

Developing an Essential Oil-Based Antibiotic: A Novel Solution to the Treatment of Mastitis in Organic Dairy Cows

Many essential oils are known to have antibacterial properties and are an organic product. The antibacterial properties of different essential oils range from non-existent in some to quite effective in others, usually dependent on phenolic contents. It is hypothesized here that the formulation of a blend of essential oils could have such a synergistic effect as to act as a very effective antibacterial agent to be used in the treatment of mastitis in organic dairy cows. The need for better treatment options for organic dairy farmers to utilize on cattle with mastitis is important to reducing herd loss and improving milk output and quality. A series of experiments built to determine optimal combinations of essential oils for antibacterial properties will consist of disk diffusion assays using isolated bacterial cultures of *Escherichia coli* grown on culture plates. The disk diffusion assays are designed to determine the extent of inhibition of bacterial growth due to the blends and concentrations of the essential oils chosen for testing. The essential oils which have shown the greatest antibacterial qualities in the previous experiments using disk diffusion assays with single essential oils in 4% solutions with alcohol include Thyme, Cinnamon, Oregano, Tea Tree and Lemongrass. These will be blended together in different formulations to compound the antibacterial properties and will be applied to the culture plates to determine their effects on the growth of *E. coli*. It is likely that an essential oil mixture will be found which produces better antibacterial results than any single oil tested previously. Future experiments in this study will use the essential oil mixture with the greatest antibiotic properties to formulate a colloidal suspension to be effective in an aqueous environment like that of a cow's udder.

Keywords: organic, antibacterial, essential oil, E. coli, dairy cow, mastitis, disk diffusion assay.