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.
Cultured Probiotic
Grew Culturelle, GT, Restore, TruBiotic and Berry Dophilites 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)

- **Susceptible**
- **Resistant**

** Zones of Inhibition (mm)**

- Culturelle
- GT
- Restore
- BerryDophilus
- TruBiotics

** p<0.001
Results

Chloramphenicol (C30)

<table>
<thead>
<tr>
<th>Zone of Inhibition (mm)</th>
<th>Culturelle</th>
<th>GT</th>
<th>Restore</th>
<th>Berry/Dophilus</th>
<th>TruBiotics</th>
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<tbody>
<tr>
<td>50</td>
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- Susceptible
- Resistant

** p<0.001
Results

Nalidixic Acid (NA30)

[Graph showing zone of inhibition (mm) for different probiotics: Culturelle, GT, Restore, BerryDophilus, TruBiotics. The graph is color-coded with green for susceptible and pink for resistant. The data is marked with symbols indicating variability.]

** p<0.001

[Image of a petri dish with bacterial growth patterns labeled NA30 and SXT.]
Results
Results
Results

Nitrofurantoin (F/M300)

- **Susceptible**
- **Resistant**

** p<0.001
Results
Results

![Graph showing Penicillin (P10) results with zones of inhibition (mm) for different samples: Culturelle, GT, Restore, BerryDophilus, TruBiotics. The graph indicates susceptible and resistant categories, with significance levels (p<0.001) marked.]

![Image of a bacterial culture plate with zones of inhibition marked by P10 and control samples.]

** p<0.001
Results
<table>
<thead>
<tr>
<th></th>
<th>Culturelle</th>
<th>GT</th>
<th>Restore</th>
<th>BerryDophilus</th>
<th>Trubiots</th>
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<td>% Susc.</td>
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<td>66.67%</td>
<td>66.67%</td>
<td>66.67%</td>
<td>88.89%</td>
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</table>
Future Research

- Individual strains
- Different antibiotics
Acknowledgments

- The University of Findlay
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Questions?


