

 **Activity 7.2.4 The Pedigree Detective****Purpose**

Pedigrees provide a visual way to observe the lineage of an animal. By following the pedigree, geneticists can track genes throughout generations. As you have learned, each parent contributes half the genes to his or her offspring. Using that knowledge, you can determine 25% of an animal's genes were given to them from grandparents, 12.5% from great grandparents, and so on. Pedigrees give producers one more tool to manage their livestock. Can pedigrees be used outside of the livestock industry?

Sally Sleuth has wanted a dog since she was little. She scoured the newspapers looking for a litter of black Lab puppies and finally found an ad that read:

“For sale to a good home: Five black Lab and one chocolate Lab seven-week-old male puppies.”

Sally called the phone number and made arrangements to see the puppies the next Saturday. When she arrived at the breeder's home, the puppies had all been sold except the chocolate colored male. Sally asked to see the pup's parents and was shocked to find that both parents were black Labs. As Sally rode home with her new puppy that she named Tango, she decided she needed to do some serious research into Tango's pedigree and the inheritance of coat color in Labrador Retrievers.

Materials**Per student:**

- Pencil
- *Agriscience Notebook*

Procedure

In this activity, you will help Sally Sleuth complete a four-generation pedigree for Tango using bits and pieces of information she could obtain from the breeder and an Internet search.

Part One – Completing a Pedigree

Based on the following clues and using what you know about pedigrees, finish filling in the names in the four-generation pedigree on *Activity 7.2.4 Student Worksheet*.

Clues

1. Maestro is Tango's maternal grandsire.
2. Maestro's paternal grandparents are Black Blizzard and Blossom.
3. Maestro has $\frac{1}{2}$ of Black Brick's genes and $\frac{1}{2}$ of Bridget's genes.
4. Maestro sired Spirit.
5. Master Kenneth III, Master Kenneth II, and Master Kenneth I are the sire, paternal grandsire, and paternal great grandsire of Zeke.
6. Master Kenneth I was mated to Lucy.
7. Zeke sired both Tango and Stranger.

8. Bridget's sire and dam are Caldwell's Extra and Esmeralda.
9. Blossom contributes $\frac{1}{4}$ of Brandi's genes.
10. Lassy is Kendall's Lass' dam.
11. Zelda contributes 25% of her genes to Tango and is the daughter of Cartwright and Crafty Ann.
12. Biff and Sonja are Zelda's paternal grandparents.

Part Two – Tracking Genes Using a Pedigree

Sally's sleuthing discovered the inheritance pattern of black and chocolate coat color in Labrador Retrievers.

Coat Color Gene

B = Black

b = Chocolate

Black (B) is dominant to Chocolate (b)

Through her research, Sally found that most of Tango's ancestors had a homozygous black (BB) genotype. However, one dog, Martha carried the chocolate gene. Use Tango's complete pedigree to answer the questions in *Activity 7.2.4 Student Worksheet*.

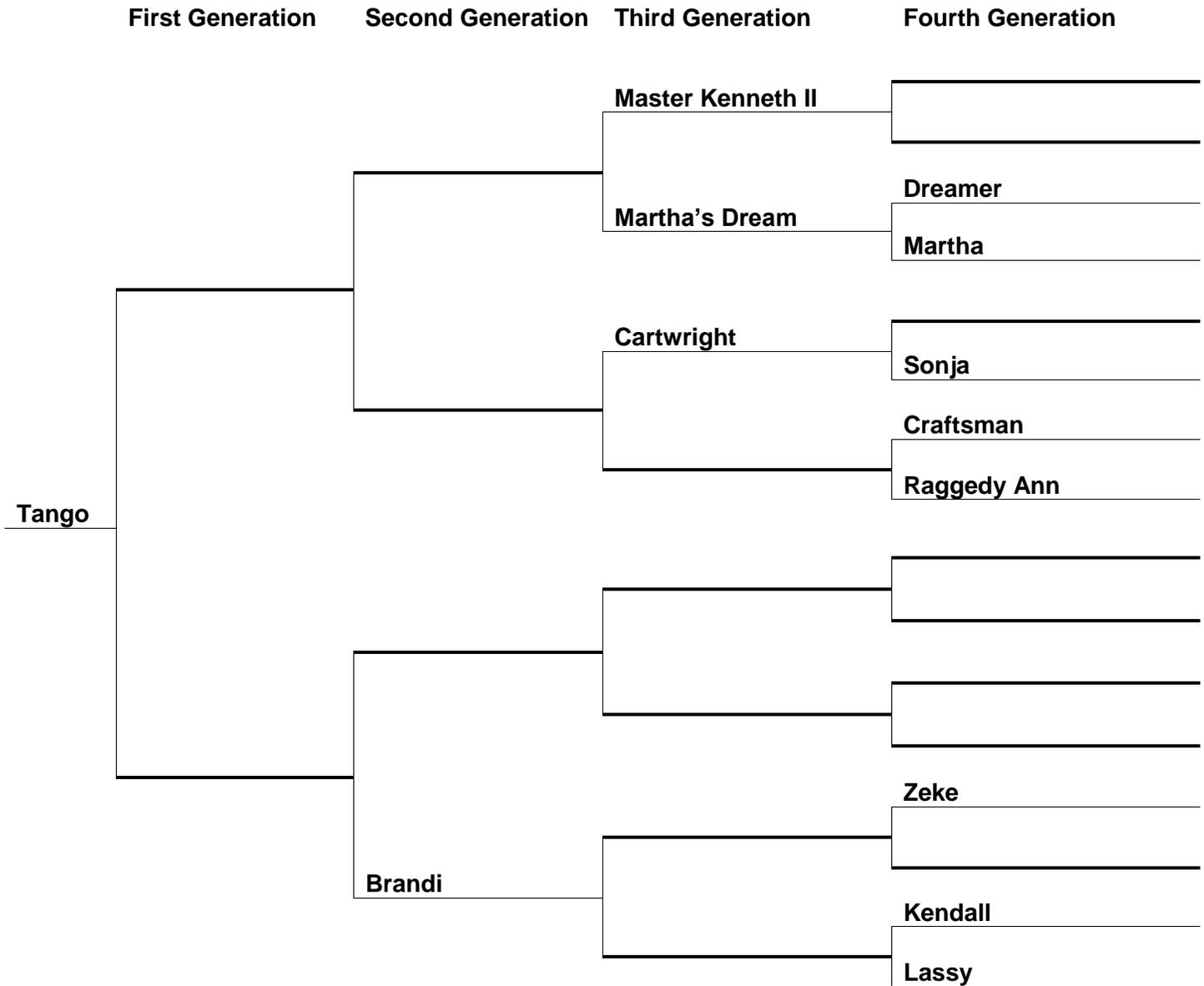
Conclusion

1. What is a pedigree?
2. How can animal breeders use pedigrees to track genetic inheritance?
3. What percentage of the genes of an animal originate in the first generation of ancestors? What percentage from the second generation?

Name: _____

Activity 7.2.4 Student Worksheet

Directions: Complete Tango's pedigree based on the clues given in Part One.



1. Which two individuals appear twice in Tango's pedigree?
2. What is Zeke's genotype?
3. What is Spirit's genotype?
4. What percentage of Black Bricks genes does Tango possess?

5. If Martha was the only chocolate carrier on Tango's paternal pedigree, list the names of the other dogs in the paternal side of Tango's pedigree that must have been carriers.

6. Where did the chocolate gene originate in Tango's maternal pedigree?

7. What are the odds that Tango would have inherited the chocolate gene from Stranger?

8. What are the odds that Tango would have inherited the chocolate gene from Martha?