Annual

U.S. Department of Agriculture **Accomplishments Report AD-421** U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions			Date (Month, Day, Year) 03/22/2012
1. Accession 0224571	Agency Identification No. 2. NIFA 3. LA.B	5. Work Unit/Project No. **LAB94084**	6. Status **Annual Report**

7. Title

Influence of Mild Processing Conditions of Various Processes on Enhancing the Probiotic Charateristics of Health Beneficial Bacteria

12. Investigator Name(s) (Last Name and Initials)

Aryana, K. J.

20. Termination Date 12/01/2015	40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011

Outputs:

Masters thesis, 1 article in refereed journal, 7 presentations at national level scientific meetings, and undergraduate training were the research conducted on on this year's projects.

Outcomes/Impacts:

It is not known whether low homogenization pressures or mild sonication conditions can improve the probiotic characteristics of three important dairy cultures. In one study, the treatments were homogenization pressures of 0 MPa, 3.45 MPa (500 psi), 6.90 MPa (1000 psi), 10.34 MPa (1500 psi) and 13.80 MPa (2000 psi). Growth and bile tolerance of samples were determined hourly for 10 hours of incubation. Acid tolerance was determined every 20 minutes for 120 minutes of incubation. Protease activity was determined at 0, 12 and 24 hours of incubation. The experimental design was repeated measurements on complete randomized block. Data were analyzed using proc mixed model of statistical analysis system (SAS). Differences of least square means were used to determine significant differences at $p<0.05$ for main effect (homogenization pressure) and interaction effect (homogenization pressure * time). All low homogenization pressures improved acid tolerance of Lactobacillus delbrueckii ssp bulgaricus LB-12 but had no beneficial effect on protease activity and had negative effect on growth and bile tolerance of the bacterium. Low homogenization pressure of 6.90 MPa (1000 psi) improved the acid tolerance, bile tolerance, and protease activity; but homogenization pressures had no effect on growth of Streptococcus salivarius ssp thermophilus ST- M5. Low homogenization pressures of 13.80 MPa (2000 psi) and, 6.90 MPa (1000 psi) improved acid tolerance and bile tolerance, respectively, of Lactobacillus acidophilus LA-K but had no effect on protease activity and growth of the bacterium. Some low homogenization pressures positively influenced some characteristics of yogurt culture bacteria and Lactobacillus acidophilus LA-K. In another study, the treatments were four sonication intensities of 8.07, 14.68, 19.83 and 23.55 Watts/cm2 randomized at three different temperatures (4, 22 and 40C) of inoculated peptone water before sonication. Low sonication conditions include a) low sonication intensities, b) temperatures and c) times; all three of which played a role in influencing the desirable attributes of both microorganisms. Of all the low sonication intensities studied, 14.68 watts /cm2 had the best overall influence at certain time points for Streptococcus thermophilus, improving its acid tolerance, bile tolerance and growth at 4C, growth at 22C, bile tolerance and growth at 40C, and improving the Lactobacillus bulgaricus bile tolerance and growth at 4C, its acid tolerance and protease activity at 40C. Low sonication intensity of 19.83 Watts/cm2 had the overall best influence at certain time points for acid tolerance of both microorganisms at 22C. Low sonication intensity of 23.55 Watts/cm2 had the overall best influence at certain time points for protease activity of Streptococcus thermophilus at 40C and Lactobacillus bulgaricus at 22C. Some low sonication conditions improved certain characteristics of culture bacteria. Some low homogenization pressures and some low sonication conditions improved certain probiotic characteristics of dairy culture bacteria hence can be used to pre treat dairy cultures to improve their desirable / probiotic characteristics.

Publications:

T. Muramalla and K.J. Aryana. 2011. Some low homogenization pressures improve certain probiotic characteristics of yogurt culture bacteria and Lactobacillus acidophilus LA-K. Journal of Dairy Science. 94: 3725-3728.

C. Boeneke, J. Vargas and K. Aryana 2011. Fluid milk quality survey. Abstract # T70. Journal of Dairy Science, Vol 94. E Supplement 1. pp. 290.

M. Moncada and K. Aryana. 2011. Effect of low sonication intensities on the growth of Streptococcus thermophilus ST-M5

subjected to different temperatures. Abstract # T83. Journal of Dairy Science, Vol 94. E Supplement 1. pp. 293.

M. Moncada and K. Aryana. 2011. Low sonication intensity influences on the protease activity of Lactobacillus delbrueckii ssp. bulgaricus LB-12 at different temperatures. Abstract # T84. Journal of Dairy Science, Vol 94. E Supplement 1. pp. 293-294.

M. Moncada and K. Aryana. 2011. Influence of low sonication intensities at different temperatures on the bile tolerance of Streptococcus thermophilus ST-M5. Abstract # T85. Journal of Dairy Science, Vol 94. E Supplement 1. pp. 294.

N. Najim and K. Aryana. 2011. Screening of pulsed electric field parameters for enhancing acid tolerance of Streptococcus thermophilus ST-M5. Abstract # T86. Journal of Dairy Science, Vol 94. E Supplement 1. pp. 294.

N. Najim and K. Aryana. 2011. Mild pulsed electric field conditions identified for improving growth, protease activity and acid tolerance of Lactobacillus delbrueckii ssp. bulgaricus LB-12 and Lactobacillus acidophilus LA-K. Abstract # T87. Journal of Dairy Science, Vol 94. E Supplement 1. pp. 294-295.

N. Najim and K. Aryana. 2011. Impact of mild pulsed electric field conditions on improving bile tolerance, protease activity and growth of Streptococcus thermophilus ST-M5. Abstract # T88. Journal of Dairy Science, Vol 94. E Supplement 1. pp. 295.

Participants:

K.J. Aryana (PI), D. Olson, K. Sternitzke, H. Paul, J. Boudreaux, and K. Moore, LSU AgCenter.

Target Audiences:

Scientific community, dairy / food industry,

Project Modifications:

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date
Khyp A Eha		3-23-12