Goat Epistatis & Dihydrid Inheritance by C Kohn, WUHS

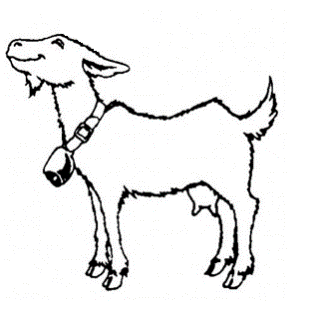
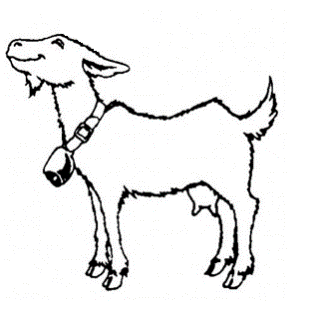
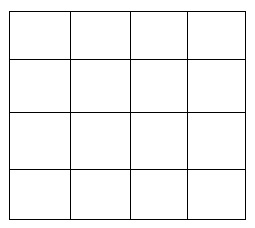
Group Names: Hour Date:

Date Assignment is due:  Why late? Score: + ✓ -   
 Day of Week Date If your project was late, describe why

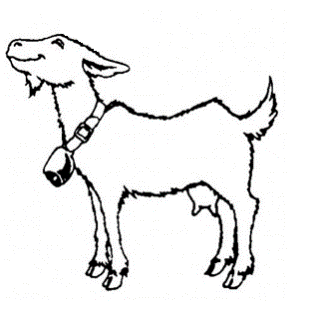
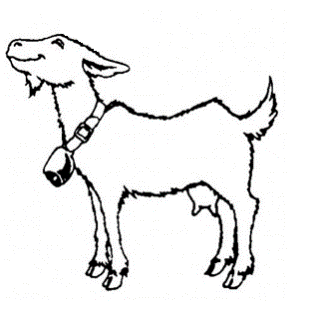
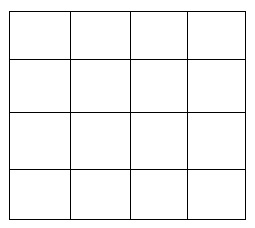
**Directions**: Complete this lab in your assigned groups of 2. Use *Rock, Paper, Scissors* to determine the genotype and phenotype of your goat. (Older partner is dominant, younger is recessive).

In this lab, you will be determining traits that are affected by epistasis. Epistasis is the condition in which one gene affects the expression of another gene.

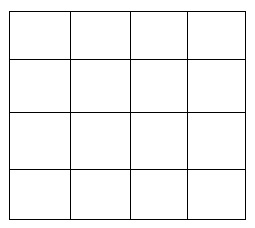
In the first, example, you will be examining the impact of epistasis on the horns of goats. Determine your goat’s genotype for two sets of genes. Then record the phenotype created by the genotype. Lastly, pair your goat with another from a different group and indicate what possible phenotypes could exist for your offspring.

1. **Horns**: *no horns (polled) is dominant to horns*  
    Game 1: Dominant Recessive Game 2: Dominant Recessive  
     
   Genotype: PP Pp pp Phenotype:
2. **Straight/Curled Horns**: *straight horns are dominant to curled horns.*  
    Game 1: Dominant Recessive Game 2: Dominant Recessive  
     
   Genotype: HH Hh hh Phenotype:
3. What is the overall phenotype of your goat?   
   *Keep in mind that if your goat is polled, it won’t have either curly or straight horns!*
4. Draw your goat 🡺.
5. Find another goat to mate yours with.   
   What is the mate’s genotype?
6. What is the mate’s phenotype?
7. Draw the mate 🡪
8. Using the genotype of your goat and its mate, complete the dihybrid Punnett square below.   
   *Remember to split up your genes so that only one allele for each set is above each row.   
   For example, the genotype AaBb would be written as AB Ab aB ab*
9. Complete the blanks below:  
     
   *How many goats have no horns? /16*   
     
   *How many goats have straight horns? /16   
     
   How many goats have curled horns? /16*
10. What genotypes would code for no horns? There are six. Record them all below:  
      
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11. What genotypes would code for straight horns? There are 2 possible combinations:
12. What genotypes would code for curly horns? There is only one possible combination:

In the second example you will focus on color. Determine your goat’s genotype for two sets of genes related to color. Then record the phenotype created by the genotype. Lastly, pair your goat with another from a different group and indicate what possible phenotypes could exist for your offspring. Keep in mind, this trait is affected by incomplete dominance (where the dominant and the recessive trait blend). The second partner should complete this example.

1. **Color**: *color is dominant to no color (albino)*  
    Game 1: Dominant Recessive Game 2: Dominant Recessive  
     
   Genotype: DD Dd dd Phenotype:
2. **Shade**: *dark shades are incompletely dominant to light shades. BB would be black; Bb would be dark gray; bb would be light gray.*  
    Game 1: Dominant Recessive Game 2: Dominant Recessive  
     
   Genotype: BB Bb bb Phenotype:
3. What is the overall phenotype of your goat?   
   *Keep in mind that if your goat is albino, it won’t have any color!*
4. Draw your goat below.
5. Find another goat to mate yours with.   
     
   What is the mate’s genotype?
6. What is the mate’s phenotype?
7. Draw the mate 🡪
8. Using the genotype of your goat and its mate, complete the dihybrid Punnett square below.   
   *Remember to split up your genes so that only one allele for each set is above each row.   
   For example, the genotype AaBb would be written as AB Ab aB ab*
9. Complete the blanks below:  
     
   *How many goats are albino? /16*   
     
   *How many goats have black hair? /16   
     
   How many goats have dark gray hair? /16   
     
   How many goats have light gray hair? /16*
10. Could two albino goats have a baby with colored hair? Explain:  
      
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In the final example you will focus on a co-dominant trait (traits in which two different alleles are both equally dominant). Both bleating and grunting are dominant traits in these goats. Mute goats are recessive.

1. **Sound**: *noisy genes are dominant to no noise (mute)*  
    Game 1: Dominant Recessive Game 2: Dominant Recessive  
     
   Genotype: NN Nn nn Phenotype:
2. **Noise**: *bleats and grunts are codominant. .*  
    Game 1: Dominant Recessive Game 2: Dominant Recessive  
     
   Genotype: BB BG GG Phenotype:
3. What is the overall phenotype of your goat?   
   *Keep in mind that if your goat is mute, it won’t bleat or grunt! If it is heterozygous, it could do both!*
4. Find another goat to mate yours with.   
     
   What is the mate’s genotype?
5. What is the mate’s phenotype?
6. Describe your goat for all three traits (horns, coat, and noises) below:   
     
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7. Using the genotype of your goat and its mate, complete the dihybrid Punnett square below.   
   *Remember to split up your genes so that only one allele for each set is above each row.   
   For example, the genotype AaBb would be written as AB Ab aB ab*
8. Complete the blanks below:  
     
   *How many goats are mute? /16*   
     
   *How many goats only bleat? /16   
     
   How many goats only grunt? /16   
     
   How many goats bleat and grunt? /16*
9. Could two co-dominant grunting *and* bleating goats have a baby that is mute? Explain:  
     
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