Lesson 10: Friday, April 4, 2020. Biology MHS
AIM: ***How has our understanding of genetics led to advancements in the fields of farming?***

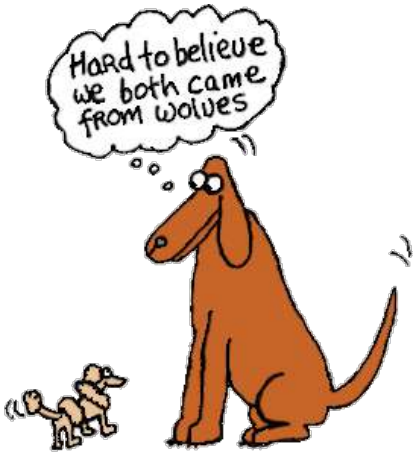
For THOUSANDS of years, humans have been manipulating the traits of organisms through a process called **selective breeding.** Humans have used selective breeding to produce organisms with desirable traits, simply by following the patterns of inheritance. We have been using this technique since '*ancient times*,' long before we even knew what DNA was. It doesn't take a genius to figure out that if 2 brown dogs reproduce, they are likely to produce brown puppies.

MATES WITH TRAITS:

Selective breeding (also called ***artificial selection***) is a technique that follows the patterns of **inheritance**; *select* two parent organisms with a *desired characteristic* and then **breed** them. Because genes are inherited, it is likely that the offspring will receive the desired trait. But, because of **genetic recombination**, it is not guaranteed. Round after round of successful selective breeding overtime can dictate which genes are in the gene pool. Overtime we can manipulate *all* organisms to look a certain way. This can eliminate genetic diversity from the gene pool and guarantee particular traits over time.

Examples of Selective Breeding throughout History:

- Farmers, to this day, use the technique of **selective breeding.** If farmers want corn that is *very sweet*, they will breed the sweetest corn plants. If farmers want corn that is *very large*, they will breed the largest corn plants. If farmers use this technique over *many generations*, they can produce corn that is very large, very sweet, or even corn with both traits!
- In fact, ALL of the produce that we are familiar with in the grocery store is the result of **selective breeding.** Have you ever been 'out in the wild' and seen a strawberry plant that looks like grocery store strawberries? How about a big head of perfectly crisp, wild lettuce? No? This is because these crops are the product of human control- they were selectively bred from smaller, less tasteful "wild" plants. Many generations of breeding has produced the fruits and vegetables that we have today.
- Have you even been 'out in nature' and seen a "wild" dairy cow? Absolutely not. There are wild buffalo, wild cattle, wild ox, etc. But, our "dairy cows" are the product of selective breeding. Over thousands of years, they were bred. They no longer have "traits for survival," they have traits that benefit humans in the form of food. All farm animals selectively bred- chickens, cows, pigs, sheep, etc.
- Have you ever been 'out in nature' and seen a wild Chihuahua? How about a wild Poodle? NO! Maybe you've seen a stray, but these organisms are not "wild" animals- they are **domesticated** animals that are the product of **selective breeding.** Did you know that ALL DOMESTIC DOGS were selectively bred ***from wolves***?? YES- even the Chihuahua. How can this be!?! Well, it's the result of about 10,000 years of selective breeding, manipulating the gene pool of organisms over time.
    - I still don't believe you. HOW could a Chihuahua be bred from wolves?? Well... If you bred the smallest dogs with the smallest dogs… for hundreds of generations... the dogs could end up pretty small. Then, you only bred dogs that had any type of brown color in their fur over, and over, and over, and over again… you might end up with small brown dogs. And then, you chose the dogs with the biggest eyeballs, over, and over, and over again. If I was around for 10,000 years to do this… I might be able to produce a Chihuahua. Over TIME, selective breeding can be pretty powerful.



Here are some pictures that represent selective breeding. Analyze each picture and read each caption.

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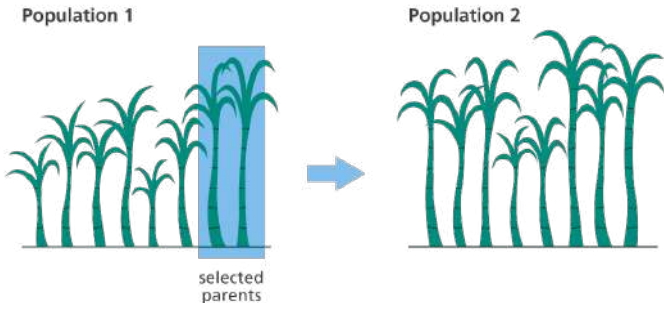
<td> 
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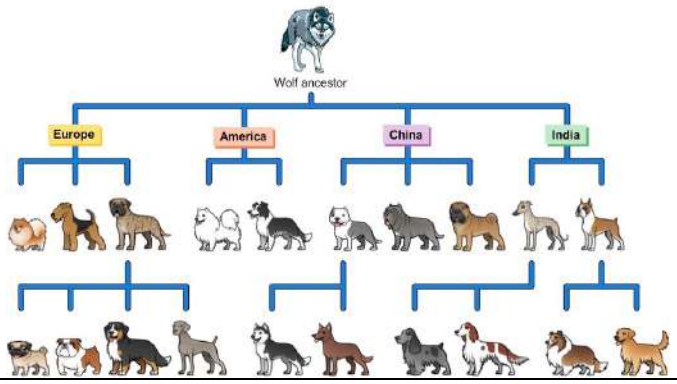
<td> 
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<td>This picture shows selective breeding for the desired trait of “height.” Two tall plants were chosen to breed. Most of the offspring inherited the gene for tallness, but not all!</td>
<td>ALL modern-day dog breeds were selectively bred from the wolf. This took thousands of years to achieve. We are still selectively breeding dogs today.</td>
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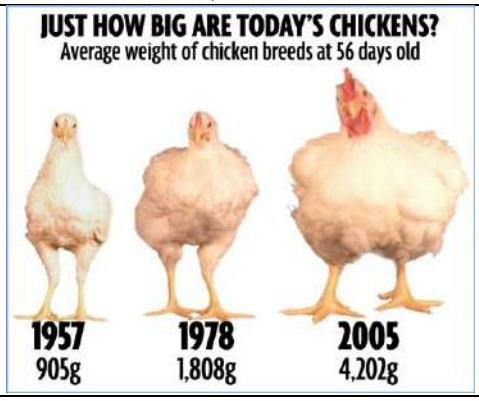
<td> 
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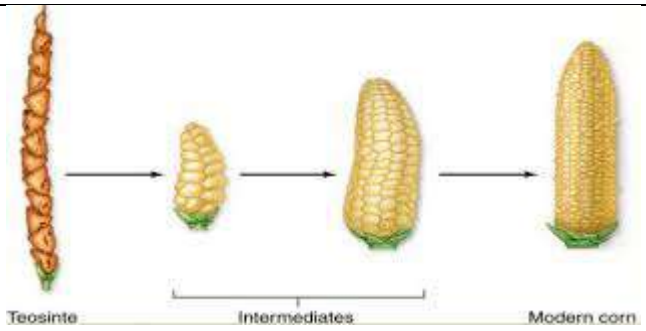
<td> 
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<td>Over the past 70 years, we have selectively bred the largest chickens to create chickens with more meat. This means more food for us.</td>
<td>Corn, and most other crops, were selectively bred from wild plants. We can see that corn was bred to be large in size, amongst other traits.</td>
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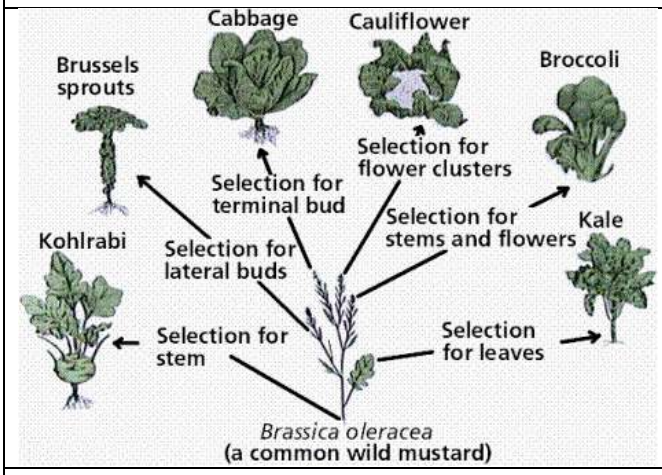
<td> 
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<td>This picture shows all the different modern vegetables that were selectively bred from a single wild plant! Once again, this process takes many generations to achieve.</td>
<td>The picture above shows a wild rose. By selectively breeding flowers for color, number of petals, and size, we’ve created many unique varieties of roses.</td>
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Watch this helpful YouTube video: https://www.youtube.com/watch?v=W_CnR0Ak604 - Mark Drollinger

Selective Breeding Questions:

1. Explain selective breeding and identify another term for it.

2. How have humans benefitted from selective breeding? Give 3 examples of things that we have selectively bred.

3. How long have humans been using the technique of selective breeding for?

4. A turkey farmer would like to produce the best Thanksgiving turkeys to be sold at Thanksgiving time. What are 3 *desirable traits* that the farmer might look for when breeding her turkeys?

5. Identify and explain 1 challenge of selective breeding.

6. Explain why humans were able to take advantage of selective breeding before we even knew about DNA and genes. What knowledge did we have?

Regents Questions: Yes, it's the same answer every time. BUT READ THE QUESTIONS TO BECOME FAMILIAR WITH WHAT YOU COULD BE TESTED ON.

The corn we eat today is larger and has more kernels than the corn people first grew thousands of years ago. Which process is most likely responsible for the changes that have occurred?

(1) Mitosis
(2) Succession
(3) Direct harvesting
(4) Selective breeding

White short-haired cattle and Black Angus cattle have been crossed to produce offspring with superior beef and rapid growth qualities. This process of choosing organisms with the most desirable traits for mating is known as

(1) Cloning
(2) Selective breeding
(3) Biodiversity
(4) Genetic engineering

When humans first domesticated dogs, there was relatively little diversity in the species. Today, there are many variations such as the German shepherd and the Dalmatian. This increase in diversity is most closely associated with

(1) Cloning of selected body cells
(2) Mitotic cell division
(3) Selective breeding
(4) Genetic engineering

Which process is a common practice that has been used by farmers for hundreds of years to develop new plant and animal varieties?

(1) Cloning
(2) Cutting DNA and removing segments
(3) Genetic engineering
(4) Selective breeding for desirable traits

Selective breeding has been used to improve the racing ability of horses.

- Define selective breeding and state how it would be used to improve the racing ability of horses
- State one disadvantage of selective breeding