

# Using genetic tools to build healthier sheep

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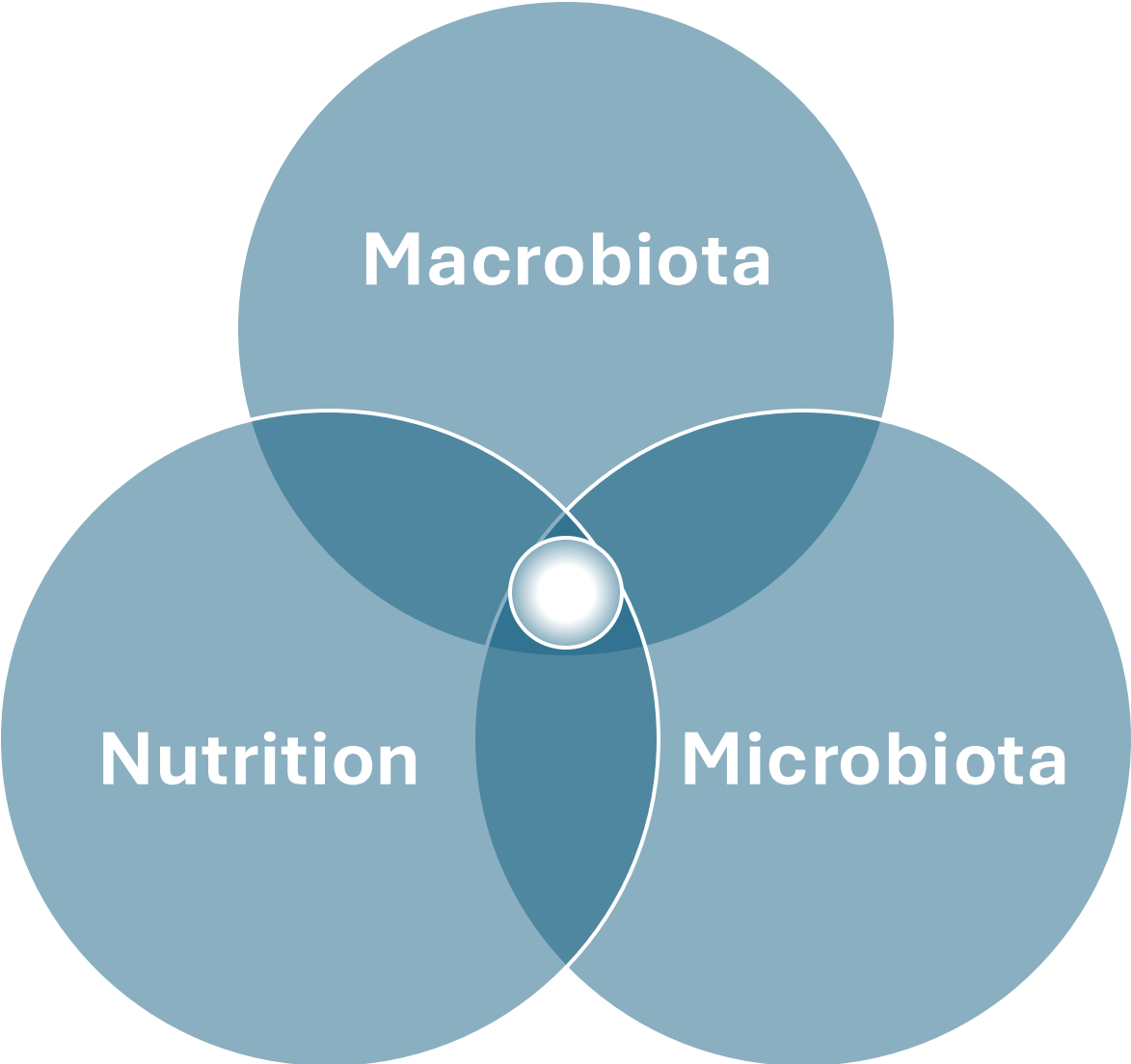
**What are healthy sheep?**





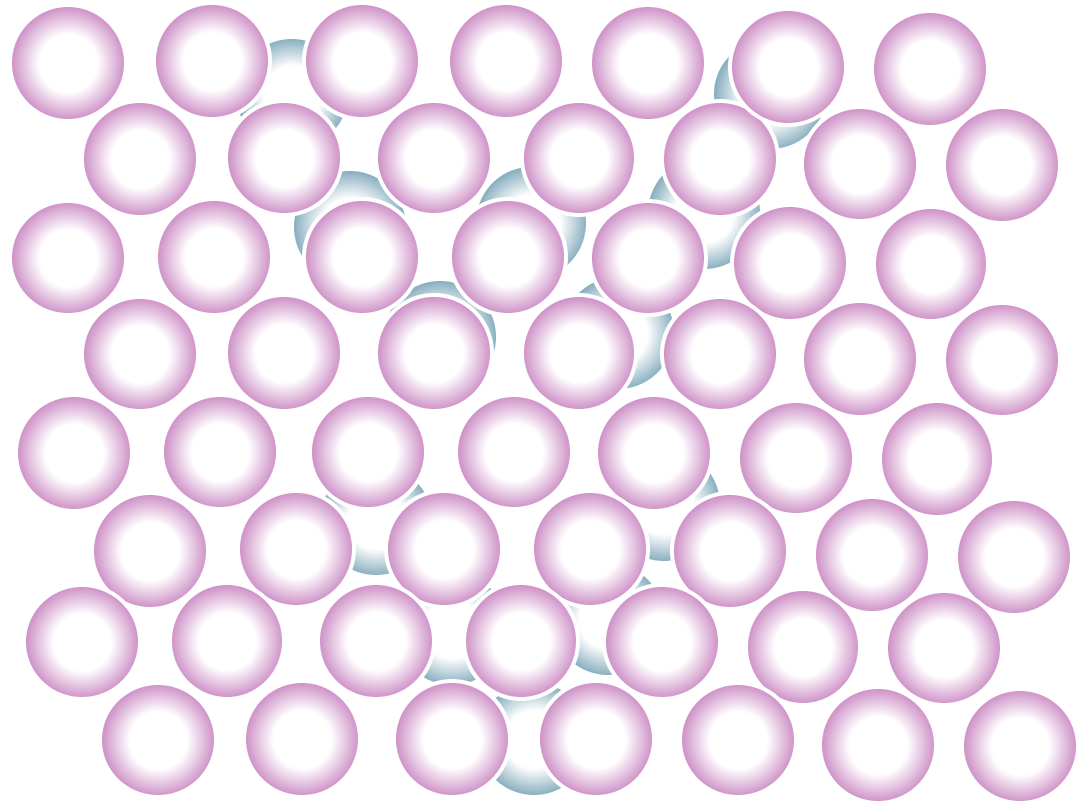


# The triad of host homeostasis....

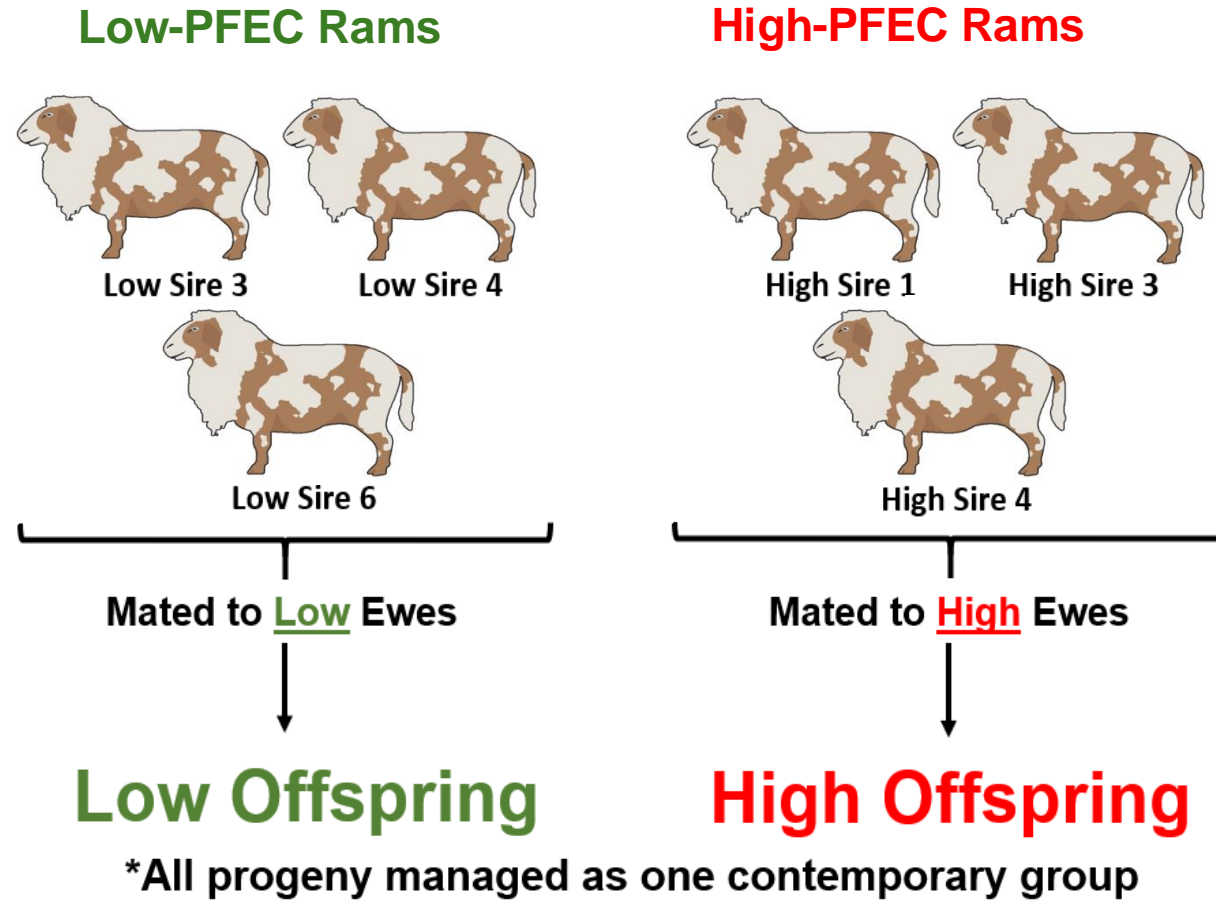


 = healthy sheep

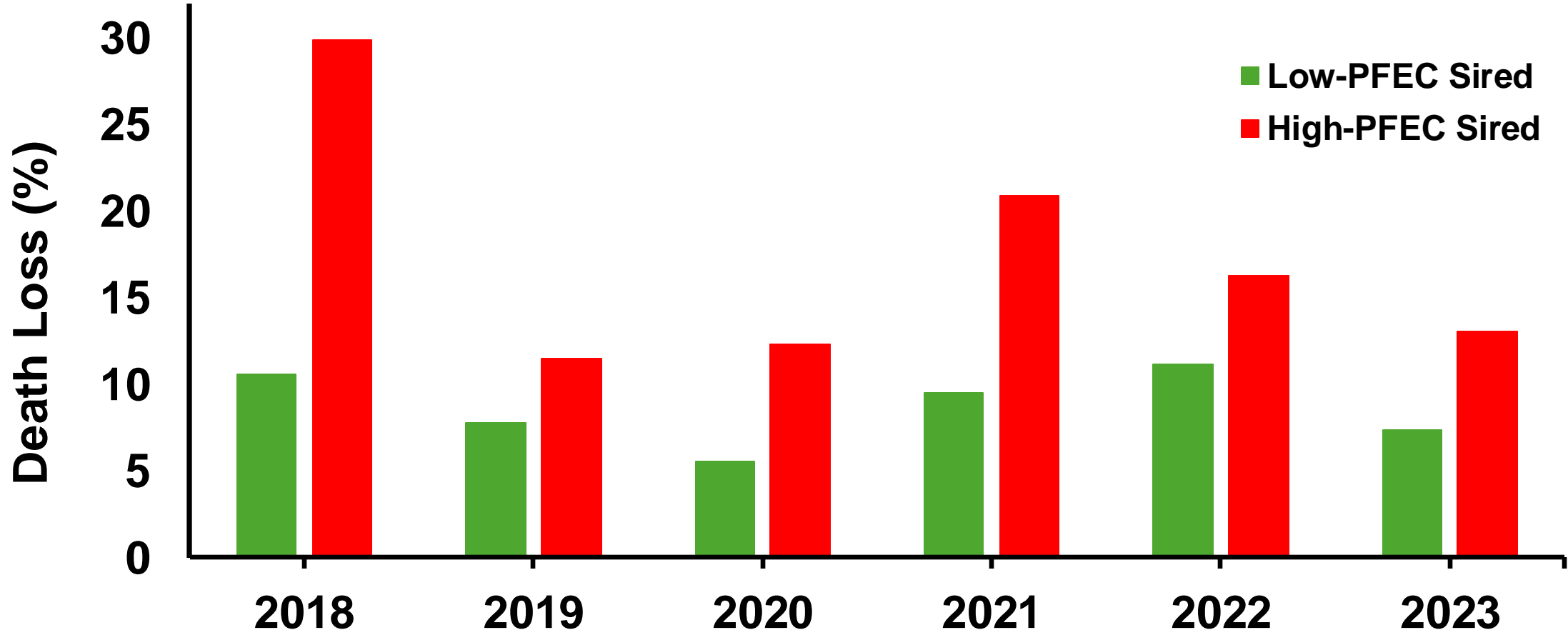
 = other sheep



# How might we remove our blindfold...experimentally!



# Non-predator Lamb Death Loss at SWAREC





**IMMUNE**



**STRENGTH**

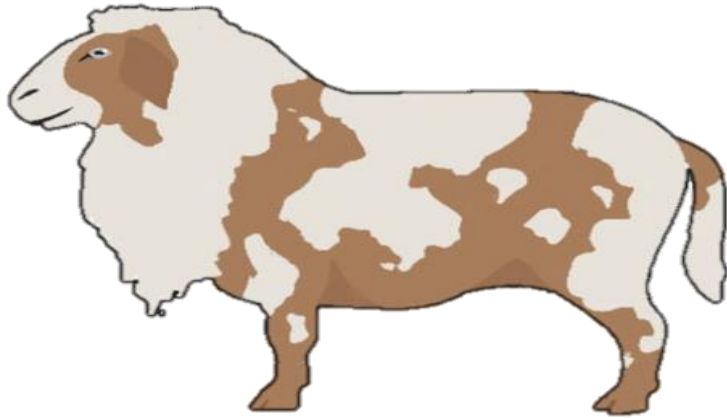


# Experimental Grouping by PFEC EBV

PFEC < -50

PFEC  $-49 < x < +49$

PFEC > +50

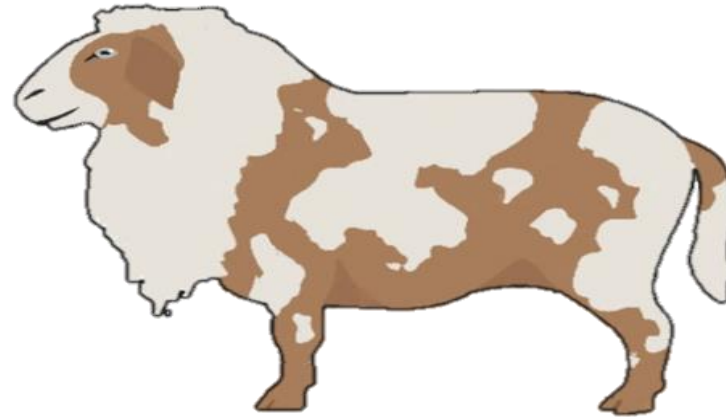


Parasite *Resistant*

or

Low-PFEC Lambs

(n= 56)

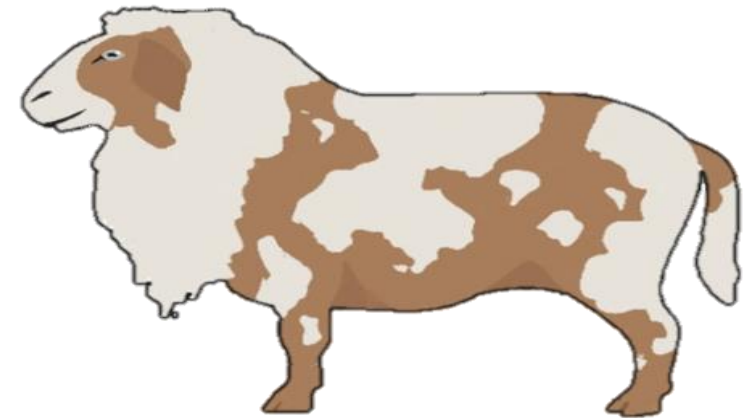


*Intermediate*

or

Mid-PFEC Lambs

(n= 53)

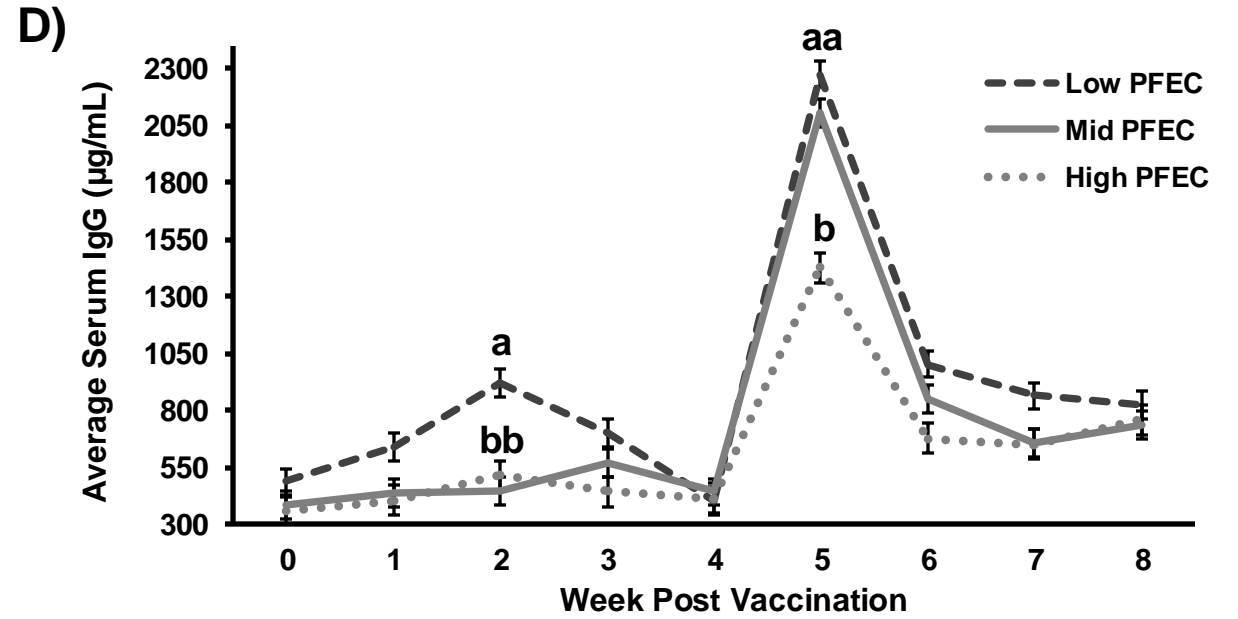
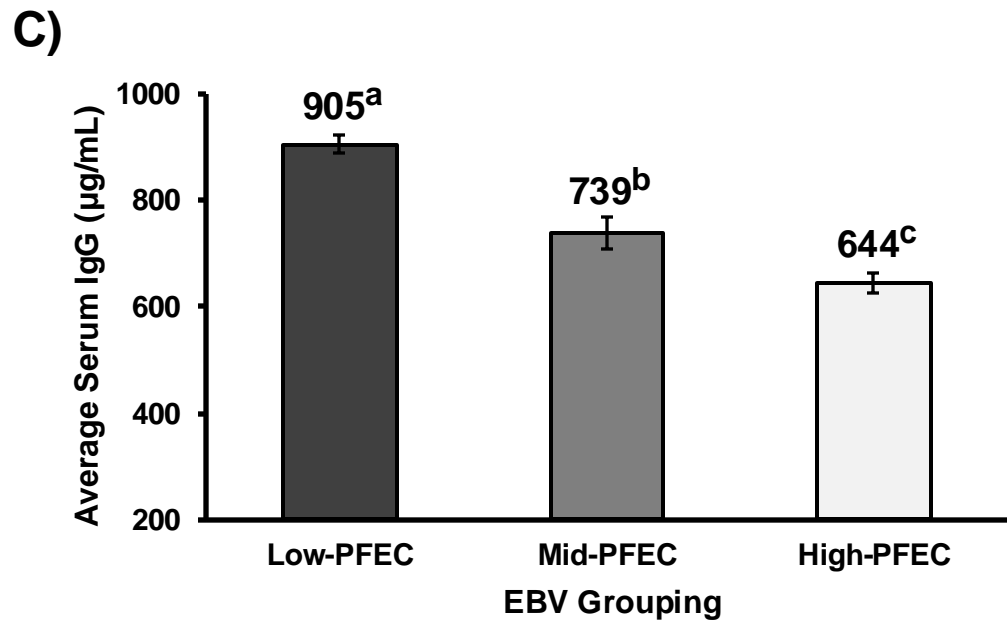
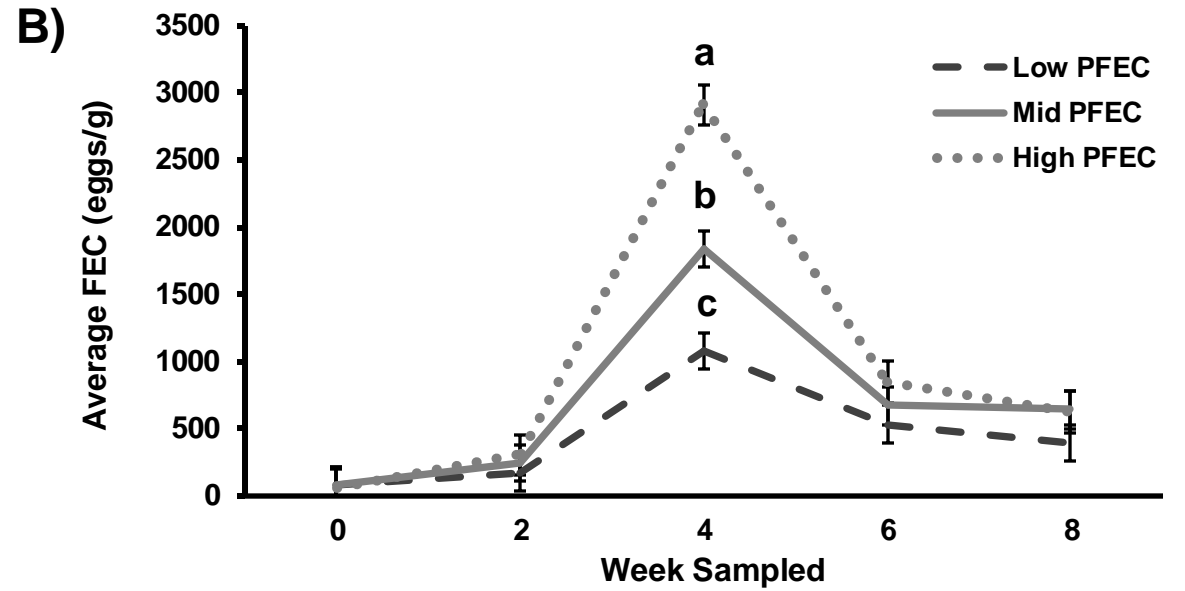
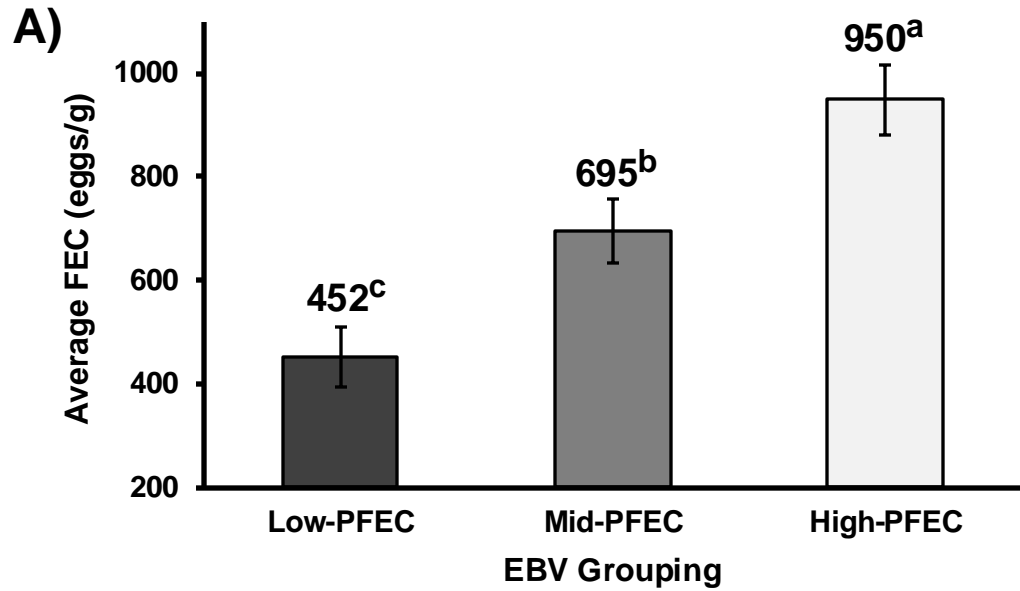


Parasite *Susceptible*

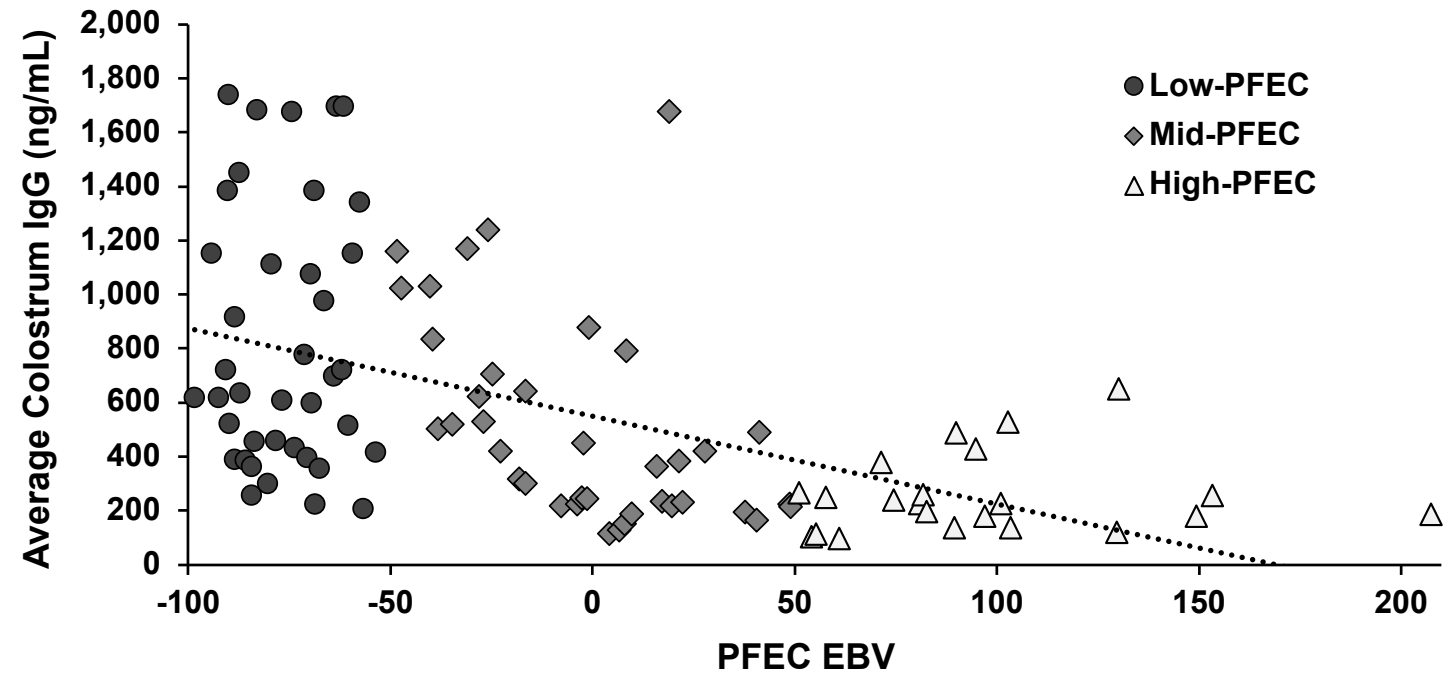
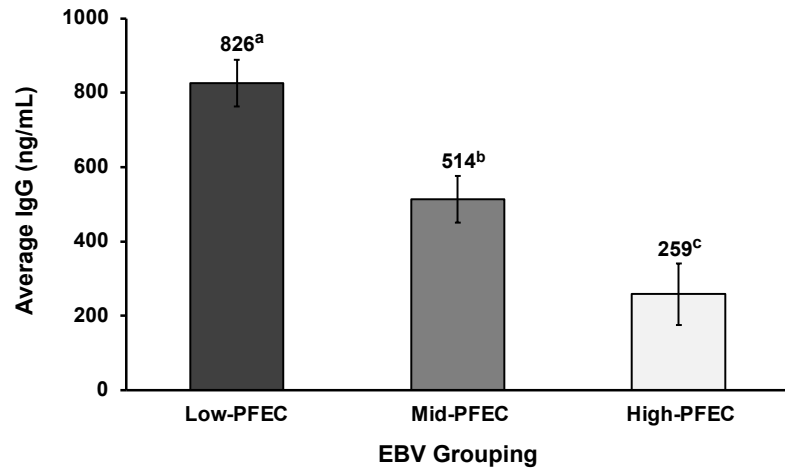
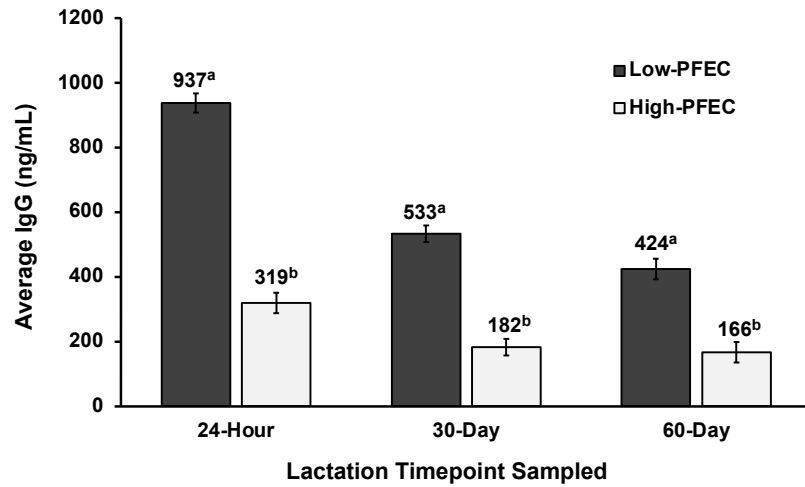
or

High-PFEC Lambs

(n= 46)



# Parasite resistance = Immune competence





**Varies due to exposure –  
environmentally and climatically  
dependent**

**Individual relative to  
contemporary group average  
>500 eggs/g**

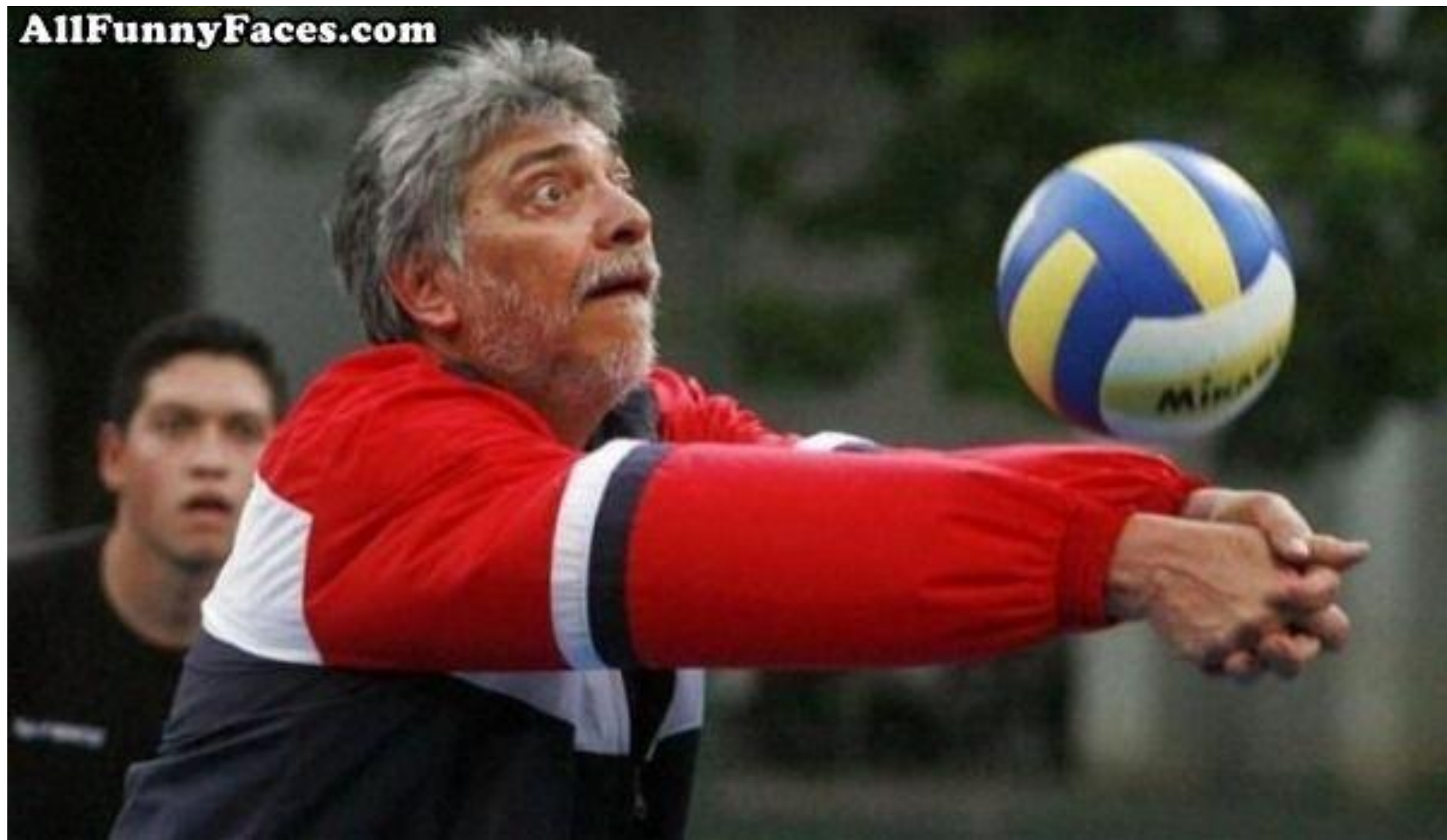
**FEC EBV!**

**The algebra of a “0” FEC**

**FEC EBV is negatively bounded  
but infinitely positive**

**Based on strongylid egg type –  
Not always *Haemonchus*!**

AllFunnyFaces.com



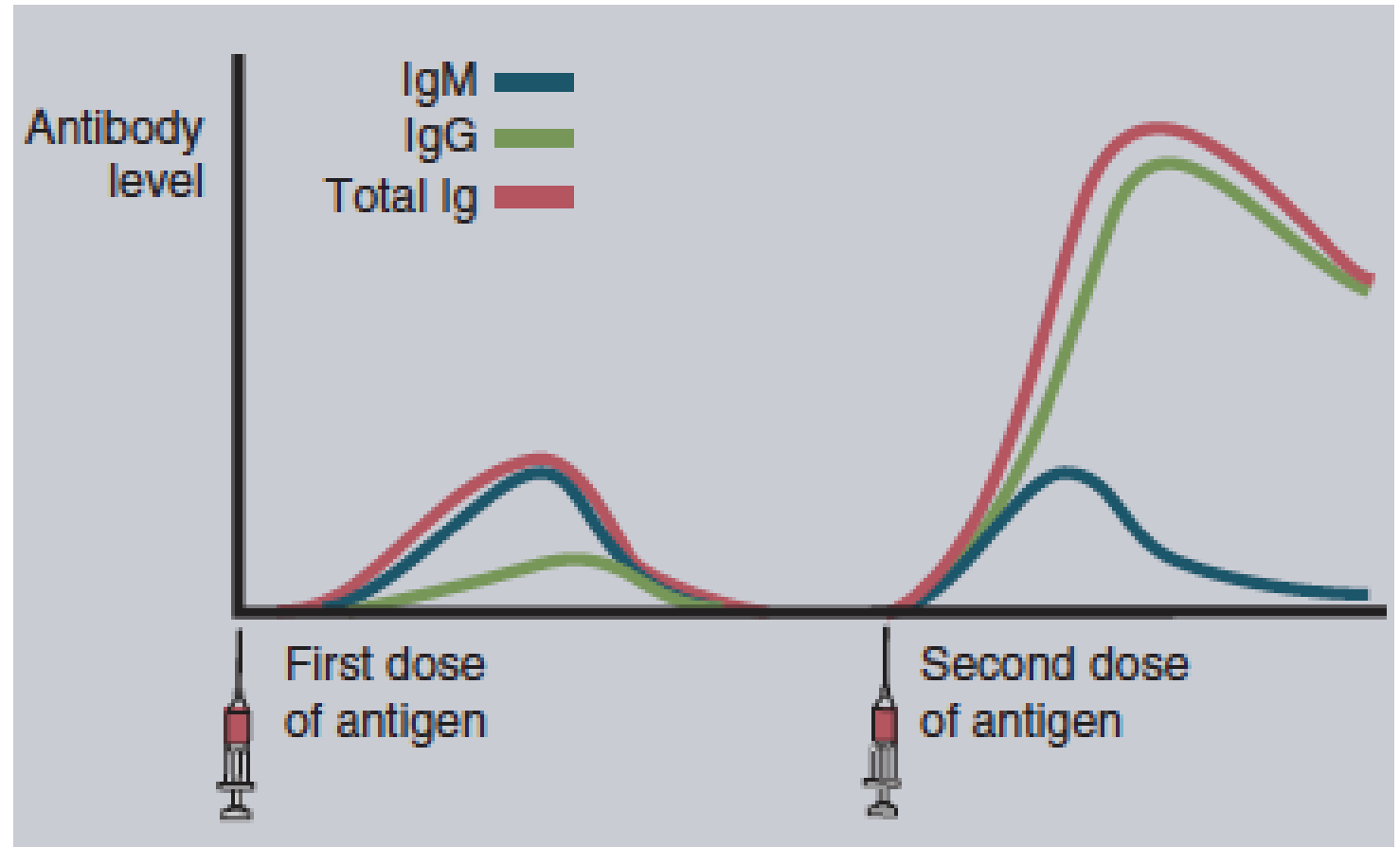






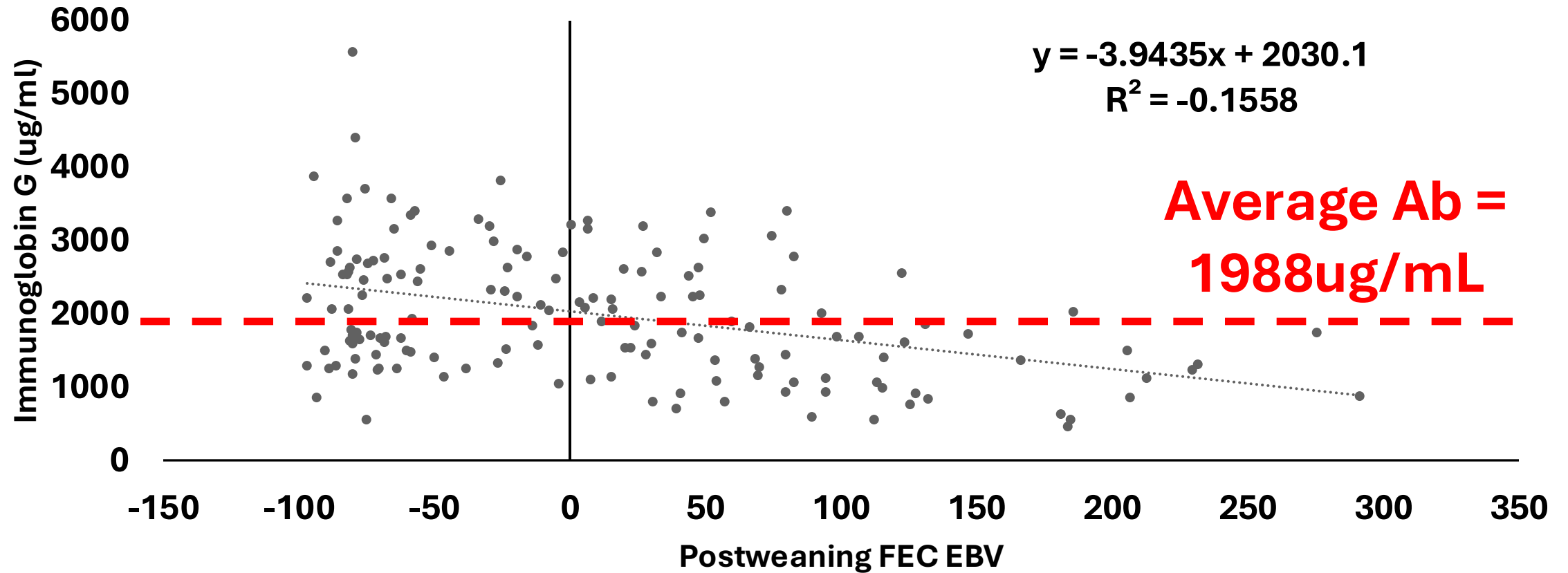
**Sheep have a range of antibody level  
and its NEVER '0'**

**Antibody can be  
measured in response  
to “something”**

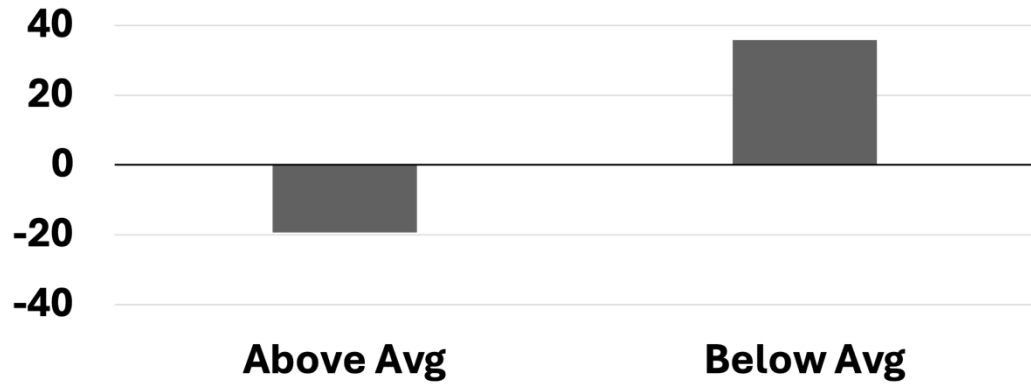


**Something here is familiar....**

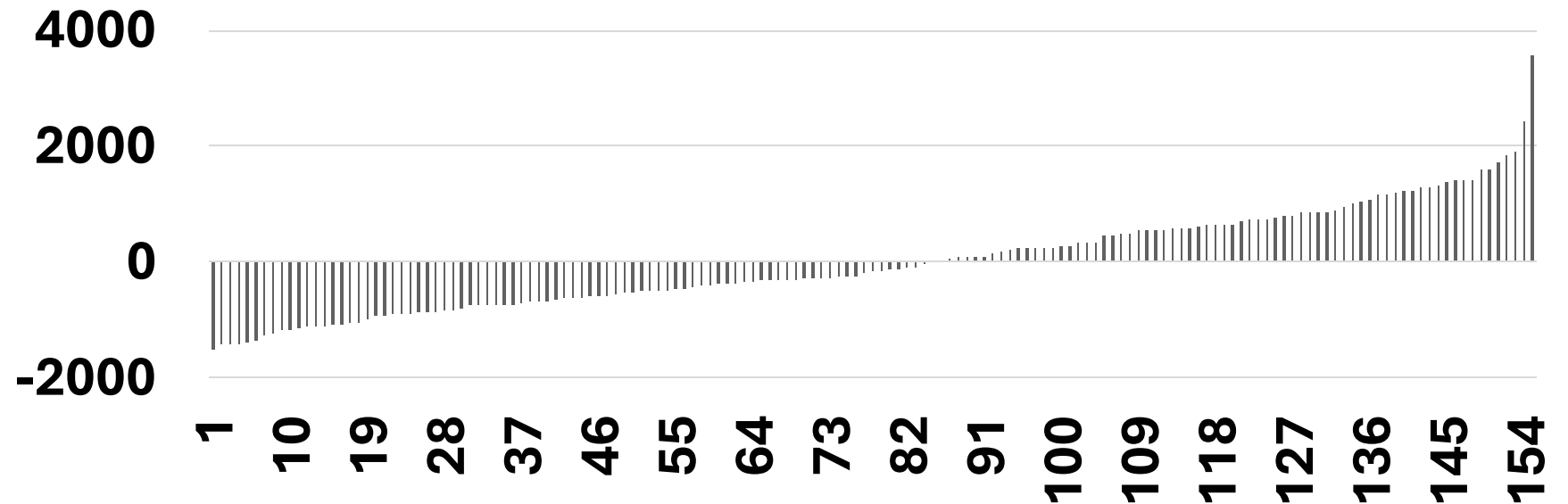
# Correlation plot of PFEC EBV and Ab production 1 week after CD&T booster



# Average PFEC EBV of lambs related to Ab Production 1 week after booster vaccination



# Deviation in Ab response to CDT Vacc





# The algebra of selection for antibody response



***Based on poultry data –  
no meaningful impact  
on performance***

*High responder birds have  
equivalent growth rate to low  
responder birds*



***Ab production has a  
dynamic range of  
values***



**There is some  
relationship with PFEC  
EBV**

May allow creation of “Health  
Index”



**May assist producer in  
areas with low  
exposure to parasites  
and permit for  
selection for health  
traits.**

**Antibiotic-free lamb??**



**Difficulty of sample collection/sample degradation**

**Cost of testing – need high throughput assay**

**How do we realize effect of selection?**



**What are healthy sheep?**

**Those with better antibody response?**





