

addition of marjoram powder at level of 4 g/kg seemed to have a positive influence on growth performance and im-

mune responses, and could be considered as a natural potential growth promoter for broiler chicks.

COMPARISON OF THE EFFECTS OF THYME AND OREGANO ON HEMATOLOGY IN LAYING JAPANESE QUAIL

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The aim of this study was to compare effects of oregano (*Mentha pulegiym*), thyme (*Thymus*) on immune system in laying Japanese quail. 420 quails were feed in completely random design by 7 treatments and 4 replications (every replication involves 12 female and 3 male quails) by following ration for 45 days: 1) control diet (without thyme and oregano), 2) control diet+thyme 1.5%, 3) control diet+thyme 3%, 4) control diet+thyme 4.5%, 5) control diet+oregano 1.5%, 6) control diet+oregano 3%, 7) control diet+oregano 4.5%. At the end of the experiment, 2 birds were selected from each replication and the hematology measures were analyzed. The result showed that us-

ing different levels of oregano and thyme in quail diet were affected on hematology. Monocytes had the highest consumer 4.5% oregano than control group (9.25 vs 6.5%). Adding oregano until 4.5% had significant effect on basophile, oezinophil and monocyte. Intake level of 4.5% thyme observed highest level in basophile and oezinophil between groups (2.22 and 5.75 respectively). Containing 4.5% oregano in group, suggests that differences in antioxidant and antioxidation properties, thyme and oregano. In conclusion, add thyme and oregano to the 4.5% of the diet has significantly positive effect on the percentage of basophile, oezinophil and monocytes.

MULTI-BIOACTIVE METABOLITES FROM *RUDBECKIA HIRTA* L. FLOWERS

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Black-eyed Susan or *Rudbeckia hirta* L. (Asteraceae) is a popular garden biennial herb. American Indian used the root tea to treat worms and colds, and as a wash for sores and snakebites, while the root juice has been used to treat earache (1). The immunomodulatory organic extract of *R. hirta* flower heads was partitioned and subjected fractionation using a series of chromatographic techniques which led to the isolation of a new highly oxygenated pseudoguaianolide: (1S*,4S*,5R*,6R*, 7S*, 10S*, 11S*)-4,14,15-tri-acetoxy-pseudoguaian-12-,6-olide along with three phenolic acids: β -resorcylic acid, (E)-p-coumaric acid, and (E)-caffeic acid; two phenolic esters: 3-O- (E)-caffeoylquinic acid and 3-O- (E)-coumaroylquinic acid methyl ester; a phenolic acid ether (Z)-p-coumaric acid-4-O- β -D-glucopyranoside;

two flavonol glycosides: gossypitrin and quercetagitritin; three methylated flavonol glycosides: eupatolin, patulitrin, eupatolitin-3-O- β -D-glucopyranoside; and eupatolitin-3-methyl ether. The structure of the new sesquiterpene lactone 1 was established on the basis of extensive spectroscopic analyses, including 1D and 2D NMR. Most of isolated compounds exhibited antioxidant (oxygen radical absorbance capacity, ORAC), immunomodulatory, 5-lipoxygenase (5-LOX) inhibitory and cytotoxic activities at variable concentrations, which can be considered as a partial scientific evidence for the ethnopharmacological uses of the plant.

Reference: Barker, J. (2004) "The Encyclopedia of North American Wild Flowers". Parragon Publishing Ltd. Bath, UK.