DOG BREEDERS

Research Area: Pedigree Verification

Background: Having graduated from Auburn and now having time for a “real” life, Susan was interested in returning to competitive show dog competition. She had been introduced to show competition by her parents who felt that it was a good family hobby. Knowing that her dogs would likely be as much companions as show animals, Susan decided that she wanted Golden Retrievers, the world’s greatest breed. Susan searched throughout the country and finally found a breeder whose dogs were outstanding examples of the breed standards. The breeder had one female, Maca (B), who had been bred with a young, two-time champion, Sun-of-Arizona. The breeder had kept two dogs from Maca’s first litter (Pup-B1 and Pup-B2) and she had a male puppy available from a new litter (Unknown B). The price of the puppy was high but given the sire and dam, the breeder was confident that the puppy would be competitive. Susan returned to Atlanta and was making arrangements to purchase Unknown B when she received a call from another breeder. The breeder told Susan that she had one puppy remaining from a mating between a World Champion sire and a four-time champion dam (Cloe (A)). Since the breeder was located in nearby Augusta, Susan scheduled a visit to the kennel for the following weekend. Susan was immediately impressed by the dam and by two adult dogs (Pup-A1 and Pup-A2) that the breeder indicated were from a previous litter produced by the same dam and sire. The breeder offered the puppy (Unknown A) at a very reasonable price. Asked why, he explained that his health no longer permitted him to travel to shows and that he wanted his last puppy to go to someone with a real interest in the breed.

Susan was very excited about both dogs but, she faced a difficult decision. She knew that she only had space and time to devote to one puppy. Two dogs would just not fit her budget or her apartment. In a conversation with her parents, Susan described the situation. Her father, being a father, warned that anything that is too good to be true, is. Her mother was a little less dramatic but also felt a little uneasy about the circumstances. Having been involved in the dog show circuit they were well aware of abuses and misrepresentations in the breeding industry. Finally, they all agreed that it would be worth the effort to have the puppies genotyped. Susan contacted the first breeder who was happy to have her vet remove and send hair samples from the dam and the three offspring. The second breeder was less agreeable. He indicated that he had another buyer and that he wanted to place the dog as soon as possible. Not wanting to miss a once-in-a-lifetime opportunity to own such a excellent prospect, Susan asked if she could at least visit the breeder to discuss the issue. He agreed but at the meeting stalled by saying that his preferred vet was out of town. Susan called the vet’s office and indeed confirmed that he was on vacation. Not to be outdone, Susan was prepared. While inspecting the dogs, Susan was able to pluck a few hairs from each and place them into individual bags.

She left the breeder after agreeing that she would make a decision by the following week.

Information and Data:

Susan needs your help. Your mastery of basic Mendelian principles will help her make her decision. Is she going to miss an outstanding opportunity or is something wrong? The basic question for you is whether the three offspring from each dam were fathered by the same sire.

- You are provided with DNA samples from the two dams (Cloe and Maca)
- You are also given DNA samples from 6 offspring (three from each dam). Two of the offspring from each dam are supposedly from the correct mating of dam and sire. The third puppy (Unknown) is the one offered to Susan and is in question.
- Your laboratory has the capability to determine genotypes at six microsatellite loci. All of the loci exhibit co-dominant modes of inheritance. Some of the locus will be informative, some may not. You may use as many or as few loci as you feel are necessary.

Assignment:

1. Use the *ELS* program to collect genotype data from each of the 8 samples. Be sure to carefully record the sample identification information on the **Electrophoresis Loading Sheets** and the genotypes on the **Genotyping Data Sheet.** Your data set is called *Dogs Data.*

2. Before examining the data, propose a hypothesis for one possible outcome of your investigation. Based on this hypothesis, state a prediction and an alternative that will allow you to answer the investigator's question.

Hypothesis:

Prediction 1:

Alternative:

3. With the information you are given and your hypothesis above, do your best to draw a pedigree based on your hypothesis.

4. Examine the genotype data from each litter. Are the data consistent with a single sire being responsible for all three puppies? If not, how many different males do you believe were involved? Can you refute either your prediction or the alternative? Carefully consider the logic that you use. Remember that alleles that can exclude samples are more “powerful” than those that are shared.

5. Return to the pedigrees. Indicate on each what the most likely genotypic pattern of the male parents would be. What can you tell Susan? Can she trust both breeders?

6. Using the word processor on your computer, write a report (see Report Format instructions) outlining your investigation, describing the results and providing your conclusions. Be sure to include careful statements about the logic that led you to your decision.

7. Submit your report and your worksheets to your TA.