Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_

Genetics

in the Animal Industry Notes

1. ***Describe the role and importance of genetics in the animal industry***

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* + “Survival of the Fittest”
  + If the animal has characteristics to survive, it reproduces
  + No human intervention

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* Humans control which animals reproduce based on presence of desirable characteristics

**Why use artificial selection in agriculture?**

* More ability to control and perpetuate desired characteristics
* Agricultural products are higher quality and more consistent

 **Phenotype: Genotype:**

Phenotype = Genotype =

1. ***Recognize & describe the interrelationship between genetics and the environment***

* ***Heredity=*** *the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ an animal has to show specific traits or performance due to it’s genetic information*
* ***Environment=*** *The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ conditions that affect the traits and performance of an animal*

**+**

**=**

**Traits**

**&**

**Performance**

**(Phenotype)**

* Some traits are influenced more by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Other traits are influenced most by genetics \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_=** The percentage a trait is affected by the animal’s GENETIC information
  + A heritability factor of 0.0 = **\_\_\_\_\_\_\_\_\_\_\_\_** influence from genetics
  + A heritability factor of 1.0= **\_\_\_\_\_\_\_\_\_\_\_\_** influence from genetics

***Cattle***

Fertility = 0.10

Birth Weight = 0.45

Conformation = 0.30 - 0.38

Weaning Weight = 0.24

Height = 0.88 - 0.95

Dressing Percentage = 0.45

Ribeye Area = 0.70

***Sheep***

Multiple Births = 0.15

Lamb Growth Rate = 0.30

Wool Face Cover = 0.56

Wool Staple Length = 0.47

Loineye area = 0.53

Carcass Fat = .57

**Swine**

Piglets Farrowed = 0.10

Growth Rate= 0.30

Backfat Thickness = 0.50

Loineye area = 0.50

Length = 0.60

Chilled carcass weight = 0.60

1. ***Identify common characteristics used to select high quality breeding stock***

* + Examples: Meat production, Temperament, Coat Color, etc.
* + In the pet industry, these animals are sterilized (spayed or neutered)
  + In the livestock industry, they are usually raised for terminal markets

**Beef Cattle**

**Dairy Cattle**

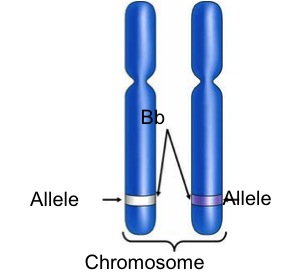
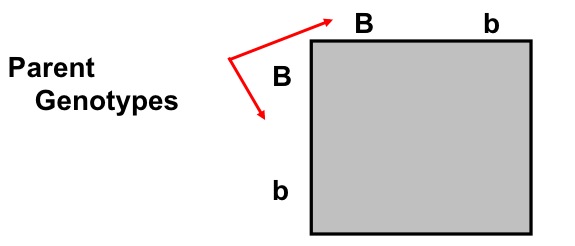
**Horses**

**Dogs**

**Pigs**

**Sheep**

***D. Describe and predict how traits are inherited using the punnet square***

* 
  + A form of a gene found in pairs
  + Located on chromosomes
  + 1 allele inherited from each parent
  + Represented by a letter
* + Represented by CAPITOL letters
  + This trait is the one expressed
* + Represented by lower case letters
  + Only expressed if both alleles are recessive
* + Both alleles are the SAME
    - (BB) = Homozygous dominant
    - (bb) = Homozygous Recessive
* + Different alleles for the same trait
    - (Bb)
* + A method of calculating the chances of inheriting a specific trait

**Now you try…**



**Holstein Cattle**

* Black & white
* Red & White

FYI…

* Punnet squares can only be used with simple traits inherited by dominance
* The inheritance of other traits are more complex

1. ***Compare and contrast qualitative vs. quantitative animal traits***

* + Controlled by a SINGLE pair of genes
  + Can usually be observed visually (phenotypes)
    - Examples:
* + Controlled by SEVERAL pair of genes
  + Can usually be measured

***F. Use EPD’s to select quality sires***

**E**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **P**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**D**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Indicates the genetic value of a specific sire compared to the average genetic value of it’s breed.
* Expressed as a number
* Used in the cattle industry

**Calculate an EPD:**

* *The average maternal milk production for Herefords is 25 lbs*
* *The average milk production for a bull’s daughters is 21 lbs*
* *The maternal milk EPD for this bull is:*

**Common EPD’s: Beef Cattle**

* *CED:*
* *BW:*
* *WW:*
* *YW:*
* *CW:*
* *RE:*

**Common EPD’s: Dairy Cattle**

* *MILK:*
* *Protein:*
* *Fat:*
* *CE:*
* *SCS:*

**Benefits of using EPD’s**

* *Use sire’s who are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*
  + *Sires with EPD’s have likely already produced 100 or more calves*
  + *Pinpoint characteristics you want to improve in your herd*

***G. Compare common breeding systems used in the animal industry***

* Breeding systems are designed based upon:
  + - Financial Goals
    - Specific markets you produce for
      * Terminal markets (meat)
      * Seedstock Markets
      * Show & Purebred industry markets

**Breeding Systems:**

* + All animals are registered purebreds
    - **Goal:** Produce high quality animals to use as breeding and/or show stock
* + Breeding females are not purebred or registered
  + Sires are typically higher quality purebreds
    - **Goal:** Produce offspring of higher quality than the commercial female. (Sometimes called “Grading up”)

**Breeding Strategies**

* + Mating animals of DIFFERENT breeds
    - Goal: Increase Hybrid Vigor in hopes that offspring will inherit the good traits of both parents
* + Mating closely related animals
  + Necessary to create new breeds or isolate genes for specific traits
* + Mating related animals
    - Half siblings
    - Grandsire x granddaughter (skip generation)

*\*Minor form of inbreeding, but not as extreme*