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Fermentation of prebiotics in whole food powders by probiotic bacteria strains

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Introduction

Colorectal cancer (CRC) is the second leading cause of cancer death in the United States. Modification of the **gut microbiome** offers potential for CRC prevention.

Probiotic bacteria strains have been shown to reduce CRC risk and improve health outcomes. Selected strains for this study:

- Lactobacillus acidophilus NCFM
- **Bifidobacterium lactis HN019**

Prebiotics are complex dietary fibers fermented by probiotic bacteria and found in:

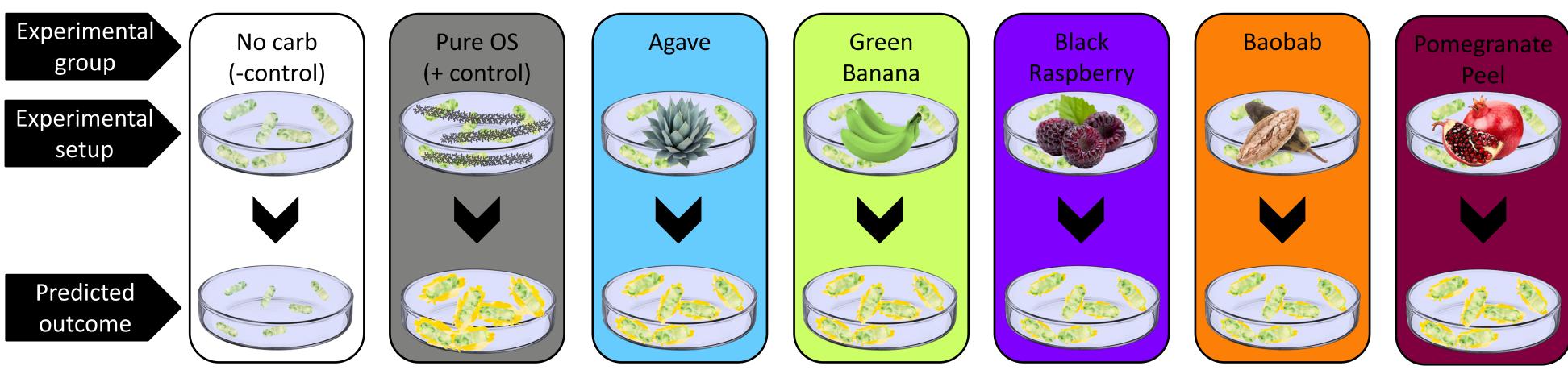
- Agave
- **Green Banana**
- **Black raspberry**
- Baobab
- Pomegranate Peel

The main objective of this study was to determine the **best combinations of probiotic** bacteria and whole food powders for future CRC dietary intervention studies.

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Figure 1- Methods and expected results



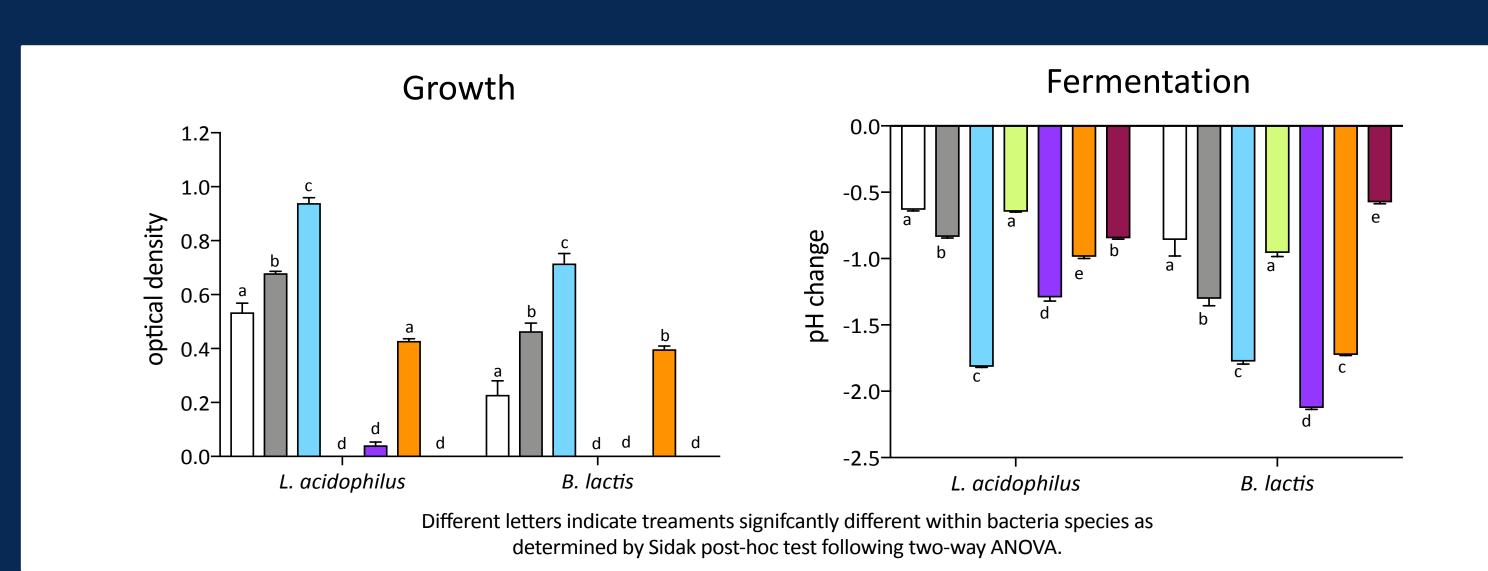
Bacterial strains were grown in media with different whole food powders as the carbohydrate source.

Methods

L. acidophilus NCFM and B. lactis HN019 were grown in MRS broth with different carbohydrate sources. Cultures were incubated for 48 hours at 37° C and then analyzed for:

- **1. Growth-** Optical density of medium
- **2. Fermentation-** Change in medium pH

Figure 2 – Bacterial growth and fermentation

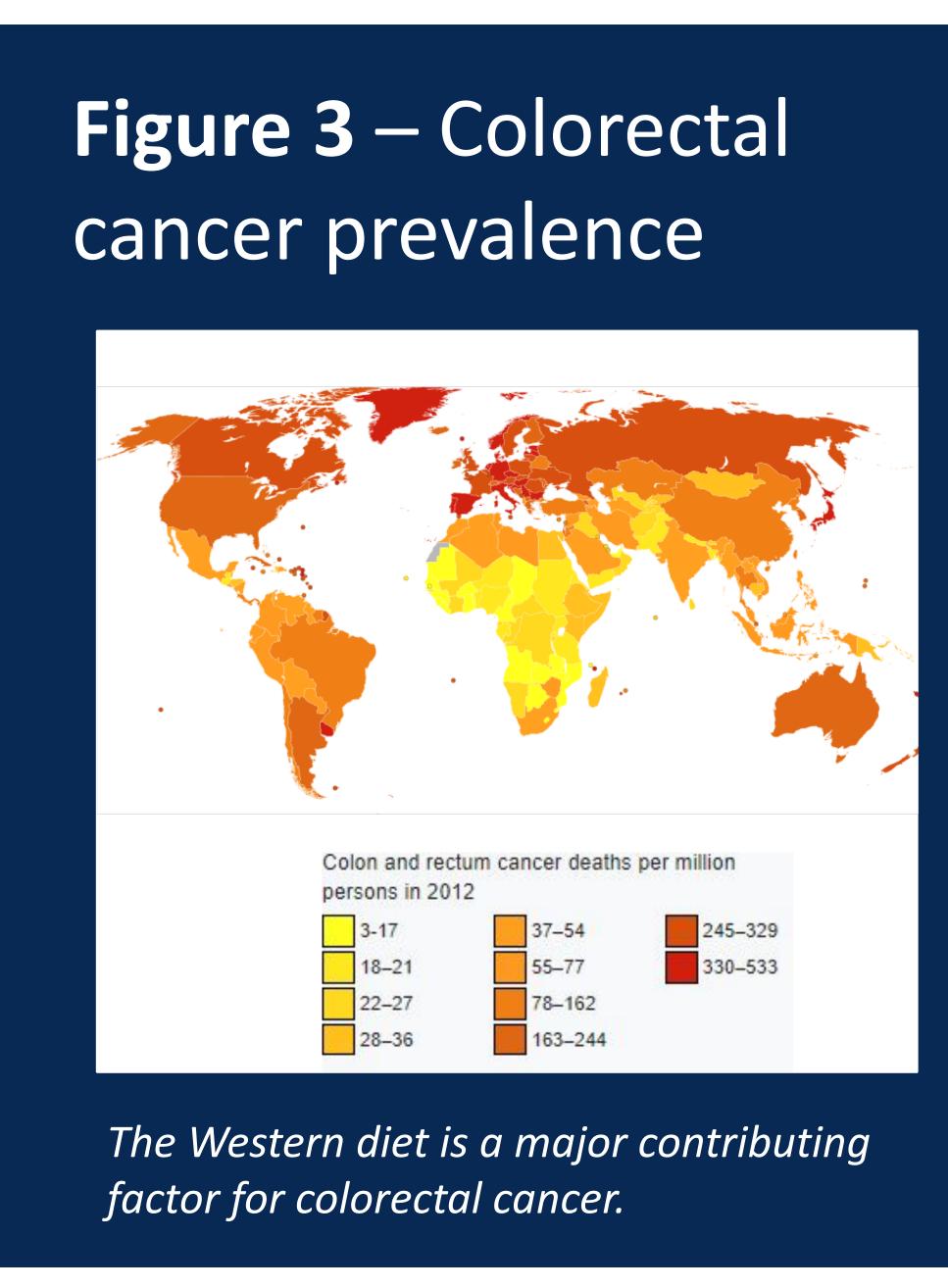


Agave increased bacteria numbers. Additionally, agave, black raspberry, and baobab decreased pH after fermentation with probiotic bacteria strains.

Study conducted with funding from a USU Undergraduate Research and Creative Opportunity Grant and lab assistance from the USU Department of Animal, Dairy, and Veterinary Sciences.

Results

• Agave increased growth and fermentation activity of both bacterial strains, better than the positive control. • Additionally, **black raspberry** and **baobab** appeared to have higher fermentation potentials than the positive control, in both bacterial strains.



Conclusions

Green banana and pomegranate peel appear not to be utilized as a food source by probiotic bacterial strains. Agave, black raspberry, and baobab may be promising candidates for future preclinical dietary intervention studies. Further investigation is required before proceeding:



no carbohydrate oligosaccharide

agave powder

baobab powder

green banana powder

black raspberry powder

pomegranate peel powder



1. An improved measure of growth is needed to accurately evaluate opaque broths. 2. Additional trials (replicates) are needed to confirm these preliminary results.

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