Nonruminant Nutrition symposium on natural phytobiotics for health of young animals and poultry: Mechanisms and application1,2

S. W. Kim,†3 M. Z. Fan,‡ and T. J. Applegate§

†Department of Animal Science, North Carolina State University, Raleigh 27695; ‡Centre for Nutrition Modelling, University of Guelph, Guelph, Ontario, Canada N1G 2W1; and §Department of Animal Sciences, Purdue University, West Lafayette, IN 47907

doi:10.2527/jas.2007-0769

Newly weaned piglets and young poultry are highly susceptible to various stressors, such as bacterial diseases resulting in decreased growth and even death (Lecce, 1986; Hoerr, 1998). Supplementing antibiotics in swine and poultry diets at subtherapeutic levels has long been shown to increase the growth rate (Becker et al., 1955; Stahly et al., 1980; Cromwell, 2002). However, due to growing concerns over antibiotic resistance, the use of antibiotics as growth promoters in animal diets could be limited due to public or regulatory pressures. Thus, current research involving feed additives for diets of young animals is focused on searching for alternatives to antibiotics that would have at least similar growth-promoting effects of antibiotics without causing bacterial resistance. Phytobiotics is a term used to describe plant-derived natural bioactive compounds, which affect animal growth and health, and is often applied to essential oils, botanicals, and extracts derived from herbal plants. Some phytobiotics are known to have antimicrobial or antiviral activities (Sökmen et al., 2004; Piao et al., 2006; Friedman, 2007). Those selected herbs or phytobiotics have long been used as complementary or alternative medicine to improve human health or to cure human disease. Recent advances in science have allowed for the identification of active components from selected phytobiotics and investigation into the mechanisms of those components in the animal’s body. More recently, animal nutritionists have attempted to use some phytobiotics as alternatives to the use of antibiotics for young animals and birds (Mao et al., 2005; Kommera et al., 2006; Peeters et al., 2006; Yuan et al., 2006). However, results have been somewhat inconclusive with limited resources and understanding.

This symposium, “Natural phytobiotics for health of young animals and poultry: Mechanisms and application”, was organized by the Nonruminant Nutrition Program Committee for 2007 Joint Annual Meeting of the American Society of Animal Science, the American Dairy Science Associate, the Asociación Mexicana de Producción Animal, and the Poultry Science Association. This symposium was held on July 11, 2007, in San Antonio, TX. The aims of this symposium were to 1) introduce different types of phytobiotics that can be used in animal feeds, 2) examine the mechanisms of action of phytobiotics on animal growth and health, and 3) discuss current and future applications in animal production. To meet the aims of the symposium, 2 key speakers were invited, followed by 3 research abstract presentations. The first speaker was Wilhelm M. Windisch from University of Natural Resources and Applied Life Sciences (Vienna, Austria) whose presentation was titled “Natural phytobiotics for health of young piglets and poultry: Mechanisms and application”. The second speaker was Xiangshu Piao from China Agricultural University (Beijing, China) who gave a talk on “The use of bioactive herbal saccharides in China”. Three additional research presentations were 1) “Effect of a phytogenic feed additive on reproduction of sows” from University of Natural Resources and Applied Life Sciences (Vienna, Austria), 2) “Effects of phytobiotics on nursery pig performance” from Kansas State University (Manhattan, KS), and 3) “Dietary supplementation with Acanthopanax Senticosus extracts enhances the digestion and absorption of dietary protein and amino acids in weaned pigs” from Institute of Subtropical Agriculture, The Chinese Academy of Sciences (Changsha, Hunan, China).

Windisch reviewed the current research on efficacy, modes of action, and aspects of application of phytobiotics as feed additives for swine and poultry diets (Wind-
disch et al., 2008). This included general aspects of phytobiotic feed additives, antioxidative action of phytobiotics, specific impacts on palatability and gut functions, specific antimicrobial actions, growth promoting efficacy, and further considerations to the use of phytobiotics. This paper also provided a comprehensive summary in tabular form of numerous in vivo and in vitro research showing the effects of phytobiotics on growth and gastrointestinal health of piglets and poultry.

Piao's presentation (Piao et al., 2007) introduced immune and antioxidant activities of the saccharides from Chinese herbs, including polysaccharides (Astragalus, Ganoderma lucidum, Phoma herbarum, Lycium barbarum, Lentinus edodes, Angelica sinensis, Coriolus versicolor, Misgurnus anguillicaudatus, Spirulina platensis, Cladonia furcata, etc.) and oligosaccharides (mannan-, galacto-mannan-, isomalto-, fructo-, xylo-oligosaccharide, etc.). It also provided examples of the use of herbal saccharides in 1) enhancing T-cell-mediated immune response and humoral immune response, 2) inhibiting the growth of tumors, 3) scavenging effects on active oxygen, 4) protective effects on acute hepatic injury, 5) promoting wound healing and proliferation of endothelial cells in vitro, 6) decreasing total cholesterol and triglyceride, and 7) improving impaired glucose tolerance. It was concluded that bioactive herbal polysaccharides can be potential immunomodulatory agents for improving health and immune function (Piao et al., 2007).

Phytobiotics are natural bioactive compounds found in herbal plants. This symposium introduced numerous phytobiotics, examined their mechanisms of action, and discussed their potential application. These phytobiotics can be used in feed as natural alternatives to the use of antibiotics, possibly benefiting growth and health of young pigs and poultry.

LITERATURE CITED