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Decrease of Minimal Inhibitory Concentration of Essential Oils and Plant Extract in Presence of Complex Microbiota

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Abstract

Bacterial resistance to multiple antibiotics is a worldwide health problem. Various essential oils (EOs) and plant extracts have shown antibacterial properties. Therefore, they could be used in the development of novel feed additives in order to increase control of pathogens at the farm. However, efficiency of essential oils assessed in vitro failed to be confirmed when tested in vivo, as well in experimental or in field conditions. The aim of this study was to determine the in vitro antimicrobial activities of EOs (camphor, carvacrol, cinnamaldehyde, eugenol, peppermint) and plant extract (garlic) on food-borne pathogens (L. monocytogenes, S. Enteritidis) in presence or not of complex microbiota. The broth minimum inhibitory concentration (MIC) determination standard method was used, followed by an adapt method where MICs will be retested with the incorporation of complex microbiota mimicking digestive contents. Most of the EOs showed strong antimicrobial activities with MICs ≥ 1/1000 or equal to 1/10000. Interestingly, the results from the standard method were not confirmed when competitive flora were incorporate. The first results suggest an increase of MICs values by a factor 10 for most of essential oils tested in these new conditions, definitive results will be available for presentation. This study propose that in vivo inefficiency is probably related to competition flora and that incorporation of complex microbiota in MICs determination is essential for the first characterization of potential novel feed additives. Further studies will include other food-borne pathogens and non-pathogenic bacteria and the determination of the effect of EO on the total bacterial communities with 16S RNAr sequencing.