegs straight with no swelling at the joints
- Large heart girth-large barrel
- Neck lean and long
- Walk squarely and gracefully
- Withers sharp
- Shoulders sharp, not droopy
- Rump long and fairly straight
- Thurl to thurl flat
- Escutcheon wide
- Rear udder attachment wide
- Fore udder – no pocket
- Udder 1/3 behind legs and 2/3 in front of legs
- Hocks point straight out
- Pasterns short, strong, not very long
- Finger between ribs

The Scientific Method of Breeding

Line Breeding: the breeding of animals with common ancestors from a certain family or families in order to intensify heredity characteristics from chosen individuals. It produces uniformity of type. Ex. Half-brother to half-sister or granddaughter to grandsire.

Inbreeding: the breeding of animals in the immediate family. Creates a smaller gene pool and intensifies characteristics, both good and bad. Not recommended unless animals are of superior quality.

Outcrossing: the breeding of animals outside of family brings new bloodlines into breed. Used when genetic pool has become too limited.

Using these breeding methods along with exhaustive record keeping, endless bloodline calculations, and keen observations, Mrs. Sandburg was able to increase the overall productivity of milkers within breed at remarkable rates. She was considered the “greatest and most predictable breeder” of her time.

Carl Sandburg Home National Historic Site



On-Site Lesson: All in the Family Part 2 - Barn Visit

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Lesson Length

30 minutes

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Procedure

Activating Strategy

Curious Clues - Ranger will share the following clues (one at a time) with students. Students will then respond aloud with the answer.

Curious Clue 1

This breed of goat has a larger structure...hair is short and fine... ears are erect and alert...originated in the mountainous region of Switzerland...white or cream in color... It is the **Saanen** goat.

Curious Clue 2

This breed of goat is medium in structure...hair is short, fine, and soft...ears are erect and forward...color is solid varying from light to dark chocolate...originated in the Switzerland...in the Toggenburg Valley...It is the **Toggenburg** goat.

Curious Clue 3

This breed of goat is the result of mating an English and an Indian breed...ears extend at least one inch beyond the muzzle...hair is short, fine and glossy...can be any color...can be solid or patterned...”Roman” nose...It is the **Nubian** goat.

Teaching Strategy

1. Ranger will lead group into barn where the exhibit of Mrs. Sandburg is located.
2. Ranger will give a “mini-talk” about the history of Mrs. Sandburg’s dairy operation and her objectives for breeding dairy goats.
3. Ranger will lead group into milking station where the physical characteristics of goats that help increase milk production (these were characteristics she looked for to pass on to the next generation).
4. Ranger will lead group outside the barn and discuss the relationship Mr. and Mrs. Sandburg together: simple life at Connemara and influence on society.
5. Discuss protocol for going into pasture.
6. Exploration time with the goats (10 minutes)

Summarizing Strategy

Think-Pair-Share, Ranger will pose this question to the students. “Name one of the physical characteristics that Mrs. Sandburg looked for to pass on to the next generation.” Why was this physical characteristic important?” Students will think about their response. Then find a partner and share their answers.