PHYTOGENIC FEED ADDITIVE ON BROILER PERFORMANCE AND CARCASS YIELD

GRANA RITCHIE ESTILLER LICLICAN

An undergraduate thesis manuscript submitted to the faculty of the Department of Animal Science, College of Agriculture, Central Luzon State University in partial fulfillment of the requirements for the degree

BACHELOR OF SCIENCE IN AGRICULTURE
(Animal Science)

FEBRUARY 2018

PHYTOGENIC FEED ADDITIVE ON BROILER PERFORMANCE AND CARCASS YIELD

by

GRANA RITCHIE ESTILLER LICLICAN

Undergraduate thesis manuscript presented to the faculty of the Department of Animal Science, College of Agriculture, in partial fulfillment of the requirements for the degree of Bachelor of Science in Agriculture major in Animal Science

APPROVED:

ERNESTO A. MARTIN
Adviser
1-11-18
Date Signed

JAMAL JAMES D. MANLAPIG
Department Research Coordinator
2018.01.17
Date Signed

OLIVER F. CELESTINO
Critic
1-12-18
Date Signed

ERNESTO P. GARILLO
Department Chairman
1-17-18
Date Signed

ACCEPTED BY:

ERNESTO A. MARTIN
Dean
1-19-18
Date Signed

RECORDED BY:

RONALDO T. ALBERTO
College Research Coordinator
1/22/18
Date Signed

BIOGRAPHICAL SKETCH

The author, Grana Ritchie E. Liclican, often called 'Grana' by her family is the youngest daughter of Mrs. Lolita E. Liclican and Mr. Rogelio V. Liclican. Her family lives in Brgy. Andres Bonifacio Sur, Llanera, Nueva Ecija She was born on March 10, 1997 at the Doctor's Hospital in Cabanatuan City, Nueva Ecija.

She finished her primary education at Andres Bonifacio Sur Elementary School and her secondary education at Saint Joseph School of San Jose City, Nueva Ecija.

When she finished her high school studies in 2013, she enrolled at the Central Luzon State University, Science City of Muñoz, Nueva Ecija where she took Bachelor of Science in Agriculture, major in Animal Science and Poultry Production as specialization.

Studying in college made her think that every failure made, gave a lesson to learn.

ACKNOWLEDGEMENT

The author would like to express her profound gratitude to those who contributed in accomplishing this work.

First and foremost, to Almighty God for giving her the guidance in times of hardships and pressures, for His weariless providing bountiful blessings, knowledge, strength and courage to withstand the critical and challenging moment of her college years.

Heartfelt thanks to Dr. Ernesto A. Martin for his generous assistance, trust, encouragement, invaluable suggestions, recommendations, and patience in giving instructions throughout the duration of the study.

To the author's critic, Dr. Oliver F. Celestino for his guidance and understanding; to Ms. Joice V. San Andres for her suggestions; Mr. Jamal James D. Manlapig for his recommendation for the improvement of the study; Dr. Ramon Cesar D. Salas for sharing his technical knowledge and pieces of advice. Thank you

To Dr. Irene J. Domingo, former department chairperson; Dr. Ernesto P. Garillo as department chairperson, and to all faculty and staff of the Department of Animal Science for the kindness and knowledge they've shared.

Special thanks to Ruth, Ellen, and Kuya John Ray for the help during the loading period; to Margarete, Leisha, Arjun, Dan, and Manipon for the assistance in recording and dressing of sample birds.

Profound gratitude to Kuya Jeff for always helping the author throughout the feeding trial; to Kuya Rolly, Kuya John, and Kuya Alvin for helping her in mixing experimental diets and whenever the author was in need of help.

To her best friend Jessa Mae Cardona, who was always there when the author was in difficult and in happy moments. To Joni Mae Taguiam, April Doring, and Maria Cellyne de Blas who were there to comfort and motivate the author.

To her brothers and sisters in the Society of Animal Science (SAS), great appreciation is extended for their companionship especially to batch CELLS.

Lastly, the author would like to express her heartfelt gratitude to her beloved parents, Mr. Rogelio V. Liclican and Mrs. Lolita E. Liclican for their unconditional love, and support both financially and emotionally. To her sisters, Ate Jing Jing and Ate Alva for their endless motivation and undying moral support that made the author attain and achieve her goals and dreams in life.

GRANA RITCHIE ESTILLER LICLICAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDIX FIGURES

PHYTOGENIC FEED ADDITIVE ON BROILER PERFORMANCE AND CARCASS YIELD

by

GRANA RITCHIE ESTILLER LICLICAN

ABSTRACT

A total of 135-day old male broiler chicks of a commercial strain (Cobb) were raised to determine the effects of diet with phytogenic feed additive (PFA) on production performance. The birds were randomly assigned to three dietary treatments: Standard Broiler Diet (SBD Control), SBD + Bacitracin Methylene Disalicylate (SBD+BMD), and SBD + Phytogenic Feed Additive (SBD+PFA). Each treatment has three replications with 15 birds per replicate.

Results of the study revealed that feeding diet with PFA did not significantly affect overall production performance, and carcass yield ($P > 0.05$) of the broilers and income over feed costs. Similarly, feeding diet with BMD did not affect overall production performance and carcass yield of broilers.

---

[1]Undergraduate thesis manuscript presented as partial fulfilment of the requirements for the degree of Bachelor of Science in Agriculture, Central Luzon State University to be conducted in Department of Animal Science, College of Agriculture, Central Luzon State University Nueva Ecija under the supervision of Dr. Ernesto A. Martin with Experimental Contribution No. CA–02–17–0006

LITERATURE CITED

ABBAS, T. E. 2012. Phytogenic Feed Additives as a Coccidiostat in Poultry. Bulletin of Environment, Pharmacology and Life Sciences. 1(7): 22 – 24. Pathogens. (4)137-156 Pathogens. (4) 137-156.

AJI, S.B., K. IGNATUIUS, A.Y. ADO, J.B. NUHU and A. ABDULKARIM. 2011. Effect of feeding onion (Allium cepa) and garlic (Allium sativum) on some performance characteristics of broiler chickens. Res. J. Poult. Sci. 4: 22-27.

AKSIT, M., E. GOKSOY, F. KOK, D. OZDEMIR, and M. OZDOGAN. 2006. The impacts of organic acid and essential oil supplementations to diets on the microbiological quality of chicken carcasses. Arch. Geflugelkd. 70:168–173.

AL-KASSIE, G. A. M. and Y. J. JAMEEL. 2009. The effect of adding *Thyme vulgariz* and *Cinnamomuim zeylanicum* on productive performance in broilers. Proceeding of 9th Veterinary Scientific Conference, College of Veterinary Medicine, University Baghdad, Iraq.

ALLEN, P.C., H.D. DANFORTH and P.C. AUGUSTINE. 1998. Dietary modulation of avian coccidiosis. Int. J. Parasitol. 28: 1131-1140.

ALLOUI, N., S. BEN AKSA and M.N. ALLOUI. 2012. Utilization of fenugreek (Trigonella foenum-graecum) as growth promoter for broiler chickens. J. World Poult. Res. 2(2): 25-27.

AMAD, A. A., K. MANNER, K. R. WENDLER, K. NEUMANNN, and J. ZENTEK. 2011. Effects of a phytogenic feed additive on growth performance and ileal nutrient digestibility in broiler chickens. Poultry Science 90:2811–2816.

AYACHI, A., N. ALLOUI, O. BENNOUNE, S. YAKHLEF, W. DAAS AMIOUR, S. BOUZDI, K. DJEMAI ZOUGHLACHE, K. BOUDJELLAL and H. ABDESSEMED. 2009. Antibacterial activity of some fruits; berries and medicinal herb extracts against poultry strains of Salmonella. Am. Eurasian J. Agric. Environ. Sci. 6 (1):12-15.

BARRETO M.S.R., J.F.M. MENTEN, A.M.C. RACANICCI, P.W.Z. PEREIRA, and P.V. RIZZO. 2008. Plant Extracts used as Growth Promoters in Broilers. Brazilian Journal of Poultry Science. 10(2):109 – 115.

BASMACIOGLOU, H., O. TOKUSOGLOU and M. ERGUL. 2004. The effect of orégano and rosemary essential oils or alpha-tocopheryl acetate on performance and lipid oxidation of meat enriched with n-3 PUFA's in broilers. South African Journal of Animal Science, v.34, n.3, p.197-210

BOLUKBASI, S.C. and M.K. ERHAN. 2007. Effect of dietary thyme (Thymus vulgaris) on laying hens performance and E. coli concentration in feces. Int. J. Nat. Eng. Sci. 1(2): 55-58

BOTSOGLOU, N. A., E. CHRISTAKI, D. J. FLETOURIS, P. FLOROU-PANERI, and A. B. SPAIS. 2002a. The effect of dietary oregano essential oil on lipid oxidation in raw and cooked chicken during refrigerated storage. *Meat Science*, *62*(2), 259-265.

BOTSOGLOU, N. A., P. FLOROU-PANERI, E. CHRISTAKI, D. J. FLETOURIS, and A.B. SPAIS. 2002b. Effect of dietary oregano essential oil on performance of chickens and on iron-induced lipid oxidation of breast, thigh and abdominal fat tissues. Br. Poult. Sci. 43:223–230.

BOTSOGLOU, N. A., A. GOVARIS, E. BOTSOGLOU, S. H. GRIGOROPOULOU, and G. PAPAGEORGIOU. 2003. Antioxidant activity of dietary oregano essential oil and alpha-tocopheryl acetate supplementation in long-term frozen stored turkey meat. J. Agric. Food Chem. 51:2930–2936.

BURT, S. 2004. Essential oils: Their antibacterial properties and potential applications in food—A review. Int. J. Food Microbiol. 94:223–253.

BURT, S. and R.D. REINDEERS. 2003. Antibacterial activity of selected plant essential oils against E. coli O157:H7. Lett. Appl. Microbiol. 36 (3):162-167.

CABUK, M., M. BOZKURT, A. ALCICEK, Y. AKBAS, and K. KU ¨CU ¨KYILMAZ. 2006. Effect of an herbal essential oil mixture on growth and internal organ weight of broilers from young and old breeder flocks. S. Afr. J. Anim. Sci. 36:135–141.

CASTANON, J.I.R. 2007. History of the Use of Antibiotic as Growth Promoters in European Poultry Feeds. Poultry Science 86:2466–2471

CATALA-GRERORI, P., S. MALLET, A. TRAVEL and M. LESSIRE. 2007. Un extrait de plante et un probiotique sont aussi efficaces que l'avilamycine pour améliorer les performances du poulet de chair. VIIemeJournées de la Recherche Avicole, Tours, France, 202-206.

CEYLAN, E. and D.Y.C. FUNG. 2004. Antimicrobial Activity of Spices. Journal of Rapid Methods and Automation in Microbiology. 12:1-55

CHO, J.H., KIM, H.J., and KIM, I.H. 2014. Effects of phytogenic feed additive on growth performance, digestibility, blood metabolites, intestinal microbiota, meat color and relative organ weight after oral challenge with Clostridium perfringens in broilers. Livestock Science 160:82–88.

CHRISTAKI, E., P. FLOROU-PANERI, I. GIANNENAS, M. PAPAZAHARIADOU, N. BOTSOGLOU, A.B. SPAIS. 2004. Effect of a mixture of herbal extracts on broiler chickens infected with Eimeria tenella. Anim. Res. 53:137–144.

CHRUBASIK, S., M. H. PITTLER, and B. D. ROUFOGALIS. 2005. Zingiberis rhizome: A comprehensive review on the ginger effect and efficacy profiles. Phytomedicine 12:684–701.

CONSENTINO, S., C.I.G. TUBEROSO, B. PISANO, M. SATTA, V. MASCIA, E. ARZEDI and F. PALMAS. 1999. In-vitro antimicrobial activity and chemical composition of Sardinian Thymus essential oils. Letters in Applied Microbiology. 29:130-135

CRAIG, W. J. 1999. Health promoting properties of common herbs. Am. J. Clin. Nutr. 70(Suppl.):491S–499S.

CUPPETT, S. L. and C. A. HALL. 1998. Antioxidant activity of Labiatae. Adv. Food Nutr. Res. 42:245–271

DIBNER, J.J. and J. D. RICHARDS. 2005. Antibiotic growth promoters in agriculture: History and mode of action. Poult. Sci. 84:634–643.

FASCINA, V.B., J.R. SARTORI, E. GONZALES, F.B. DE CARVALHO, I.M.G.P DESOUZA, G.D.V. POLYCARPO, A.C. STRADIOTTI and V.C. PELICIA. 2012. Phytogenic additivesand organic acids in broiler chicken diets. Revista Brasileira de Zootecnia. v.41.n.10, p.2189-2197.

FLOROU-PANERI, P., I. GIANNENAS, E. CHRISTAKI, A. GOVARIS, and N. A. BOTSOGLOU. 2006. Performance of chickens and oxidative stability of the produced meat as affected by feed supplementation with oregano, vitamin C, vitamin E and their combinations. Arch. Geflugelkd. 70:232–240.

GAUTHER, R. 2005. Organic acids and essential oils, a realistic alternative to antibiotic growth promoters in poultry. I Forum Internacional de Avicultura, 17 a 19 de Agosto, Brasil. 148-157.

GIANNENAS I., P. FLUOROPANERI, M. PAPAZAHARIADOU, E. CHRISTAKI, N.A. BOTSOLOU and A.B. SPAIS. 2003. Effect of dietary supplementation with oregano essential oil on performance of broilers after experimental infection with *Eimeria tenella*, Arch Anim Nutr. 57:99-106

GIANNENAS, I. A., P. FLOROU-PANERI, N. A. BOTSOGLOU, E. CHRISTAKI, and A.B. SPAIS. 2005. Effect of supplementing feed with oregano and (or) alpha-tocopheryl acetate on growth of broiler chickens and oxidative stability of meat. J. Anim. Feed Sci. 14:521–535.

GOVARIS, A., N. BOTSOGLOU, G. PAPAGEORGIOU, E. BOTSOGLOU, and I. AMBROSIADIS. 2004. Dietary versus post-mortem use of oregano oil and (or) alpha-tocopherol in turkeys to inhibit development of lipid oxidation in meat during refrigerated storage. Int. J. Food Sci. Nutr. 55:115–123.

GOVARIS, A., P. FLOROU-PANERI, E. BOTSOGLOU, I. GIANNENAS, I. AMVROSIADIS, and N. BOTSOGLOU. 2007. The inhibitory potential of feed supplementation with rosemary and/ or α-tocopheryl acetate on microbial growth and lipid oxidation of turkey breast during refrigerated storage. ScienceDirect. 40: 331-337

GULMEZ, M., N. ORAL, and L. VATANSEVER. 2006. The Effect of Water Extract of Sumac (Rhus coriaria L.) and Lactic Acid on Decontamination and Shelf Life of Raw Broiler Wings. Poultry Science 85:1466–1471

GUSTAFSON, R.H., and R.E. BOWEN. 1997. Antibiotic use in animal agriculture. J. Appl. Microbiol. 83:531–541.

HASHEMI, S. R. and H. DAVOODI. 2010. Phytogenics as New Class of Feed Additives in Poultry Industry. Journal of Animal and Veterinary Advances. 9(17): 2295-2304.

HINTON, M.Z., A.M. CHALABY, and V. ALLEN.1982. The persistence of drug resistant Escherichia coli in the intestinal flora of healthy broiler chicks. J. Hyg. 89:269–275.

JACELA, J. Y., H.L. FROBOSE, J.M. DEROUCHEY, M.D. TOKACH, S. S. DRITZ, R.D. GOODBAND and J.L. NELSSEN. 2010. Amino acid digestibility and energy concentration of high-protein corn dried distillers grains and high-protein sorghum dried distillers grains with solubles for swine. Journal of animal science. 88(11), 3617-3623.

JAMROZ, D., A. WILICZKIEWICZ, T. WERTELECKI, J. ORDA and J. SCORUPINSKA. 2005. Use of active substances of plant origin in chicken diets based on maize and locally grown cereals. Br Poul Sci. 46:485-93

JAMROZ, D., T. WERTELECKI, M. HOUSZKA, and C. KAMEL. 2006. Influence of diet type on the inclusion of plant origin active substances on morphological and histo-chemical characteristics of the stomach and jejunum walls in chicken. J. Anim. Physiol. Anim. Nutr. (Berl.) 90:255–268.

JANG, I. S., Y. H. KO, H. Y. YANG, J. S. HA, J. Y. KIM, S. Y. KANG, D. H. YOO, D. S. NAM, D. H. KIM, and C. Y. LEE. 2004. Influence of essential oil components on growth performance and the functional activity of the pancreas and small intestine in broiler chickens. Asian-australas. J. Anim. Sci. 17:394–400.

JUNGBAUER, L., K.W. PURSER and K.R. WENDLER, 2010. Effects of a Phytogenic Feed Additive on Performances in Broilers. Nutriquest, Mason City, L.

KHAN, R.U., Z. NIKOUSEFAT, V. TUFARELLI, S. NAZ, M. JAVDANI and V. LAUDADIO. 2012. Garlic (Allium sativum) supplementation in poultry diets: Effect on production and physiology. World Poultry Sci. J. 68: 417-424.

KOSCOVA, J., R. NEMCOVA, S. GANCARCIKOVA, Z. JONECOVA, L. SCIRANKOVA, A. BOMBA and V. BULECA. 2006. Effect of two plant extracts and Lactobacillus fermentum on colonization of gastrointestinal tract by Salmonella enteric var. Dusseldorf in chicks. Biol. Brat. 61(6): 775 – 778.

KUMAR, A., J. DINGLE and D. ALHASSANI, 2008. Effects of Phytogenic Feed Additives on Broilers Chicken Performance. Department of Animal Resources College of Agriculture, University of Baghdad, Iraq.

LAMBERT, R.J.W., P.N. SKANDAMIS, P.J. COOTE and G.J.E. NYCHAS. 2001. A study of the minimum inhibitory concentration and mode of action of oregano essential oil, thymol and carvacrol. Journal of Applied Microbiology. 91:453-462

LEE, K. W., H. EVERTS, H. J. KAPPERT, M. FREHNER, R. LOSA, and A. C. BEYNEN. 2003. Effects of dietary essential oil components on growth performance, digestive enzymes and lipid metabolism in female broiler chickens. Br. Poult. Sci. 44:450–457.

LEWIS, M.R., S.P. ROSE, A.M. MACKENZIE and L.A. TUCKER. 2003. Effects of dietary inclusion of plant extracts on the growth performance of male broiler chickens. Br. Poult. Sci. 44 (Suppl. 1): 43-44.

LIPPENS, M., HUYGHEBAERT, G. and CERCHIARI, E. 2005. Effect of the use of coated plant extracts and organic acids as alternatives for antimicrobial growth promoters on the performance of broiler chickens. Archiv für Geflügelkunde 69(6): 261-266

LOVLAND, A. and M. KALDHUSDAL. 2001. Severely impaired production performance in briler flocks with high incidence of Clostridium perfringens-associated hepatitis. Avian Pathology. 30:73-81

MAMOUN, T., A. MUKHTAR and M.H. TABIDI. 2014. Effect of fenugreek seed powder on the performance, carcass characteristics and some blood serum attributes. Adv. Res. Agri. Vet. Sci. 1: 6-11.

MOLTERS, W. 1998. Withdrawal of the authorization of certain antibiotics. Directive 70/524/EEC concerning additives in feedingstuffs. Council regulation (EC) no. 2821/98 of 17 December.

MUTHUSAMY, N. and V. SANKAR, 2015. Phytogenic Compounds Used as a Feed Additive in Poultry Production. International Journal of Science, Environment and Technology. 4:167-171.

NAIDOO, V., L. J. MCGAW, S. P. BISSCHOP, N. DUNCAN, and J. N. ELOFF. 2008. The value of plant extracts with antioxidant activity in attenuating coccidiosis in broiler chickens. Vet. Parasitol. 153:214–219.

NAKATANI, N. 2000. Phenolic antioxidants from herbs and spices. Biofactors 13:141–146.

NASCIMENTO, G.G.F., J. LOCATELLI, P.C. FREITAS, G. SILVA. 2000. Antibacterial Activity of Plant Extracts and Phytochemical on Antibiotic-Resistant Bacteria. Brazilian Journal of Microbiology. 31:247-256

NAVID, J., M. MOZAFFAR and K. KAZEM. 2013. Effect of dietary medicinal herbs on performance, egg quality and immunity response of laying hens. Adv. Env. Biol. 7(13): 4382-4389.

NIEWOLD, T. A. 2007. The non-antibiotic anti-inflammatory effect of antimicrobial growth promoters, the real mode of action? A hypothesis. Poult. Sci. 86:605–609.

NICHOL, R. and T. STEINER. 2008. Efficacy of phytogenics in commercial Lohmann Brown layers. In: Feed Ingredient & Additives Asia Pacific Conference, March 5, Bangkok, Thailand.

LIPPENS, M., HUYGHEBAERT, G. and CERCHIARI, E. 2005. Effect of the use of coated plant extracts and organic acids as alternatives for antimicrobial growth promoters on the performance of broiler chickens. Archiv für Geflügelkunde 69(6): 261-266

LOVLAND, A. and M. KALDHUSDAL. 2001. Severely impaired production performance in briler flocks with high incidence of Clostridium perfringens-associated hepatitis. Avian Pathology. 30:73-81

MAMOUN, T., A. MUKHTAR and M.H. TABIDI. 2014. Effect of fenugreek seed powder on the performance, carcass characteristics and some blood serum attributes. Adv. Res. Agri. Vet. Sci. 1: 6-11.

MOLTERS, W. 1998. Withdrawal of the authorization of certain antibiotics. Directive 70/524/EEC concerning additives in feedingstuffs. Council regulation (EC) no. 2821/98 of 17 December.

MUTHUSAMY, N. and V. SANKAR, 2015. Phytogenic Compounds Used as a Feed Additive in Poultry Production. International Journal of Science, Environment and Technology. 4:167-171.

NAIDOO, V., L. J. MCGAW, S. P. BISSCHOP, N. DUNCAN, and J. N. ELOFF. 2008. The value of plant extracts with antioxidant activity in attenuating coccidiosis in broiler chickens. Vet. Parasitol. 153:214–219.

NAKATANI, N. 2000. Phenolic antioxidants from herbs and spices. Biofactors 13:141–146.

NASCIMENTO, G.G.F., J. LOCATELLI, P.C. FREITAS, G. SILVA. 2000. Antibacterial Activity of Plant Extracts and Phytochemical on Antibiotic-Resistant Bacteria. Brazilian Journal of Microbiology. 31:247-256

NAVID, J., M. MOZAFFAR and K. KAZEM. 2013. Effect of dietary medicinal herbs on performance, egg quality and immunity response of laying hens. Adv. Env. Biol. 7(13): 4382-4389.

NIEWOLD, T. A. 2007. The non-antibiotic anti-inflammatory effect of antimicrobial growth promoters, the real mode of action? A hypothesis. Poult. Sci. 86:605–609.

NICHOL, R. and T. STEINER. 2008. Efficacy of phytogenics in commercial Lohmann Brown layers. In: Feed Ingredient & Additives Asia Pacific Conference, March 5, Bangkok, Thailand.

NOTT, R. 2002. Phytogenic flavours maintain performance 2002. World Poultry Science Association Conference, October 8th 2002, Gold Coast, Australia.

PIAO, X.L., X.S. PIAO, S. W. KIM, J. H. PARK, H. Y. KIM and S.Q. CAI. 2006. Identification and characterization of antioxidants from Sophora flavescens. Biol. Pharm. Bull. 29: 1911–1915.

PLATEL, K., and K. SRINIVANSAN. 2004. Digestive stimulant action of spices: A myth or reality? Indian J. Med. Res. 119:167–179.

RAHIM, A., A. MIRZA AGHAZADEH and M. DANESHYAR. 2011. Growth performance and some carcass characteristics in broiler chickens supplemented with Thymus extract (Thymus vulgaris) in drinking water. J. Am. Sci. 7(11), 400-405.

RHAYOUR, K., T. BOUCHIKHI, A. TANTAOUI-ELARAKI, K. SENDIDE, and A. REMMAL. 2003. J. Essent. Oil Res. 15:286-292

ROSEN G.D. 1996. The nutritional effects of tetra-cyclines in broiler feeds. Pages141–146inProceedingsoftheXXWorld's Poultry Congress. Vol II. New Delhi, India.

RUBERTO, G., M.T. BARRATA, M. SARI and M. KAABECHE. 2002. Chemical composition and antioxidant activity of essential oils from Algerian Origanum Glandulosum Desf. Flavour Frag. J. 17: 251-254.

SARI, M., D. M. BIONDI, M. KAABECHE, G. MANDALARI, M. D'ARRIGO, G. BISIGNANO, A. SAIJA, C. DAQUINO and G. RUBERTO. 2006. Chemical composition, antimicrobial and antioxidant activities of the essential oil of several populations of Algerian Origanum glandulosum Desf.

SCAN.1996. Report of the scientific committee for animal nutrition (SCAN) on the possible risk for humans on the use of avoparcin as feed additive. VI/6474/96+cd. European Commission, Brussels, Belgium.

SHELEF, L.A. 1983. Antimicrobial effects of spices. Journal of Food Safety 6:29-44

SCHIAVONE, A., F. RIGHI, A. QUARANTELLI, R. BRUNI, P. SERVENTI, and A. FUSARI. 2007. Use of Sibyllum marianum fruit extract in broiler chicken nutrition: Influence on performance and meat quality. J. Anim. Physiol. Anim. Nutr. (Berl.) 91:256–267.

SCHWAN, M. 1969. Joint Committee on the use of antibiotics in animal husbandry and veterinary medicine: Report presented to Parliament Report Cmdn.4190. Her Majesty's Stationery Office, London.

SIMS M.D., K.A. DAWSON, K.E. NEWMAN, P. SPRING, and D.M. HOOGE. 2004. Effects of Dietary Mannan Oligosaccharide, Bacitracin Methylene Disalicylate, or Both on the Live Performance and Intestinal Microbiology of Turkeys. Poultry Science 83:1148–1154.

SMITH-PALMER, A., J. STEWART, and L. FYFE. 1998. Antimicrobial properties of plant essential oils and essences against five important food-borne pathogens. Lett. Appl. Microbiol. 26:118–122.

SOLTAN, M. A. 2008. Effect of Dietary Organic Acid Supplementation on Egg Quality and Some Blood Serum Parameters in Laying Hens. International Journal of Poultry Science. 7(6): 613-621

SRINIVASAN, K. 2006. Fenugreek (Trigonella foenum-graecum): A review of health beneficial physiological effects. Food Rev. Int. 22: 203–224.

SRIVASTAVA, K.C., A. BORDIA and S.K. VERMA. 1995. Garlic (Allium sativum) for disease prevention. South African J. Sci. 91: 68-77.

VAN DEN BOGAARD, A.E. 1997. Anti-microbial resistance—Relation to human and animal exposure to antibiotics. J. Antimicrob. Chemother. 40:453–454.

WANG, R., D. LI and S. BOURNE, 1998. Can 2000 years of herbal medicine history help us solve problems in the year 2000. Proceedings of Alltech's 14th Annual Symposium, (AAS'98), Kentucky, USA., pp:273-291.

WALDENSTEDT, L. 1998. Coccidial and clostridial infections in broiler chickens: influence of diet composition. Acta Uni. Agric. Suec. Agrar. 88: 1-61.

WALDENSTEDT, L., K. ELWINGER, P. THEBO and A. UGGLA. 1999. Effect of betaine supplement on broiler performance during an experimental coccidial infection. Poult. Sci. 78: 182-189.

WATI, T., T.K GHOSH, B. SYED, S. HALDAR. 2015. Comparative efficacy of a phytogenic feed additive and an antibiotic growth promoter on production performance, caecal microbial population and humoral immune response of broiler chickens inoculated with enteric pathogenic. Animal Nutrition 1. pp:213-219.

WEI, A. and T. SHIBAMOTO. 2007. Antioxidant activities and volatile constituents of various essential oils. J. Agric. Food Chem. 55:1737–1742.

WINDISCH W.M., K. SCHEDLE, C. PLITZNER, and A. KROISMAYR. 2008. Use of phytogenic products as feed additives for swine and poultry. J Animal Science. 86:140–148.

WINDISCH, W. and V. SANKAR. 2015. The effects of phytobiotics on performance and gut function in monogastrics. http://en.engormix.com/MA-feed-machinery/articles/the-effect-phytobiotics-performance_285.htm.

YANG, Y., P.A.IJI and M. CHOCT. 2009. Dietary modulation of gut microflora in broiler chickens: A review of the role of six kinds of alternatives to in-feed antibiotics. World'sPoult.Sci.J.65:97-114.