CHAPTER 1

INTRODUCTION

It has been said that good feeds make healthy and strong body. To have a healthy and a strong body means to have resistance to diseases and to have high immunity to all kinds of infections. Therefore, good feed creates good immunity, and eating good feed means to improve the quality of immunity in all kinds of animals. If animals are free from diseases, a great deal of saving in the cost of raising animals can be resulted loss money needed to be spent for drugs and medicines necessary to rear the animals. Additional benefit can be yielded by the reduction of residues drugs and chemical substances in carcasses, by which, will eventually be beneficial to health of the meat consumers. Drugs and chemical residues in animal carcasses such as chicken and poultry have caused a great deal of market loss in the past years. It was because of the international concerns on food safety. The **hazard analysis and critical control point** (HACCP) basic was widely implemented as one of the obligatory steps in food processing and Thailand will have to comply with it in poultry meat processing for export. This means Thailand has to produce poultry and other animal products which are free from all kinds of chemical residues and pathogenic microorganisms, in every step of production. Therefore, the study aiming to improve immune status of the animals enabling a minimal use of drugs and chemical feed additives n very essential to maintain expert markets for foods from the Thai animal products in "food safety" era.

The immune system appears to be particularly sensitive to oxidative stress. Immune cells rely heavily on cell-to-cell communication, particularly via membrane-bound receptors, to work effectively. Cell membranes are rich in **polyunsaturated fatty acids** (PUFA) that, if oxidized, can lead to a loss of membrane integrity, altered membrane permeability, (Baker and Meydani, 1994), and result in alterations in intracellular signaling and cell function. It has been shown that exposure to **reactive oxygen species** (ROS) can lead to a reduction in cell-membrane receptor expression (Gruner *et al.,* 1986). The immune system is particularly vulnerable to oxidative damage because many immune cells produce those reactive compounds as part of the body's defense mechanisms. Also, the animals exposed to those ROS froms daily feed as animals take in antigens by mouth every day. Therefore, the local immune system of the intestinal tract must immediately response efficiently and effectively to the antigen. The mucosal surfaces of the gastrointestinal and respiratory tracts, like the skin, are colonized by lymphocytes and accessory cells in order to respond optimally to ingested and inhaled antigens (Abbas *et al.,* 2000). Although the presence of lymphocytes in the mucosa and submucosa of the gastrointestinal and respiratory tracts has been recognized for many decades, the idea of a specialized mucosal immune system is relatively new. Like the skin, these mucosal epithelia are barriers between the internal and external environment and are, therefore, an important first line of defense against infection. In the mucosa of the gastrointestinal tract, lymphocytes are found in the epithelial layer, scattered throughout the lamina propria, and in organized collections in the lamina propria such as Peyer's patch (Abbas *et al.,* 2000). This system protects the body from specific and non-specific antigens. Lymphoid tissues in the gastrointestinal tract work with lamina propria and Peyer's patch. Some part of the ROS are eradicated by antioxidant enzymes such as **superoxide dismutase** (SOD), **glutathione peroxidase** (GSHPX), and **catalase** (CAT) which can safely decompose peroxides, particularly hydrogen peroxide produced during the "respiratory burst" involved in killing invading microorganisms, and SOD can intercept or "scavenge" free radicals (Hughes, 2001). In addition, feeds provide animal body with a large amount of total supply of antioxidants in the form of various micronutrients and "non-nutrients" such as ascorbic acid, retinol, tocopherol, carotenoid (Chew, 1996) and γ-oryzanol (Duve and White, 1991).

Gamma oryzanol is a mixture of sterol esters of ferulic acid and contains a hydroxyl group. Gamma oryzanol occurs in the unsaponifiable fraction of rice bran oil (*Orysae sativa L.*) (Kaneko and Tsuchiya, 1954). Rice bran oil contents γ-oryzanol at in approximately 1.56 % by weight (Norton, 1995). Karladee *et al.,* (2003) and Pongpichan *et al.,* (2004) reported that purple glutinous rice bran exhibited higher of γ-oryzanol than white rice bran. Ferulic acid has antioxidant activity, and reduction in lipid peroxides has been reported in studies with γ-oryzanol (Graf, 1992 and Wada *et al.,* 1981). The 10 components of γ-oryzanol were identified as Δ-7-stigmastenyl ferulate, stigmasteryl ferulate, cycloartenyl ferulate, 24-methylene cycloartanyl ferulate, Δ-7-campestenyl ferulate, campesteryl ferulate, Δ-7-sitostenyl ferulate, sitosteryl ferulate, compestanyl ferulate, and sitostanyl ferulate, three of these, cycloartenyl ferulate, 24-methylenecycloartanyl ferulate, and campesteryl ferulate, were major components of γ-oryzanol. The highest antioxidant activity was found for 24-methylenecycloartanyl ferulate, and all three γ-oryzanol components had activities higher than that of any of the four vitamin E components (α-tocopherol, β-tocopherol, γ-tocopherol and δ-tocopherol). Gamma oryzanol may be a more important rice bran antioxidant than vitamin E, the major antioxidant, in inhibiting cholesterol oxidation. Therefore, the beneficial effect of γ-oryzanol consumption in immune improvement could party be explained by its antioxidant mechanisms.

The objectives

1. To prove an immune response property of pure γ-oryzanol.
2. To determine the optimal level on immune response property of pure γ-oryzanol and purple glutinous rice bran in male mice.
3. To show that purple glutinous rice bran.