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Editorial

The Future Use of Medicinal Plants as Alternatives to Antibiotics in Animal Health and Production

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Editorial

The health and animal health experts all over the world are very concern about the widespread of antibacterial resistance which happens when bacteria genetically change following over use and misuse of antibiotics. The use of antibiotics as growth promotors to enhance animal production is banned in many countries around the world where organic production is being encouraged. In USA, the use of sub-therapeutic doses in animal feed and/or water to promote growth and improve feed efficiency was eliminated effective January 1, 2017, as a result of new FDA Veterinary Feed Directive [1].

This practice has been banned in Europe since 2006 [2]. There is a need therefore, for new alternatives to antibiotics in medicine and veterinary medicine practices. However, could the plants and their extracts fill the gap? Ancient people faced many years of struggles against illnesses due to which they learned to pursue drugs in barks, seeds, fruit bodies, and other parts of the plants with extensive use in China and India [3]. The beginnings of the medicinal plants' use were instinctive, as is the case with animals [4].

In every period, every successive century from the development of humankind and advanced civilizations, the healing properties of certain medicinal plants were identified, noted, and conveyed to the successive generations. The benefits of one society were passed on to another, which upgraded the old properties, discovered new ones, till present days [3]. Emergence of antibiotic resistant bacteria has created the necessity of replacement of antibiotics with other products such as essential oils (EOs) [5].

Various plant extracts, especially essential oils, have been studied for their antimicrobial activities. The essential oils are mixture of fragrant and volatile compounds, which are usually originated from plant, and are named with the aromatic characteristics considering the origin of plant [6]. Among medicinal plants the genus Thymus is one of the largest and economically most important genera within the Lamiaceae (=Labiatae) family.

Many Thymus species are used as medicinal herbs, and they are known to possess antispasmodic, sedative, antiphlogistic, antiviral, antioxidant, antibacterial and antifungal activities. *in vitro* antibacterial activity of essential oil of Thymusalgeriensis showed very strong antibacterial activity against Escherichia coli, *Pseudomonas aeruginosa, Salmonella typhimurium, Proteus mirabilis* (human isolate) and some Gram-positive bacteria namely *Listeria monocytogenes, Bacillus cereus* (clinical isolate), *Micrococcus flavus,* and *Staphylococcus aureus* [7]. In another study, essential oil blend (EO; carvacrol, thymol, eucalyptol, lemon) significantly reduced Salmonella Heidelberg colonization in crops of challenged birds, significantly lowered the feed conversion ratio, and increased weight gain in broilers [8].

The antimicrobial mechanisms of essential oils and other plant extracts include different activities, such as membrane disruption by terpenoids and phenolics, metal chelation by phenols and flavonoids, and effect on genetic material by coumarin and alkaloids that are thought to inhibit growth of microorganisms [9]. Essential oils are marginally more effective against Gram-positive as compared to Gram-negative food pathogens [10] because they have an outer membrane surrounding the cell wall which limits the intrusion of hydrophobic compounds through its lipopolysaccharide structures [11,12].

Many essential oils stimulate growth of beneficial microbes and limit number of pathogenic bacteria in poultry [13]. A clear effectiveness of low doses of essential oils and sodium butyrate were reported against Salmonella in broilers [14]. The blend of thymol and cinnamaldehyde is proven to have selective antibacterial properties inhibiting the growth of yeast and fungi [15]. However, Most supplements claimed to be alternatives to antibiotics have effects on the microflora, either directly or indirectly [16].

Despite a rich tradition of medicinal plants used for the treatment of various infectious diseases, inflammations, and injuries in many parts of the world, many challenges are facing its use such as the quantity needed for intensive animal production since some of these plants almost extinctive and some are difficult to cultivate. The antimicrobial activity of EO's, similar to all natural extracts, is dependent on their chemical composition and the amount of the single components. EOs can be used in poultry feed, but there are still questions concerning their action, metabolic

pathway, optimal dosage in poultry and effect on the micro flora which are to be explored in details. Moreover, medicinal plants may have side effects if consumed in high doses therefore conducting research is needed to verify the efficacy of this treatment system.

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