UNIVERSITY of FLORIDA

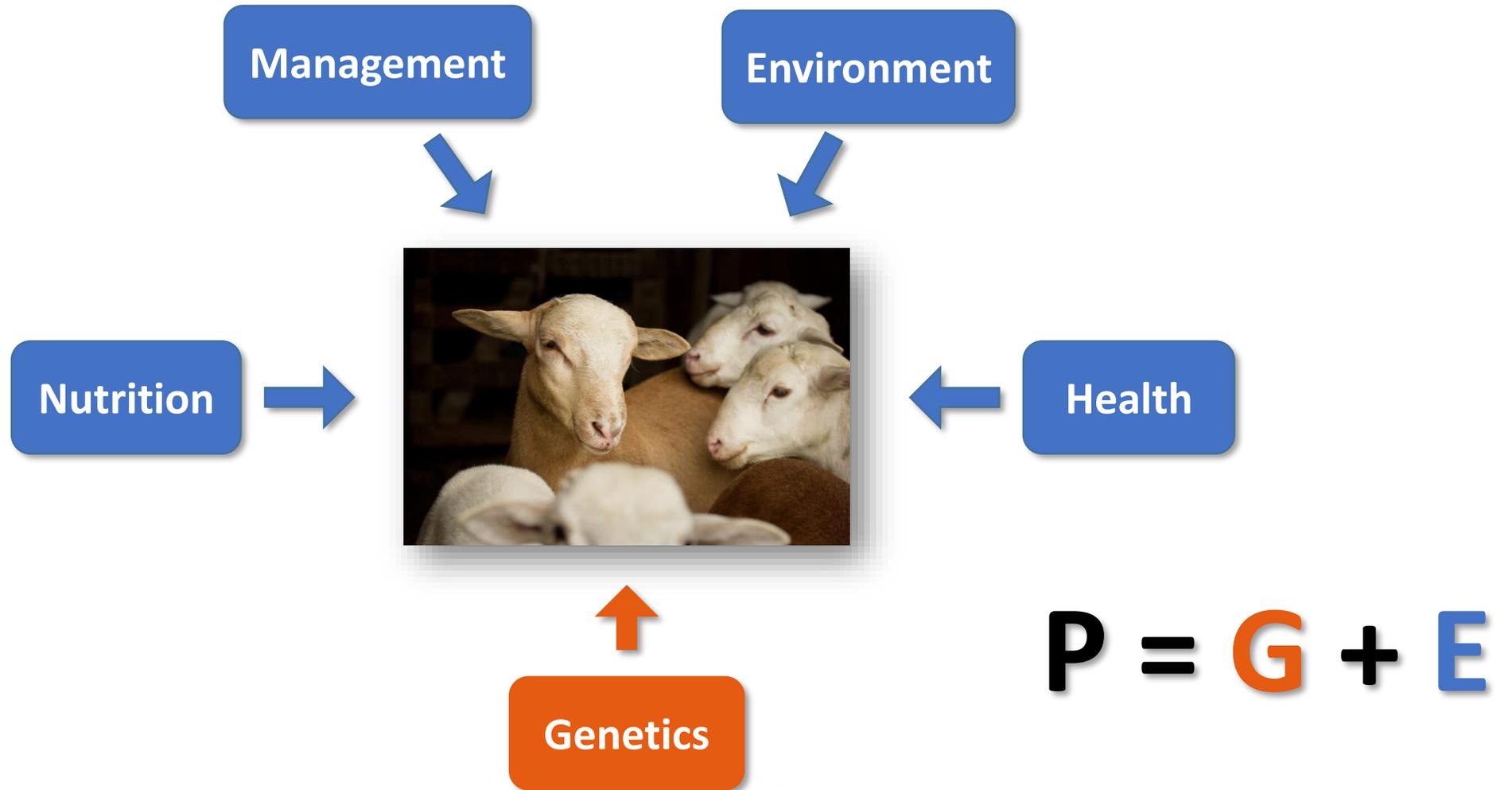**Department of Animal Sciences**

Florida Meat Sheep Program:
a pathway to enhanced productivity & profitability

Fernanda Rezende, PhD

Assistant Professor
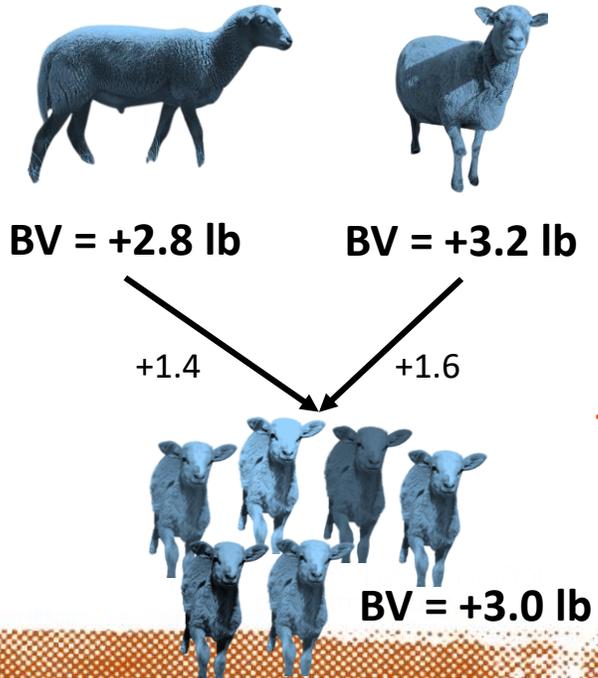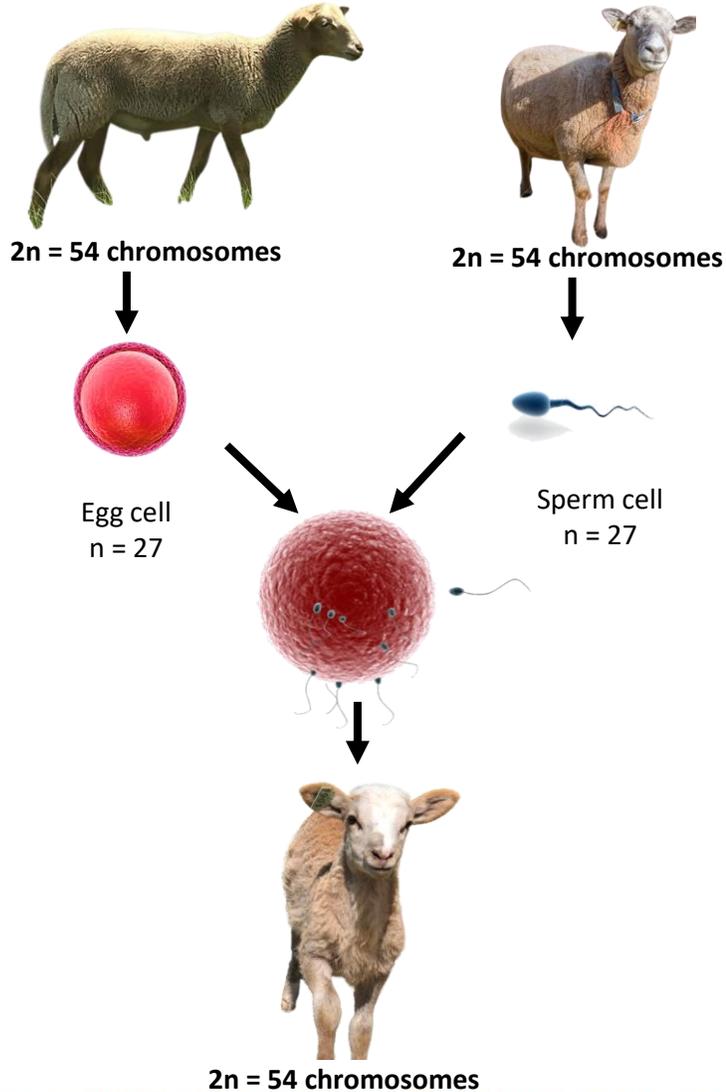**Statistical Genetics and Quantitative Genomics**

What determines animal performance?

Management

Environment

Nutrition

Health

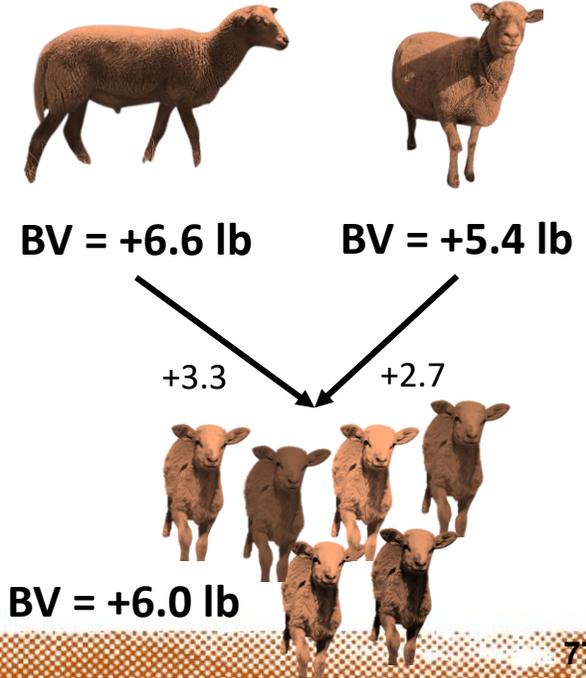Genetics

$$P = G + E$$

Genetic makeup

BV = breeding value

- Genetic makeup is **determined at conception**
- **Half of genetic material is inherited from each parent**
- Genetic inheritance is a **random process**
- Genetically superior parents are **more likely** to have genetically superior offspring

2n = 54 chromosomes

2n = 54 chromosomes

Egg cell
n = 27

Sperm cell
n = 27

2n = 54 chromosomes

BV = +2.8 lb

BV = +3.2 lb

$$EPD = \frac{BV}{2}$$

BV = +6.6 lb

BV = +5.4 lb

+1.4

+1.6

+3.3

+2.7

+3.0 lb at weaning due to superior GENETICS

BV = +3.0 lb

BV = +6.0 lb

Selection and mating decisions

- Two **most important decisions** that a producer frequently makes

- Represents a great **opportunity to improve the profitability** of the sheep enterprise

- Changes achieved through **selection** are **incremental**, **cumulative** and **permanent**
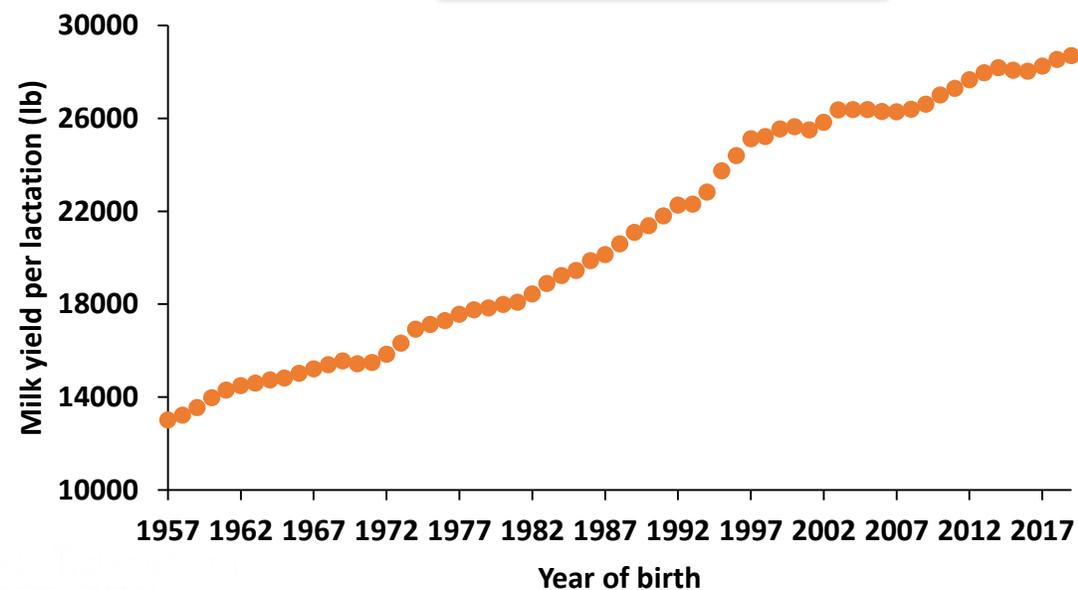
Selection and mating decisions

- Two **most important decisions** that a producer frequently makes

- Represents a great **opportunity to improve the profitability** of the sheep enterprise

- Changes achieved through **selection** are **incremental**, **cumulative** and **permanent** -> **cost-effective**
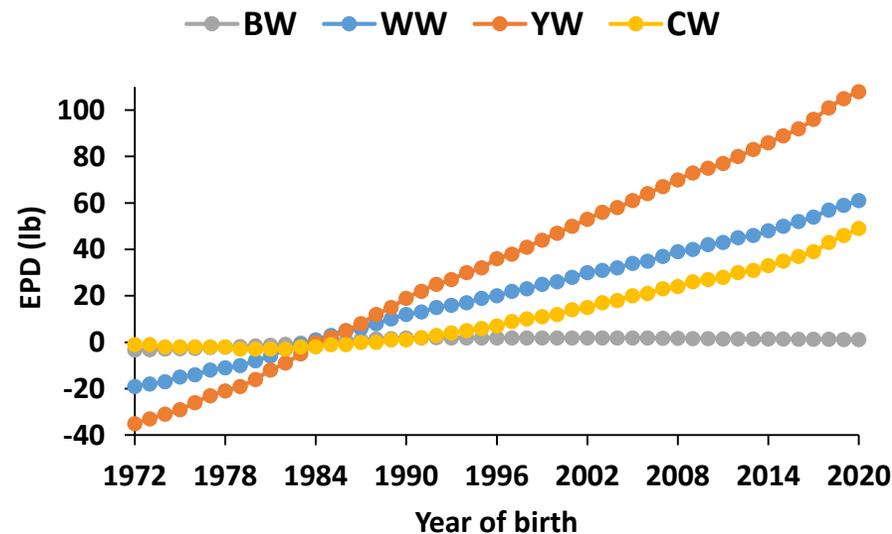
Angus beef cattle
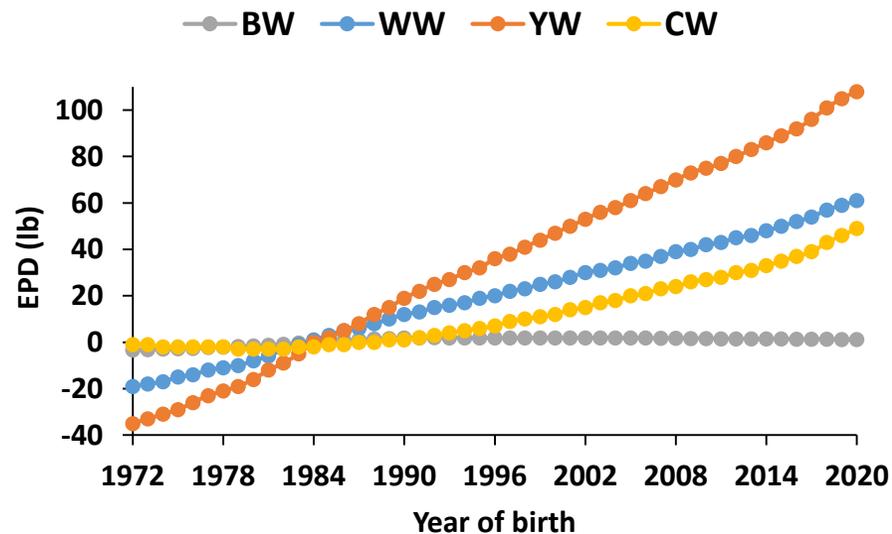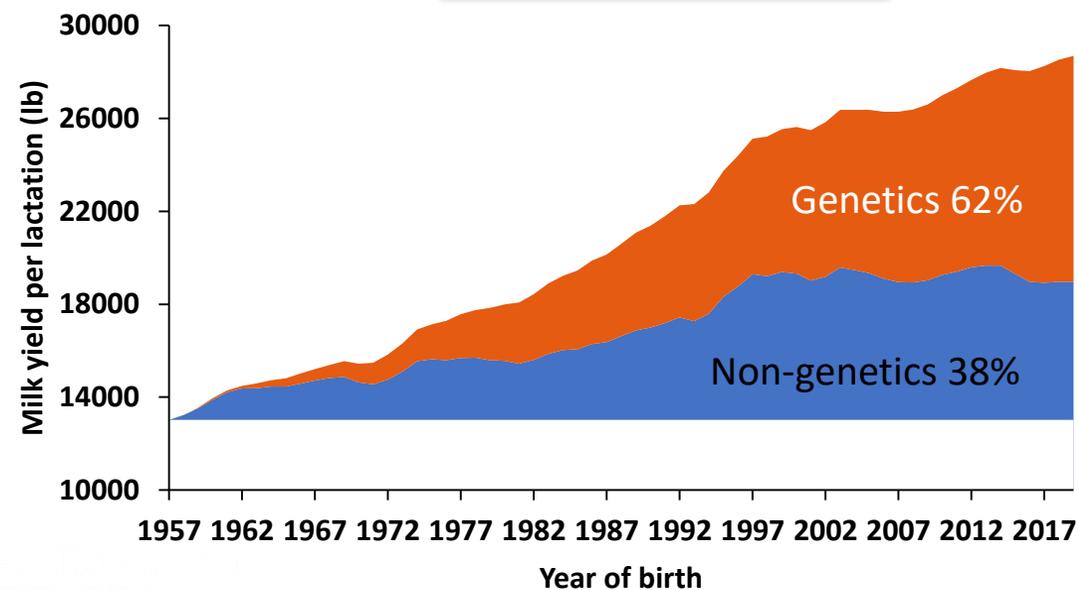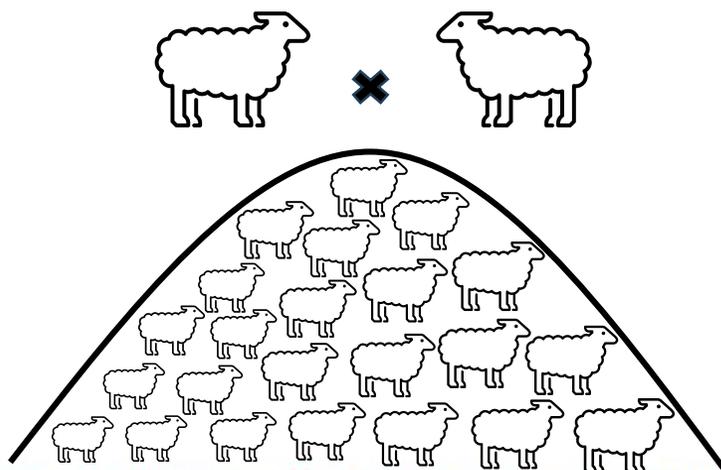

Holstein dairy cattle

Selection and mating decisions

- Two **most important decisions** that a producer frequently makes

- Represents a great **opportunity to improve the profitability** of the sheep enterprise

- Changes achieved through **selection** are **incremental**, **cumulative** and **permanent** -> **cost-effective**

- **Mating** decisions have direct impact in the **variation of the offspring**
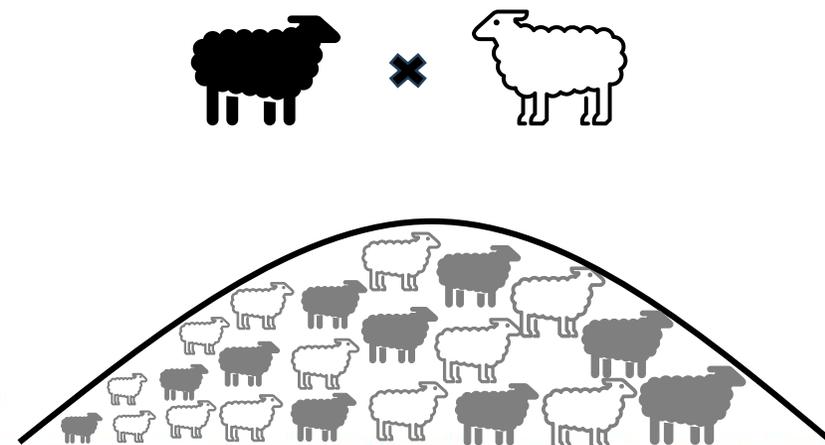
Within breed

Crossbreeding

Selection and mating decisions

- Two **most important decisions** that a producer frequently makes

- Represents a great **opportunity to improve the profitability** of the sheep enterprise

- Changes achieved through **selection** are **incremental**, **cumulative** and **permanent** -> **cost-effective**

- **Mating** decisions have direct impact in the **variation of the offspring**

Mating the "best" to the "best"
as quickly as possible
is the basic principle of making
genetic progress in a population

$$\Delta G = \frac{genetic\ superiority\ of\ selected\ parents}{generation\ interval}$$

ΔG = rate of the genetic gain
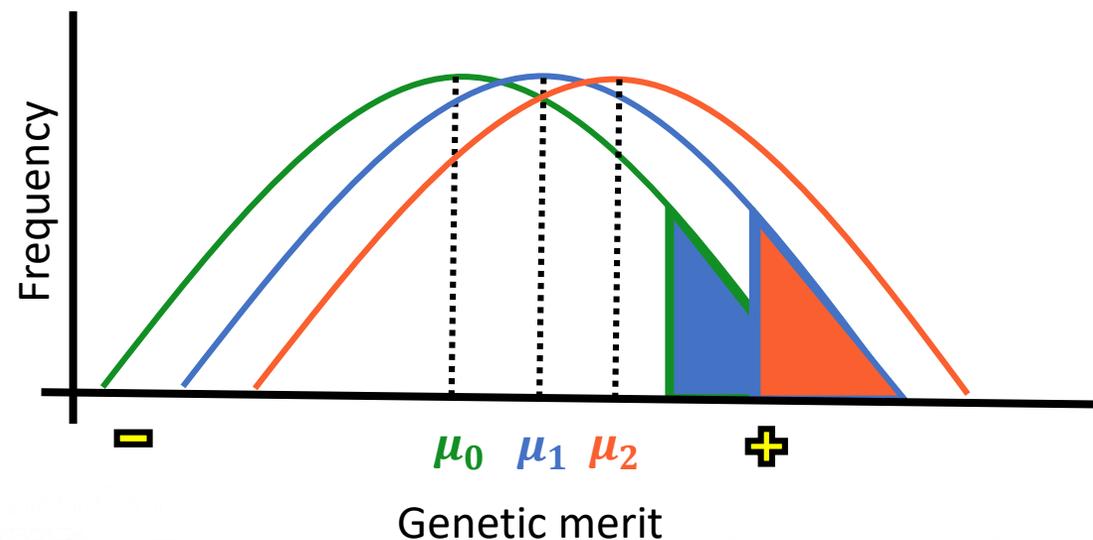
Will you choose the right ram?

Performance records (pounds)		
		9moW
RAM 1		120.3
RAM 2		118.4
RAM 3		125.6
RAM 4		130.2

Will you choose the right ram?

Raising and management information						
	Twin	**Mature ewe**	**Creep feeding**	**Disease**	**Dewormed**	**Only pasture**
RAM 1	✓		✓			✓
RAM 2				✓	✓	
RAM 3	✓	✓	✓			✓
RAM 4		✓			✓	

Will you choose the right ram?

	BW	MWW	WW	PWW	YW
Genetic merit (BV = breeding value)					
RAM 1	0.7	1.8	2.6	5.6	6.3
RAM 2	0.5	2.5	3.4	4.9	5.8
RAM 3	1.2	1.5	4.3	7.5	8.2
RAM 4	0.4	2.2	3.1	6.2	7.9

BW: birth weight
MWW: maternal weaning weight
WW: weaning weight
PWW: post-weaning weight
YW: yearling weight

The protagonists: rams and ewes

- They are our "machines" to produce gametes

- Rams and ewes have the important role of **disseminating genetic material** for the next generation

- Both **must be selected by** and **are worth** the **average value of their gametes**

- **Genetic selection** is the method by which the producer identifies individuals with **more desirable traits,** and **only those** are **allowed to reproduce**
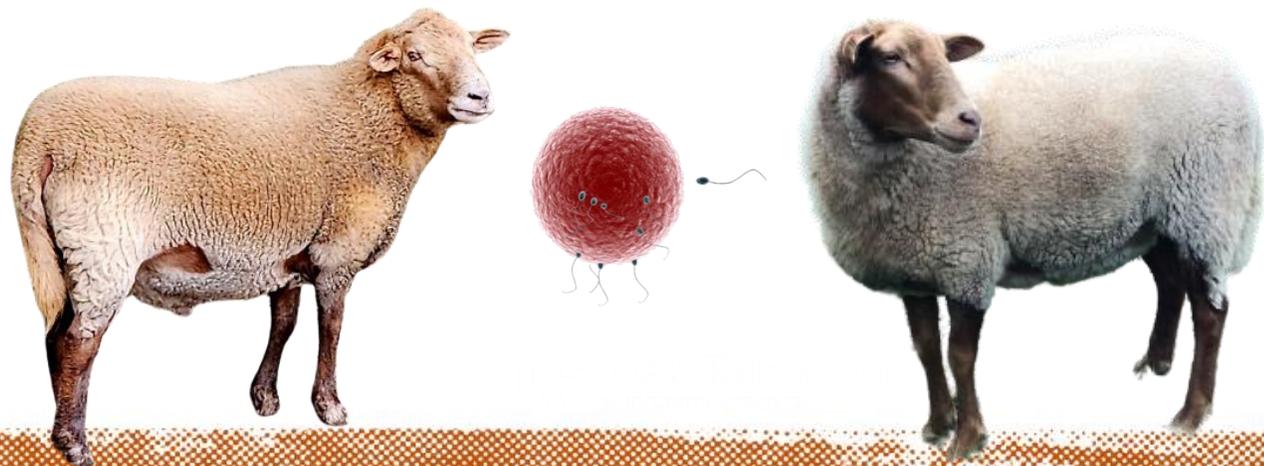
Expected progeny difference (EPD)

$$EPD = \frac{BV}{2}$$

- Estimate of the relative **genetic superiority that an animal will pass down to its offspring**

- EPD is an exceptional **tool for comparing and ranking** animals

- We should **always use EPD** when making **selection decisions**

- The **difference between the EPDs** of two rams is an **estimate of the difference** we expect to observe in the **performance of their progeny**

Ram A
BV = -2.4

Ram B
BV = +4.4

RAM 2 vs RAM 1 profitability

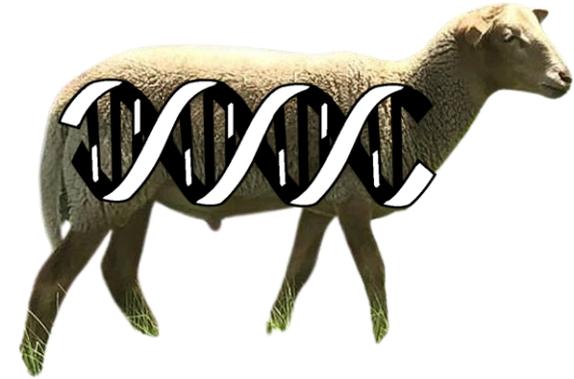20 progeny/year, 2 years in service, $4 per pound of weaned lamb

Lambs at weaning
3.4 lb difference
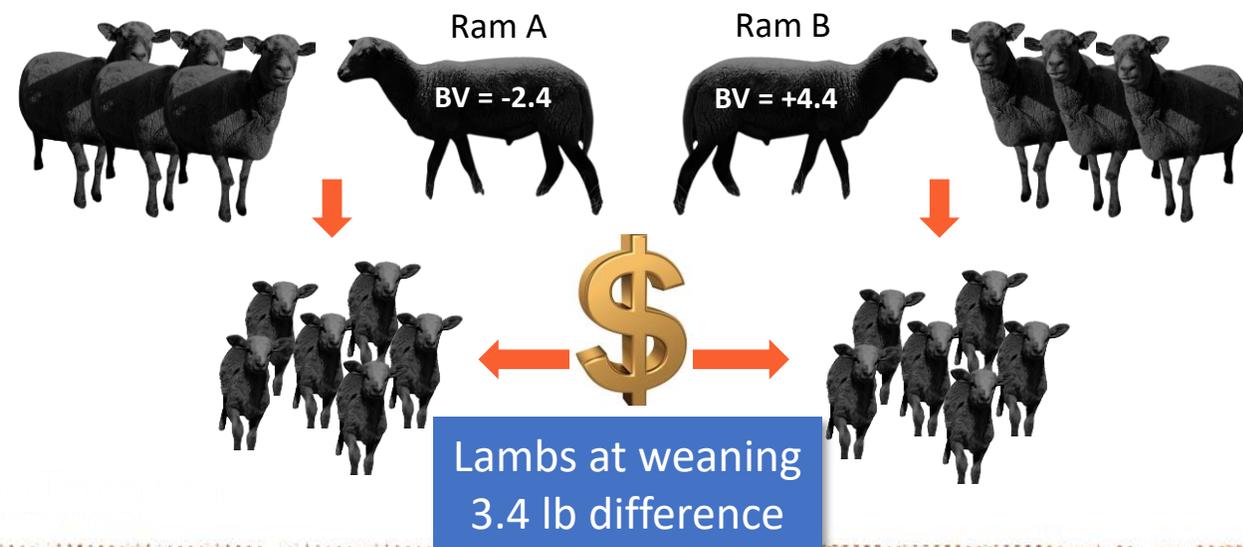
Genetic evaluation

**Performance records
Pedigree
(Genetic markers)
Raising conditions
Contemporary group**

Breeding values (BV) are the BEST prediction of animals' genetic merit for a particular trait
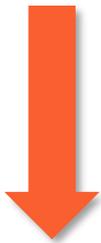
Estimation of breeding values

Breeding values (BV) are an indication of how an animals' progeny will perform
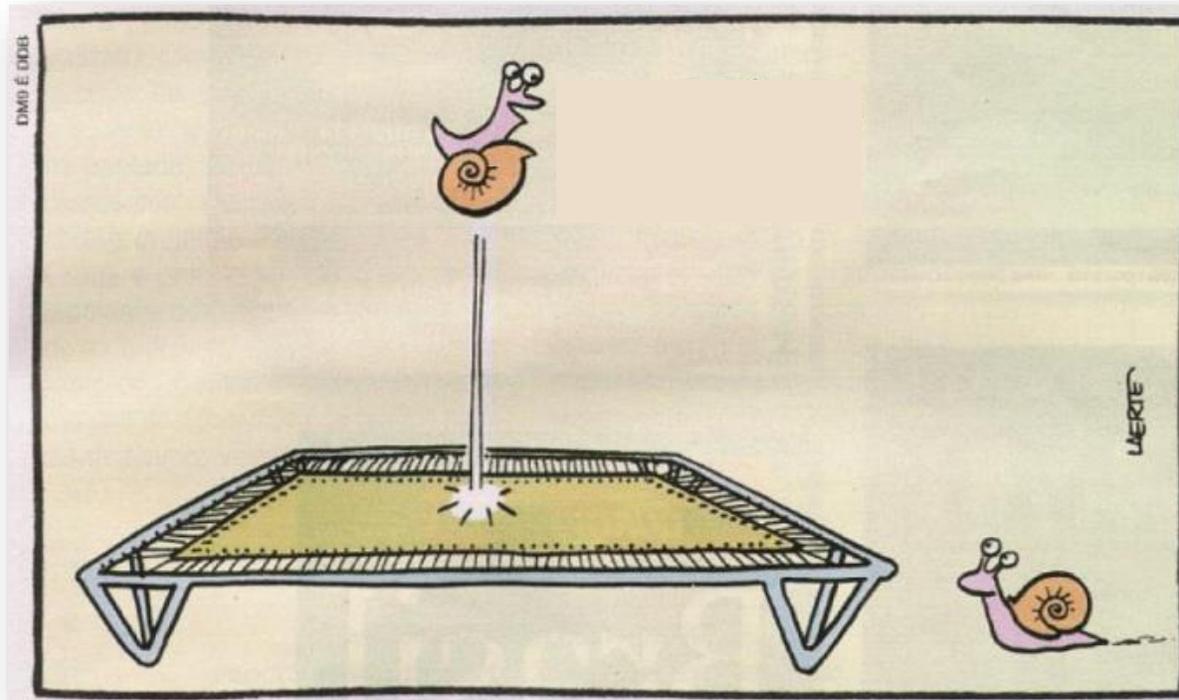
Benefits of genetic evaluation

- Facilitates identification of **genetically superior rams and ewes earlier in life**

- Allows **comparison across flocks**

- Supports more **assertive selection, culling and mating decisions**

- Allow **custom selection and mating criteria**

- Improves flock **management and traceability**

- Promotes **faster genetic progress**

- **Science-based methods**

- **Industry-tested approach**

- Enhances animals' **marketability**

- **Sales and purchases** based on numbers

- Benefits have **impact on the entire sheep industry**

Breeding programs seem to be challenging at first, but are rewarding once you start seeing the results

UNIVERSITY of FLORIDA
Department of Animal Sciences

Rezende Lab
Animal Statistical Genetics &
Quantitative Genomics

Point your cell phone
camera here!

Thank you for your attention!

Fernanda Rezende

Phone: +1 (352) 294-6988

Email: frezende@ufl.edu