



CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

Name(s) Wesley Leung; Ivy Nguyen	Project Number S1512
Project Title Pro-, Pre-, and Synbiotics: Analyzing the Effects of <i>L. acidophilus</i> with Lactulose as a Novel Approach to Weight Control	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Human gastrointestinal flora includes probiotics, which are beneficial bacteria that participate in a wide variety of metabolic processes that confer good gastrointestinal health. Prebiotics, nondigestible food ingredients, are used to selectively stimulate the growth and activity of probiotics. The combination of the two is called synbiotics. To address the growing issue of weight control, this research focused on developing a probiotic treatment to induce weight loss in laboratory mice. It was hypothesized that the probiotics will consume glucose in the GI tract to induce weight loss and the efficiency with which it does so will be enhanced by increased dosage and the addition of prebiotics.</p> <p>Methods/Materials Four groups of mice were administered probiotic <i>Lactobacillus acidophilus</i>. Lactulose was used as a prebiotic in conjunction with <i>L. acidophilus</i> to aid probiotic survival in the GI tract. Weight was monitored daily. Additionally, <i>L. acidophilus</i> was cultured in glucose, lactulose, a combination of both, and simulated stomach acid (0.1 M HCl) to determine the viability of the strain in those mediums.</p> <p>Results <i>L. acidophilus</i> flourishes in glucose, lactulose, and a combination of both, covering an area over ten times that of the null treatment control group. Furthermore, the simulated stomach acid culture survived, covering a total area of about a third of that of control. A chi-2 test for significance indicates that these differences are statistically significant.</p> <p>Mice weights show negative correlation for all treatment groups, indicating consistent weight loss. The average weights of mice administered synbiotics showed 60% and 370% greater loss than the control for single and double doses, respectively. Mice administered probiotics displayed similar results. In both treatments, increased dosage increased the rate of weight loss. There is, however, no statistically significant difference in weight lost between probiotic and synbiotic groups administered the same dose.</p> <p>Conclusions/Discussion <i>L. acidophilus</i>'s effective metabolization of glucose and survival in simulated stomach acid lent support to the hypothesis that the species can promote weight loss. Though prebiotic lactulose did not lead to greater weight loss, an increased dose of either treatment did. Thus, while synbiotics have no added benefit, probiotics show promise as an effective approach to promoting weight control.</p>	
Summary Statement This research tested the ability of probiotic bacteria to metabolize glucose in the GI tract to an extent that would induce weight loss and analyzed the effects of prebiotic lactulose in increasing the effectiveness of the probiotic dose.	
Help Received Veterinarian Greg Anderson gave advice on mouse care. Teacher Darra Cacao let us use biology room at school and lent us basic lab supplies.	