Probiotic Supplements Are Surprisingly Devoid of Antibiotic Resistance

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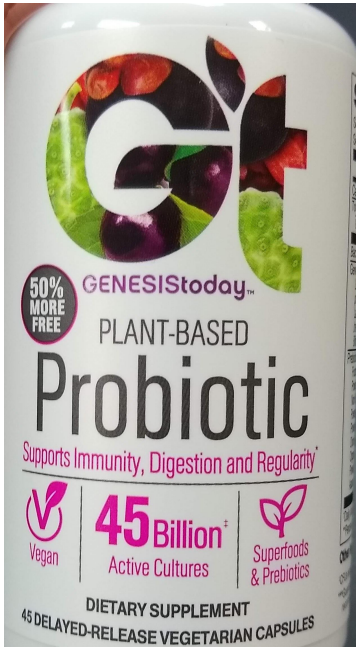
What are Probiotics?

- Derived from the Greek, meaning *for life*
- Probiotics can be used to optimise gut flora and to prevent and treat a range of diseases
- *Lactobacillus*: over 170 species and 17 subspecies
    - Gram-positive, non-spore forming rod
    - Utilize carbohydrates and produce lactic acid

Why are Probiotics Important?

- Assist in re-establishing the disrupted intestinal microflora
- Enhance immune responses
- Increased daily weight gain in pigs
- In broilers, increased performance and health
    - *Salmonella*
    - *Escherichia coli*
    - *Clostridium perfringens*



Antibiotic-Associated Diarrhea

- Common complication of antibiotic use
- AAD occurs 2-8 weeks after exposure
- Little protective barrier
    - *Clostridium difficile*
- Malabsorption

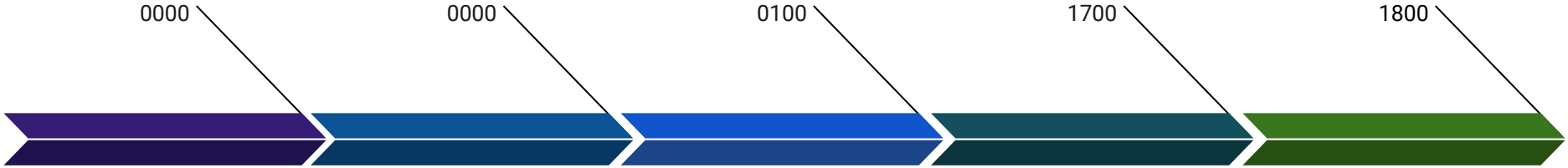
Objective

Examine the antibiotic resistance among commercially available probiotics.

Hypothesis

Probiotic supplements possess antibiotic resistance in order to replenish the normal GI microbiota following the depletion by antibiotics.

Procedures



Cultured Probiotic

Grew Culturelle, GT, Restore, TruBiotic and Berry Dophilies in Tryptic Soy Broth.

Incubated Culture

Placed cultures in shaking incubator for 24 hours.

Plated on MRS Agar

Swabbed probiotics onto MRS agar then placed antibiotics.

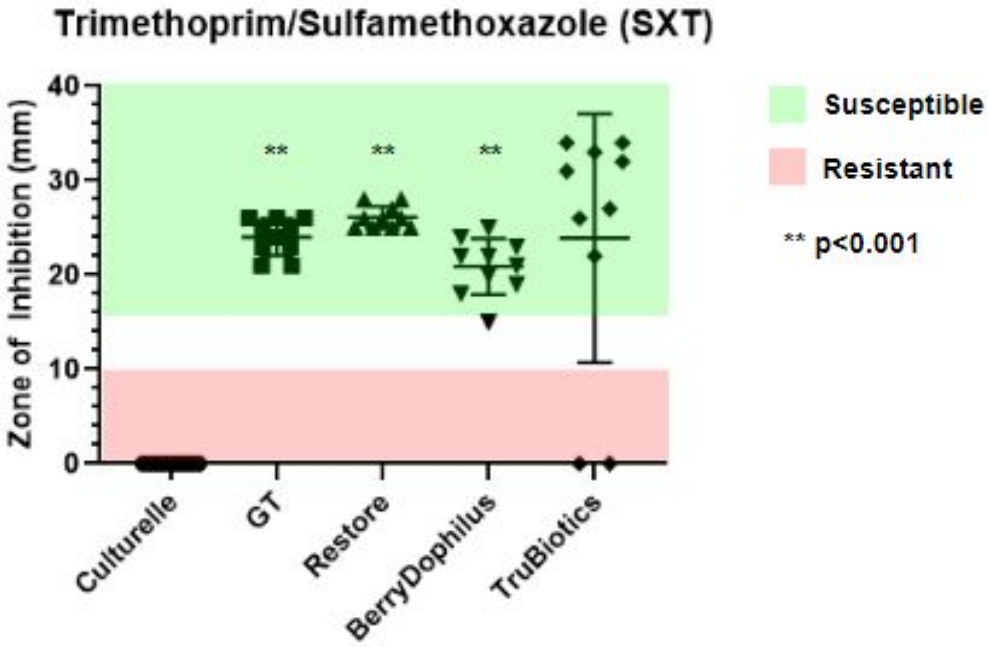
Incubated in CO2

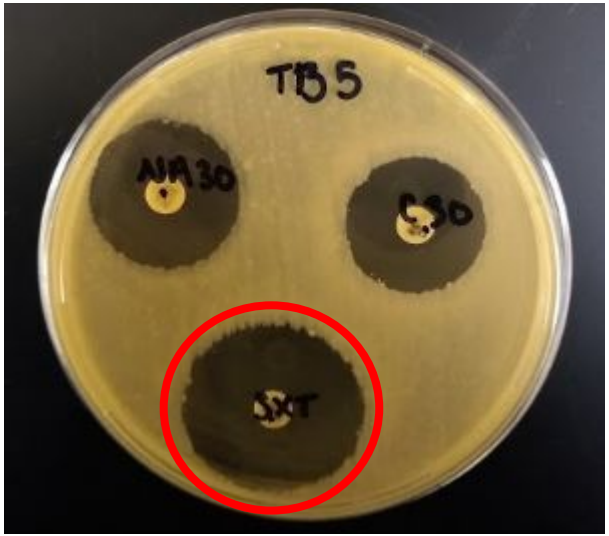
Placed plates in CO2 incubator for 16 hours.

Measured ZOI's

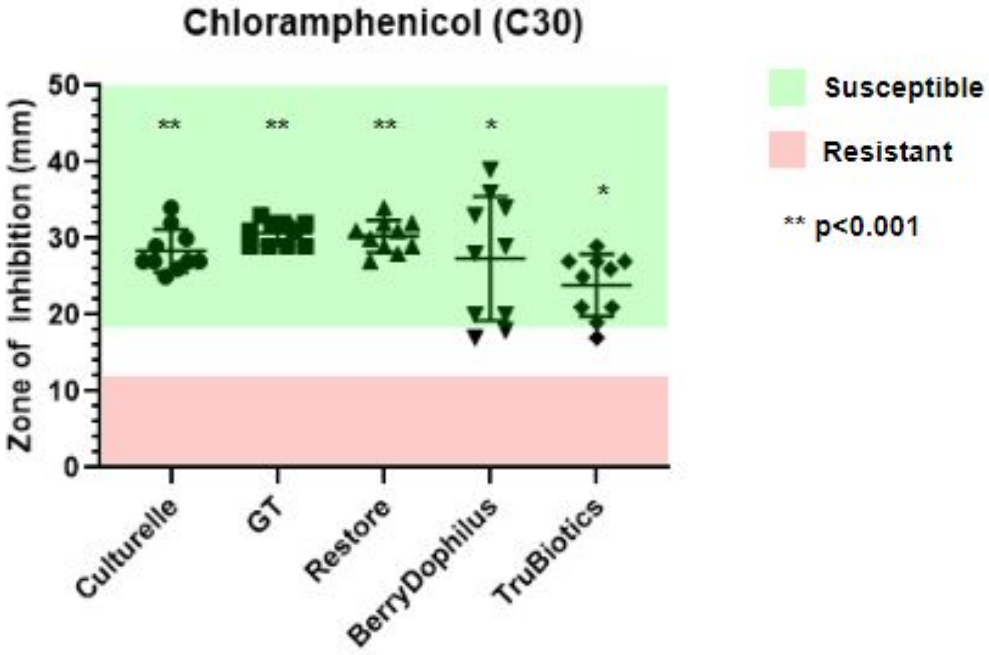
Measured zones of inhibition in mm.

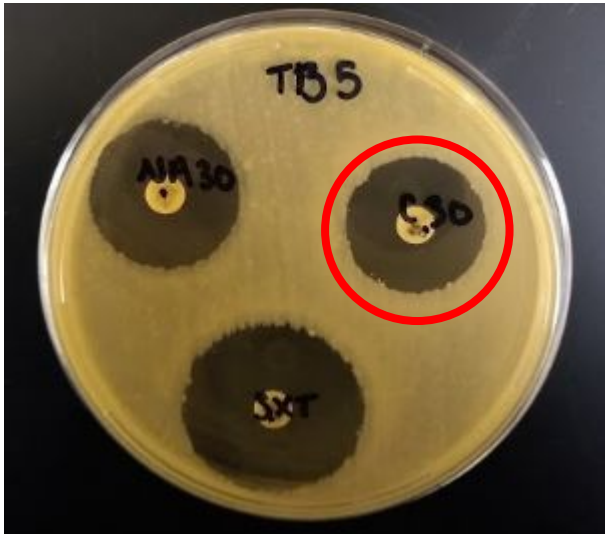
Results


Trimethoprim/Sulfamethoxazole (SXT)
Zone of Inhibition (mm)
40
30
20
10
0
**
**
**
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001

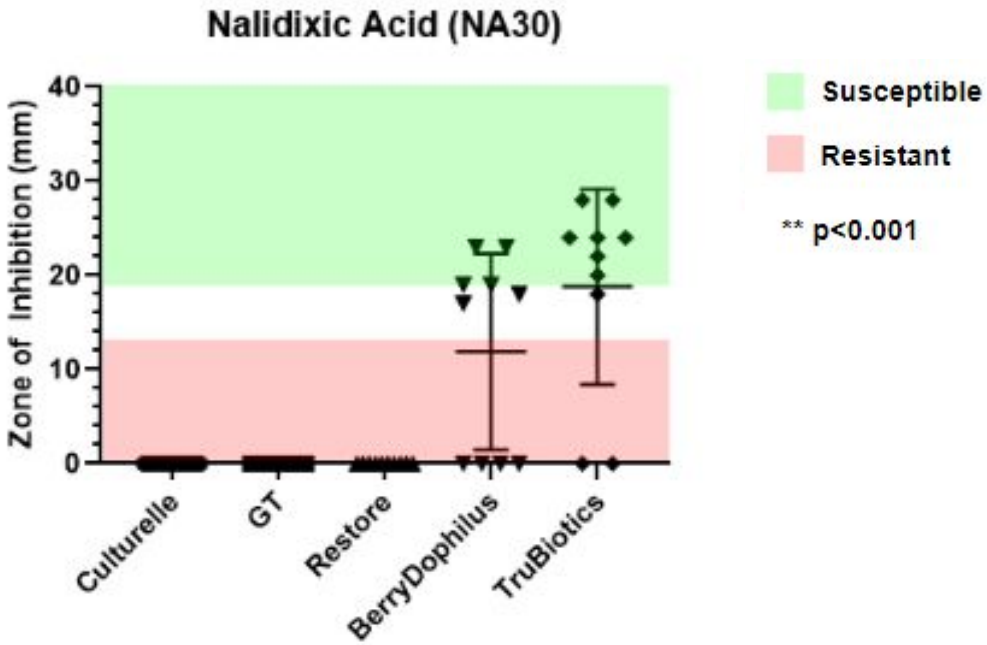

TB5
AMP30
C30
SXT

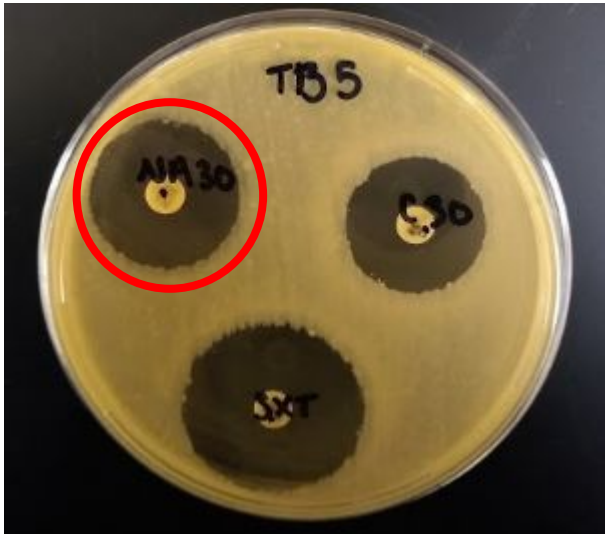
Results


Chloramphenicol (C30)
Zone of Inhibition (mm)
50
40
30
20
10
0
**
**
**
*
*
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001

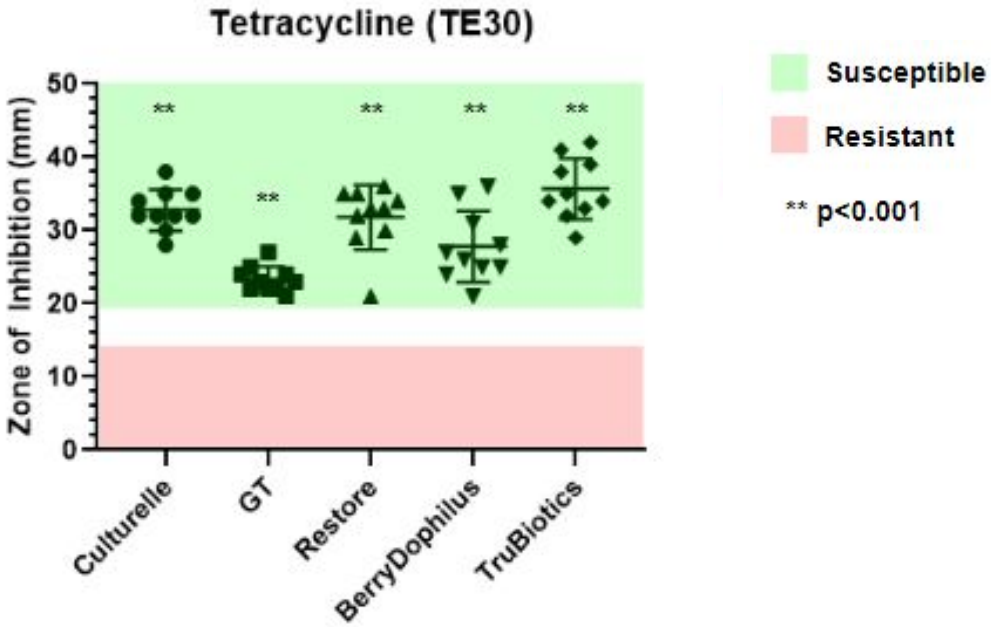

TB5
AM30
C30
SXT

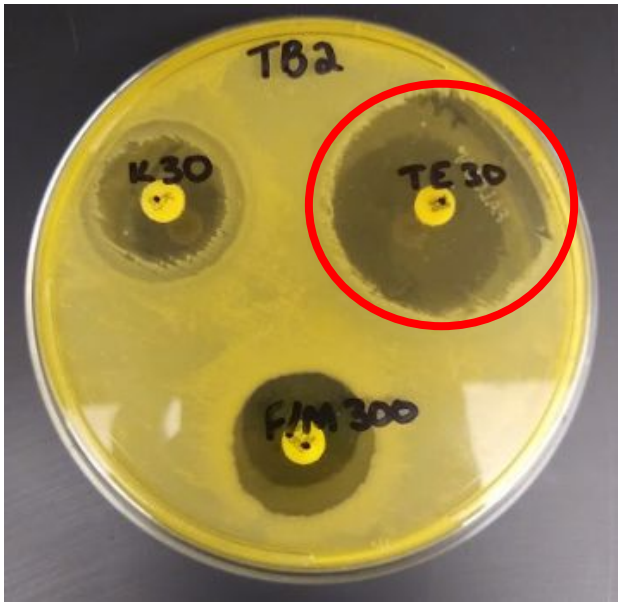
Results


Nalidixic Acid (NA30)
Zone of Inhibition (mm)
40
30
20
10
0
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001

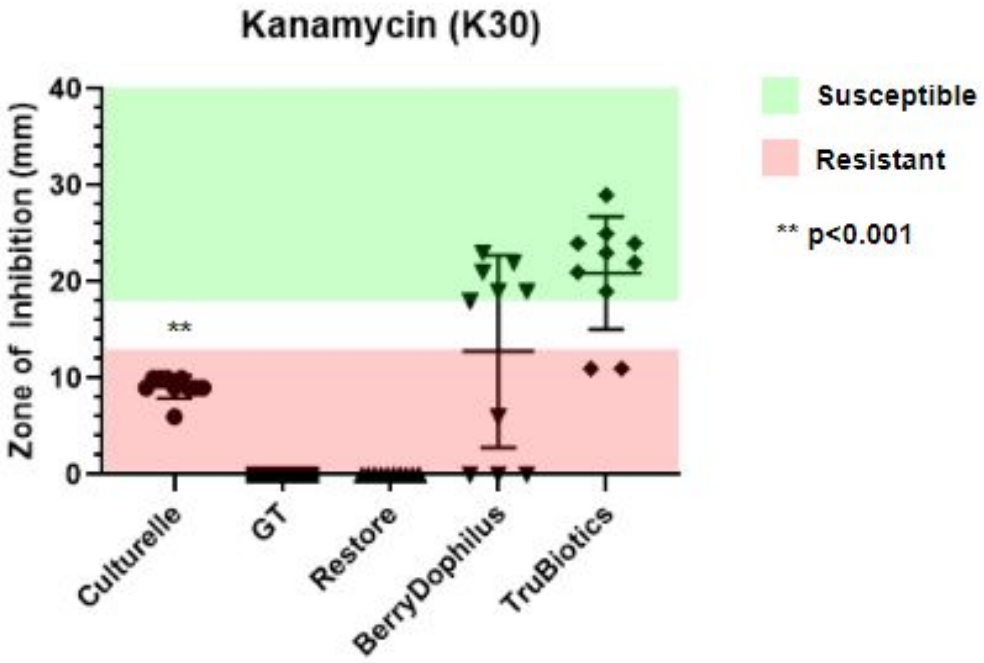

TB5
NA30
C30
SXT

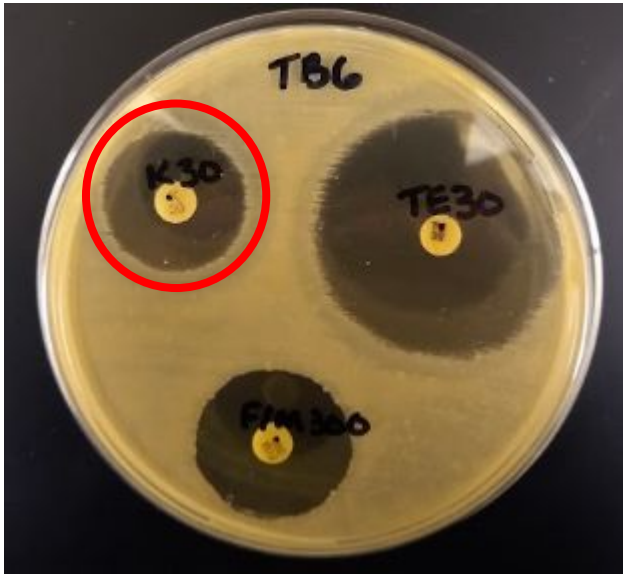
Results


Tetracycline (TE30)
Zone of Inhibition (mm)
50
40
30
20
10
0
**
**
**
**
**
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001

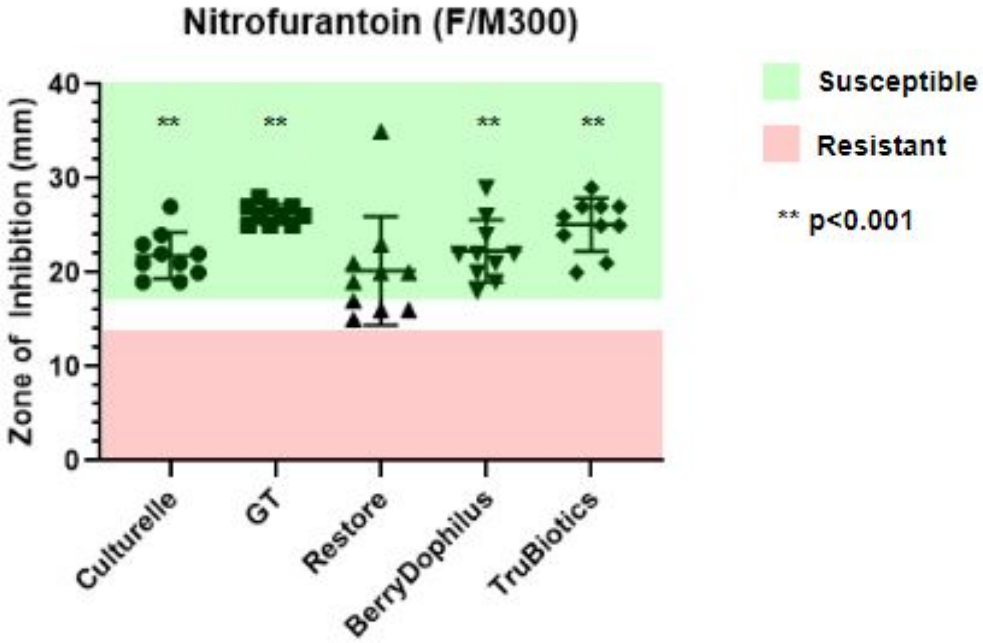

T82
K30
TE30
FM300

Results


Kanamycin (K30)
Zone of Inhibition (mm)
40
30
20
10
0
**
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001

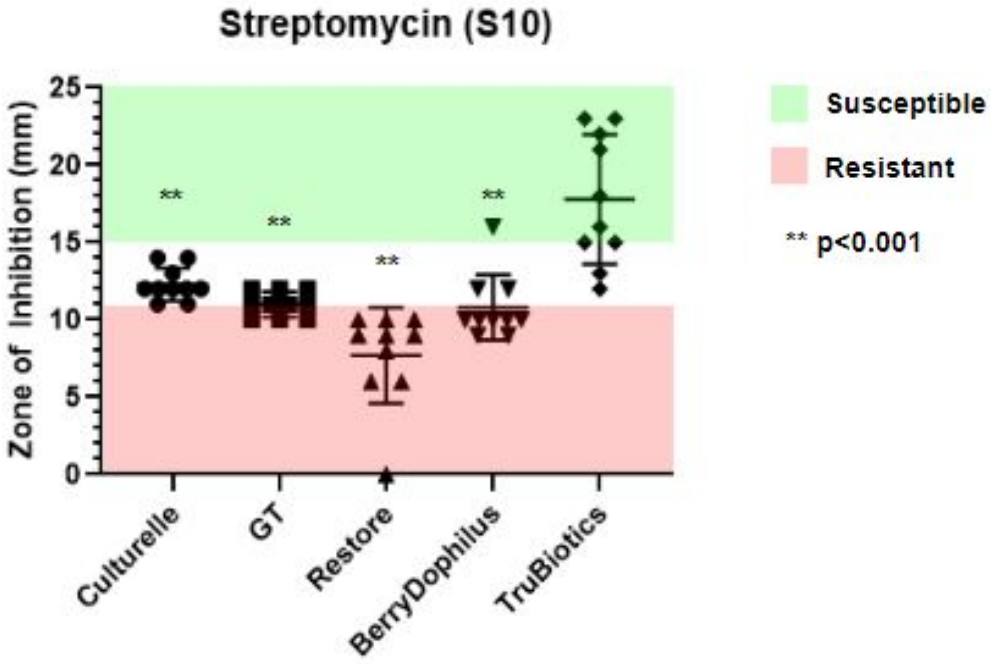

TB6
K30
TE30
FM300

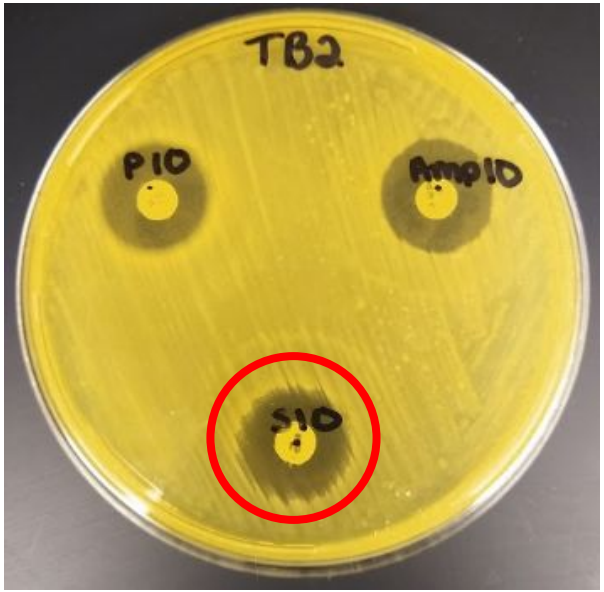
Results


Nitrofurantoin (F/M300)
Zone of Inhibition (mm)
40
30
20
10
0
**
**
**
**
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001

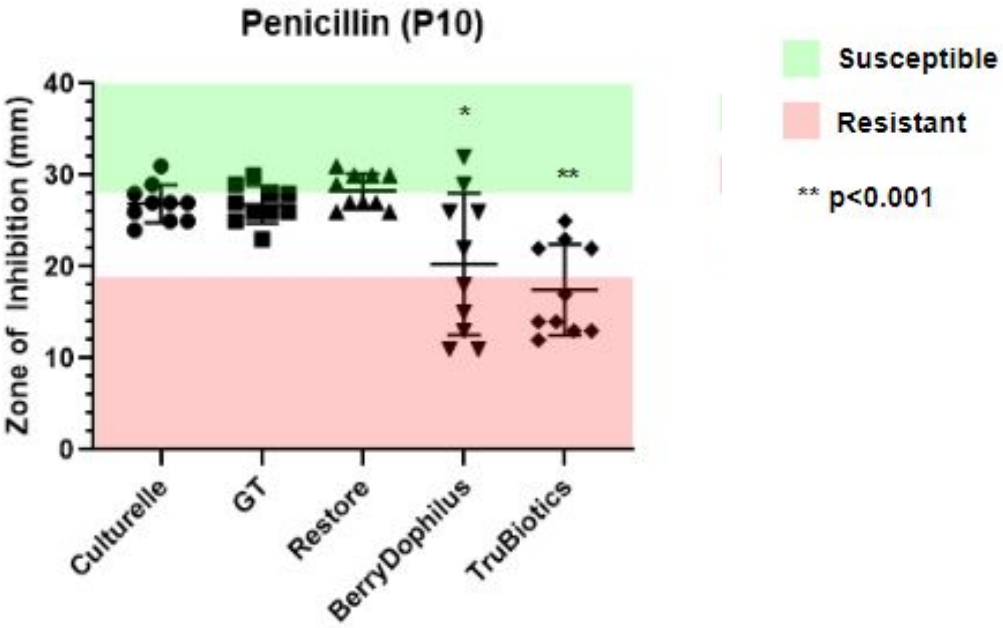

GT 3
K30
TE 30
F/M300

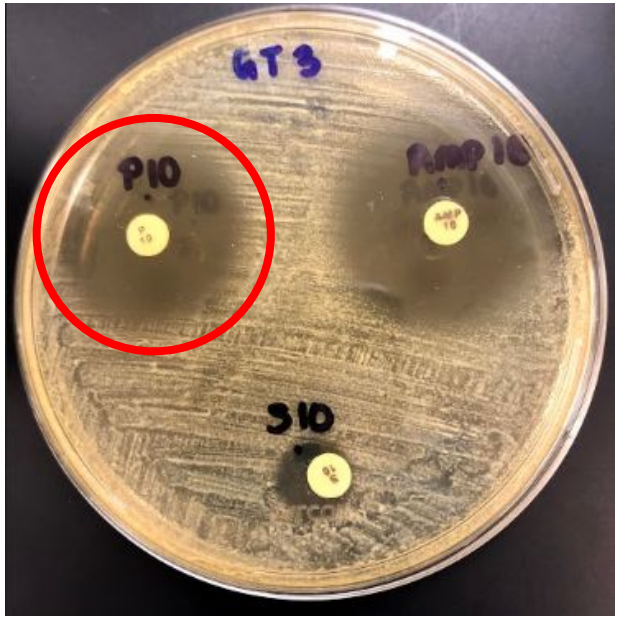
Results


Streptomycin (S10)
Zone of Inhibition (mm)
25
20
15
10
5
0
**
**
**
**
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001

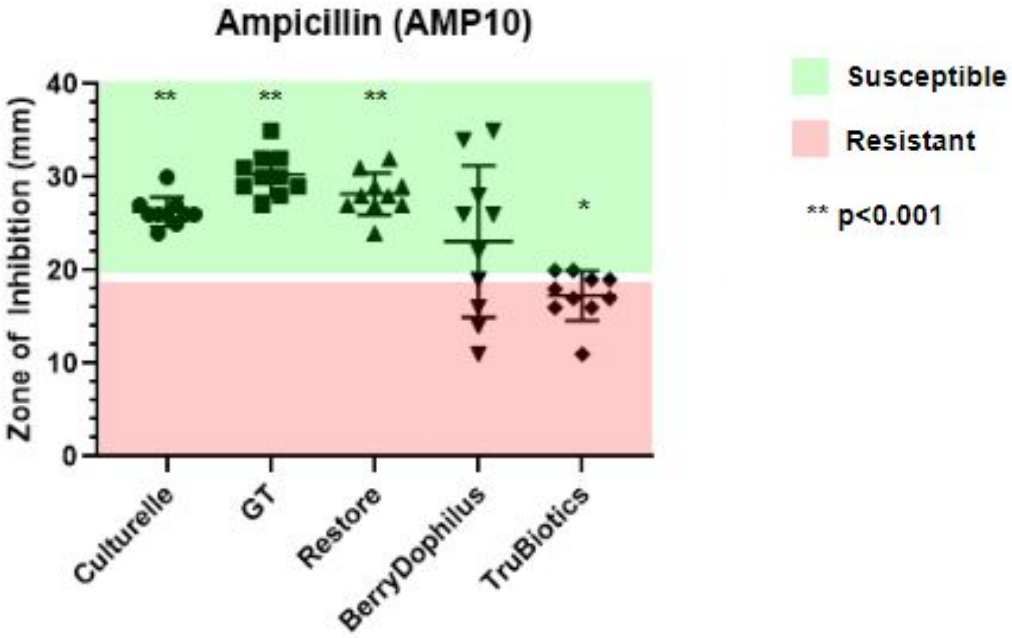

TB2
P1D
Amp1D
S1D

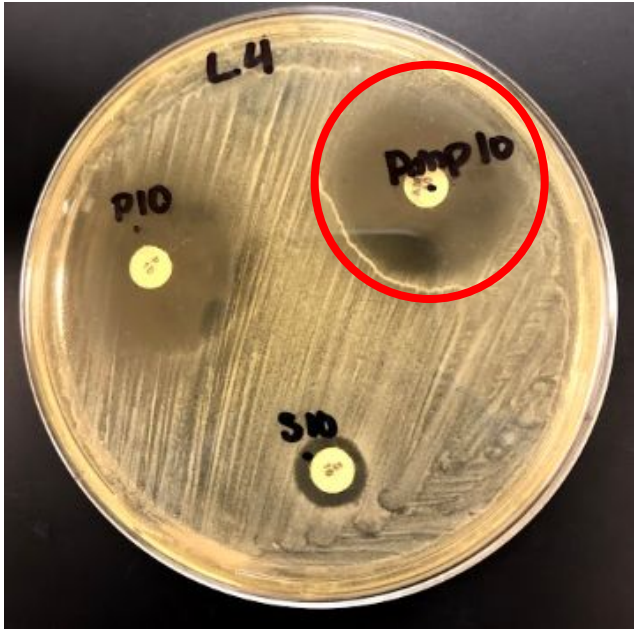
Results


Penicillin (P10)
Zone of Inhibition (mm)
40
30
20
10
0
*
**
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001


GT 3
P10
S10

Results


Ampicillin (AMP10)
Zone of Inhibition (mm)
40
30
20
10
0
**
**
**
*
Culturelle
GT
Restore
BerryDophilus
TruBiotics
Susceptible
Resistant
** p<0.001


L4
P10
Amp 10
SXT

	Culturelle	GT	Restore	BerryDophilus	Trubiotics	
SXT	r	s	s	s	s	
C30	s	s	s	s	s	
NA30	r	r	r	-	s	
TE30	s	s	s	s	s	
K30	r	r	r	-	s	
F/M300	s	s	s	s	s	
AMP10	s	s	s	-	r	
P10	s	s	s	r	r	
S10	s	r	r	r	s	**Total**
% Susc.	**66.67%**	**66.67%**	**66.67%**	**66.67%**	**88.89%**	**71.11%**

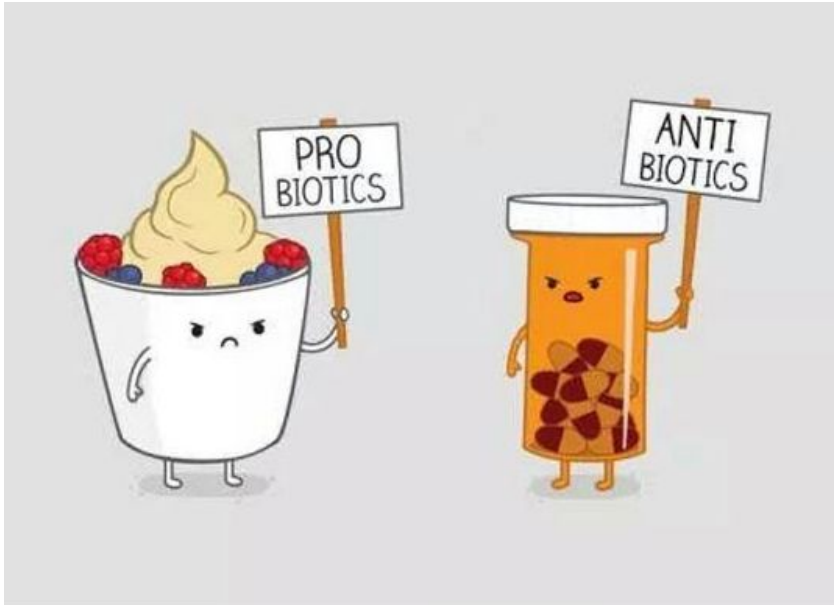
Future Research

- Individual strains
- Different antibiotics

Acknowledgments

- The University of Findlay
- Department of Biology
- Leandra Hess, Hannah Cope and Hannah McColl
- NCUR
- Kennesaw State University

Questions?



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