he essential oils (EOs) have been used in humans and animals for several millennia, as they represent an important part of folk medicine for their medicinal properties. EOs are a very heterogeneous group of complex mixtures of secondary plant metabolites. The nature of an EO varies from plant to plant, species to species, and within botanical families. By now, more than 3000 varieties of volatile aromatic compounds have been identified. Hundreds of chemical compounds have been identified in the essential oils (EOs) of some plants, with properties such as antioxidative, anti-inflammatory, antibacterial, antiviral, antifungal, antiseptic, antimycotic, antitumor, antispasmodic, immunostimulating, etc. In addition to aromatherapy, they are either ingested or topically applied for conditions such as pain, arthritis, bruises, scratches, scars, flea control, and many others. This chapter describes EOs of plant and non-plant origins, their active constituents, and clinical applications in animal health and disease.

The ban of antimicrobial growth promoters (AGP) has been a challenge for animal nutrition, increasing the need to find alternative methods to control and prevent the colonization of pathogenic bacteria. The elimination of antibacterials in animal nutrition has had adverse consequences on the production, health, and welfare of animals. Much research has been focused on the development of antibiotic alternatives to maintain or improve animal health and performance. Modulation of the gut microbiota with zoo-technical feed additives such as prebiotics and probiotics for host protection to support animal husbandry, including livestock, poultry, and fish farming, is the key to maximize productivity and maintain animal health and welfare. This chapter describes the classes of available prebiotics, probiotics, and synbiotics alternatives to increase productivity and aid performance in several food-producing animals. For farm animals, optimal combinations of various alternatives coupled with good management and husbandry practice, better housing conditions, and improvement of biosecurity measures are essential.

Exogenous enzymes are potentially important alternatives to antibiotics for improving growth performance, particularly in poultry and swine, although research in other animals such as ruminants, fish, fur-bearers, and pets has been done in recent years. The value of added feed enzymes in promoting growth and efficiency of nutrient utilization in animal production is clearly recognized. This chapter covers several reaction conditions that need to be met for the enzyme to act, as well as feed enzymes and gastrointestinal microbiota, mode of action for enzymes, dietary substrates, and enzyme types to be used in animal feed (for example, phytase, and enzyme classes such as xylanases, β-glucanases, pectinases, amylases, and proteases) which improve the feed utilization of dietary components such as protein, amino acids, starch, lipids, and energy. Feed enzymes can affect gastrointestinal tract (GIT) microbial ecology by reducing undigested substrates and anti-nutritive factors and producing oligosaccharides in situ from dietary non-starch polysaccharides (NSP) with potential prebiotic effects.

Animal feed additives are used all over the world for various livestock including poultry for more reasons than one like to provide essential nutrients, increase palatability of the feed, improve their growth performance, as well as optimize the utilization of the feed. Animals with high growth performance need to maintain a high health status, and the use of proper additives is a predominant argument in such cases. With increasing industry standards and consumer awareness as well as demand for healthy food products of animal origin, there is an increased pressure on the industry for more natural and non-residual alternatives than the conventional feed additives used till recently as animal feed products. Consumer and animal welfare are primary concerns dictating the valuable alternatives of animal feed additives. Some of the alternatives seen for use as animal feed additives are probiotics, prebiotics, enzymes, and herbs. Such choice of feed additives is backed by scientific and empirical research on these alternatives as herbs and their extracts (botanicals) have been found to have a wide range of activity which cannot only stimulate feed intake but also stimulate endogenous secretions or have antimicrobial, coccidiostat, or anthelmintic activity.

Ban of antibiotic use as growth promoters, cost-effectiveness, and increased awareness about harmful residual effect cause herbal feed additive to gain importance in sustainable livestock production. Animal husbandry sector gets benefited by the use of number of feed additives such as ascorbic acid, prebiotic, probiotic, and herbal extracts. Medicinal properties of the herbs to improve antimicrobial, anti-inflammatory, antioxidant, digestibility, and immune-stimulant activity must be explored in the feeding of animals as well as safe food for human beings. Standardization of correct dosage regime of herbal feed additives for a particular function is the demand of situation so more research should be conducted in this direction.

La necessità di un’alimentazione sana e bilanciata per gli animali ha imposto di integrare eventuali carenze riscontrate negli ingredienti motivate da diversi fattori, intrinseci o estrinseci alla materia prima di origine vegetale o animale; alcuni esempi riguardano cause geografiche o stagionali, altri interessano la disponibilità e la costante qualità delle stesse sul mercato.

Allo stesso modo, si è imposta la necessità di fornire agli animali alimenti che compensassero anche le inevitabili sottrazioni di energia dovute alla loro attività e le eventuali mancanze dovute a stati di malessere (causati spesso dalla presenza di flore batteriche patogene).

Di conseguenza, per il benessere e la salute dell’animale, è opportuno rispondere con efficacia e tempestivamente alle richieste nutrizionali, siano esse temporanee o persistenti nel tempo. L’aggiunta di oligoelementi, vitamine ed altri principi nutritivi risponde proprio a questo insieme di esigenze, pur se inclusi nella formulazione del mangime solo in quantità sufficienti a raggiungere lo scopo prefissato.

Gli additivi sono quindi sostanze o microrganismi o preparati intenzionalmente aggiunti agli alimenti per animali o all’acqua di abbeverata al fine di svolgere una o più funzioni (Reg. CE n. 1831/2003), secondo cui si dividono in categorie specifiche:

* tecnologici, ad es. per proteggere i mangimi dal deterioramento, omogeneizzare, regolarne il pH, aumentare la viscosità, ridurre o aumentare la fissazione fra particelle di mangime, migliorare le proprietà meccaniche del mangime (consistenza, stabilità) ma anche conservabilità, ecc.
* organolettici, ad es. per conferire o restituire le proprietà organolettiche e visive dei mangimi oppure per influire favorevolmente sul colore del m