LA-UR 12-22367

Licensable Technologies

Probiotics in Treatment and Prevention of Animal Diseases

Applications:

- Treatment and prevention of animal diseases

Benefits:

- Possible application as an alternative to antibiotics in the treatment of honey bee diseases

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Summary:

This project will study the effectiveness of probiotics in treatment of honey bee diseases, such as enterobacterious, European foul broods, American foul broods, and ascospheros (*Ascosphera apis*). The following tasks are planned to be performed: 1. Study the antagonistic activity of selected probiotics against various pathogens in bees. 2. Select the component makeup of targeted-action probiotics against specific pathogens. 3. Test the preparations on bees. 4. Develop process instructions for the production of the preparations created.

Polilaktovit- and Laktovit-probiotics that are recommended for the treatment and prevention of diseases in farm animals have the greatest antagonistic activity against enterobacteriosis and European and American foulbrood agents. Association of *Lactobacillus plantarum*, *L. brevis*, and *Propionibacterium shermanii* has a higher activity against ascospherosis. The therapeutic action of the probiotic Polylaktovit against European foulbrood and American foulbrood was tested at the apiary by treating the comb frames with a liquid preparation containing 10×108 living cells of lactic-acid and propionic-acid bacteria. The treatment was performed in the spring-summer period every 7 days until the bee colonies fully recovered. The results of the studies showed that spraying the comb frames three times with Polylaktovit every 7 days in April and June produced a good therapeutic effect. The therapeutic efficacy of the preparation was 92.4% in colonies affected by European foulbrood and 80.2% in colonies affected by American foulbrood. The triple treatment of the bees in the spring with Laktovit-K in combination with the supplementary protein/carbohydrate feed in the amount of 100-150 mL per bee space [spacing between combs] for 10-12 days reduced the extent of the infestation by up to 74.1% (for average bees in terms of strength) and 77.8% (for weak bees), whereas the extent of infection with American foulbrood was reduced by up to 92.5% and 91.7%, respectively. In the process, the strength of the bee colonies increased (10.3 bee spaces as opposed to 6.0 in the control), which made it possible to maintain strong colonies in the apiary that are more resistant to infectious diseases and to increase the brood quantity to a size 1.7-fold greater than that of control. In groups in which bee colonies have received Laktovit-K in combination with the sugar syrup, infestation was reduced by 70.0% (average bees) and 55.3% (weak bees), and the extent of infection with American foulbrood was 81.0% and 80.5%, respectively. Bee colonies that underwent triple fall treatment with Laktovit-K in combination with a supplementary biological feed exceeded the control group considerably in terms of honey production and reproduction of the young. The absence of brood in the control group and the presence of mites in the brood chamber that disturbed the old bees generally resulted in those bee colonies wintering poorly. The efficacy of Laktovit-K against American foulbrood was, in this experiment, 90.7% and 92.1%, and the percentage of the reduction of infestation was 75.6% and 83.8%. The data obtained in the above testing make it possible to conclude that probiotics prepared on the basis of lactic-acid bacteria could, in the long term, be an alternative to antibiotics in the treatment of bees, due to the innocuousness and high efficacy of such preparations.

Development Stage:

LANL and the Almaty Institute of Microbiology and Virology, Kazakhstan, are at the initial stages of proposal development, based on the previously performed limited testing.

Patent Status:

No patent applications have been filed yet for the technology to be developed under this project.

Licensing Status:

Available for licensing once project is developed.

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