Effect *of Andrographis paniculata* (Burm. F.) Nees. on broiler performance and mortality compared with chlortetracycline

Naiyana Tipakorn, Phichit College of Agriculture and Technology, Phichit, Thailand, 66140. E-mail: ntipakorn@hotmail.com
Wandee Tartrakoon, Department of Animal Science, Faculty of Agriculture, Chiang Mai University, Chiang Mai, Thailand. E-mail: twandee@hotmail.com
Grete Thinggaard, Institute of Animal Physiology and Animal Nutrition, Goettingen University, 37077 Goettingen, Germany. E-mail: umeulen@uni-goettingen.de
Udo ter Meulen, Institute of Animal Physiology and Animal Nutrition, Goettingen University, 37077 Goettingen, Germany. E-mail: umeulen@uni-goettingen.de

Abstract: A study was conducted at the poultry research farm, Phichit College of Agriculture and Technology, Phichit Province, Thailand and the study was carried out to examine the effect of *Andrographis paniculata* (Burm.F.) Nees. (AP) leaves meal on broiler performance and mortality and to establish the proper levels of AP leaves meal supplement. The feeding trial was accomplished in approximately 2 months during February 2001-April 2001, while the laboratory analyses were conducted after the feeding trial. 240-broiler chickens were divided into six groups and raised in coops in deep litter system under station management for 6 weeks. During the first week the chicken were kept together and brooder lamps were supplied for all chicken. They were fed a balanced diet added 0%, 0.2%, 0.3%, 0.4% of AP leaf meal. For group 6, the feed was mixed with chlortetracycline (50 mg/1 kg of feed) In every group average daily gain (ADG), feed conversion ratio (FCR) and mortality rates were measured. Every 2 weeks blood samples were collected and analyzed for glucose, total protein, albumin and globulin. After 6 weeks the chicks were slaughtered, carcass characteristics were analyzed. Data were collected for analysis according to ANOVA and Duncan's new multiple rang test. The study showed no significant differences in mean of average daily gain, feed conversion ratio, blood clinical chemistry values and carcass characteristic among all treatment groups. However, there were significant differences in mortality rate between group 1 (control) and other groups. Group 5 that received 0.4% AP as feed additive, showed lower mortality rate than group 6 that received chlortetracycline. Thus, AP leaves can be used as feed additive to replace antibiotics due to lower mortality rate. This will reduce the risk of antibiotic residue in chicken meat that can occur when antibiotics are used in poultry production.

Key words: *Andrographis paniculata* (Burm.F.) Nees, AP leaves meal, broiler performance, mortality, chlortetracycline

Introduction: Raising of broiler chickens is becoming popular in Thailand especially in Phichit province. Currently, the farmers in Thailand usually raise broiler by using antibiotic for example chlortetracycline for stimulates growth rate of broiler and for the reason to prevent the chicken from the disease. However the using of antibiotic has some problems about the toxic in chicken meat. So these studies will considered the using of *Andrographis paniculata* (Burm. F.) Nees. (AP), it is a shrub found throughout India and other Asian countries that is sometimes called "India echinacea." It has been used historically in epidemics, including the Indian flu epidemic in 1919, during which AP was credited with stopping the spread of the disease. It has well known for the active compound the name Andrographolide. There are using as medicine for human. On the other hand AP is long known in traditional Asian medicine as an immune system booster. AP is said to have beneficial effects on various modify functions and ailments ranging from degenerative diseases to the common cold.

If *Andrographis paniculata* can be used for reduce the mortality rate and improve the broiler performance. So using of AP is the better way to reduce the cost in raising broiler and no problem about the toxic residue in chicken meat that happened in raising broiler chickens with the chemical substance from antibiotic. It will be good for human health in the future. However, before giving any recommendation in this regard should study and considered in the effect of this plant and proper rations to use in the proper way for the best result.

Objective:
The study was conducted to:
1. To assess whether AP leaf powder or chlortetracycline as feed additive causes changes in broiler performance,
2. To assess whether AP leaf powder or chlortetracycline as feed additive causes changes in broiler mortality rate.

Materials and Methods:
Animals and housing
240 one day old broilers were bought from C.P. Company Limited in Phitsanulok Province. All chickens (240) were raised in coops on deep litter of rice husk under station management for 6 weeks. During the first week the chicken were kept together and brooder lamps were supplied for all chicken.
Design of experiment
After one week the chickens were randomly divided into 6 groups (6 treatments) under a completely randomised design (STEEL and TORRIE, 1981). Each treatment had four replications with 10 chickens per replication. When the chickens were 2, 4 and 6 weeks of age, blood was collected and glucose, total protein, albumin and globulin levels tested. For feed and feeding procedure, all chickens were fed *ad libitum* with a balanced diet fed in two phases: starter phase (0 - 3 weeks) with 23.20% crude protein content and finisher phase (4 - 6 weeks) with 21% crude protein content. AP leaf meal additive at different levels was added to this feed: 0% (control group), 0.1%, 0.2%, 0.3%, and 0.4% of AP leaves (Andrographolide 7.30%) for group 1 to 5 respectively. For group 6, 50 mg of chlortetracycline (CTC) per kg of feed was used. Water was freely available.

Measurements
For average daily gain (ADG), feed conversion ratio (FCR), mortality rate in case that death of broilers was recorded throughout the experiment. Post mortem examinations of dead birds were done at the Department of Animal Science, Phichit college of Agriculture and Technology, Phichit Province or at the Diagnosis and Research Centre (DRC), Department of Livestock Development, Phitsanulok Province, Thailand. Blood clinical chemistry values**:** 8 broilers were sampled from each treatment (2 per replication) to test their blood clinical chemistry values. 1 ml blood was collected per broiler by the veterinarian staff from DRC at the end of week 2, 4 and 6. The blood samples were tested for glucose, total protein, albumin and globulin levels in the serum. Glucose was tested using GOD-PAO method, total protein was determined by the Biuret method (Enzymatic colorimetric test, method without deproteinisation), albumin was tested by BCG method (Photometric Colorimetric Test). All methods are described in "Human Gesellschaft für Biochemica und Diagnostica mbH" (1998). Globulin levels were calculated as the difference between total protein level and albumin level.

Data analysis : The collected data were analysed using analysis of variance procedure (SAS, 1986). Duncan`s new multiple range test was used to compare differences between treatment means.

Results And Discussion:

Average daily gain

The result indicated no significant differences ($p>0.05$) in average daily gain of the 6 weeks growth period (Table 1.) between the groups.

Table 1. Average daily gain (ADG) of broilers fed diets with varying levels of *Andrographis paniculata* leaf meal or chlortetracycline additive.

Group	Week						Average daily gain	Average gain/ bird
	1	2	3	4	5	6		
1	12.29	20.57	28.03	45.35	46.42	33.92	31.09	1305.99
2	13.57	21.24	28.74	54.10	45.71	44.64	34.66	1456.00
3	13.78	21.35	28.21	53.37	44.28	48.21	34.86	1464.40
4	13.92	22.06	29.82	52.49	39.63	51.78	34.95	1467.90
5	14.21	21.81	31.60	50.71	52.13	53.57	37.33	1568.21
6	13.13	21.28	25.71	50.36	38.56	44.61	32.28	1355.76
SEM[1/]	0.11	2.48	6.30	27.58	50.78	70.18	240.93	

[1/] Standard error of the mean (n = 40)

Average daily gain ranged from 12.28 – 46.42 g/broiler/day in group 1 and from 13.57 – 54.10 in group 2, 13.78 – 53.37 in group 3, 13.92 – 52.49 in group 4 and 14.21 – 53.37 in group 5, and 13.13 – 50.36 in group 6. The average daily weight from group 1 – 6 were 31.09, 34.66, 34.86, 34.95, 37.3 3 and 32.28 respectively. ADG ranged from 12.29 -1 4.21, 20.57 - 22.06, 25.71 - 31.60, 45.35 - 54.10, 38.56 - 52.13 and 33.92 - 53.57 in week 1 to 6 respectively. Even though there were no significant differences among the mean ADGs of the groups there was a tendency for group to have the highest ADG, followed by groups 4, 3, 2, 6 and 1 with respective ADGs of 37.33, 34.95, 34.86, 34.66, 32.28 and 31.09 g/broiler/day. A similar pattern was observed within the separate weeks.

Feed conversion ratio

The results indicated no significant differences ($p>0.05$) in feed conversion ratio between the treatment groups (Table 2.). Mean feed conversion ratio ranged from 1.50 – 2.69 in group 1, 1.35 – 2.27 in group 2, 1.34 – 2.10 in group 3, 1.33 – 1.98 in group 4, 1.33 – 1.82 in group 5 and from 1.45 – 2.39 in group 6. Mean FCR from group 1 to 6 were 1.97, 1.71, 1.66, 1.62, 1.57 and 1.80 respectively.

FCR ranged from 1.33 - 1.50, 1.41 - 1.66, 1.45 - 1.74, 1.67 - 1.92, 1.76 - 2.36 and 1.82 - 2.69 in week 1 to 6 respectively. Even though there were no differences ($p>0.05$) in mean FCR, there was a tendency for group 5 to have the best feed conversion ratio of 1.57, followed by groups 4, 3, 2, 6 and 1 with FCRs of 1.62, 1.66, 1.71, 1.80 and 1.97 respectively. The control group and the group supplemented with CTC had the worst FCRs when compared with the other groups.

Table 2. Feed conversion ratio (FCR) of broilers fed diets with varying levels of *Andrographis paniculata* leaf meal or chlortetracycline additive

Group	Week						FCR
	1	2	3	4	5	6	
1	1.50	1.66	1.74	1.92	2.36	2.69	1.97
2	1.35	1.44	1.58	1.73	1.94	2.27	1.71
3	1.34	1.41	1.56	1.71	1.89	2.10	1.66
4	1.33	1.43	1.47	1.73	1.80	1.98	1.62
5	1.33	1.41	1.45	1.68	1.76	1.82	1.57
6	1.45	1.58	1.60	1.78	2.05	2.39	1.80
SEM[1/]	0.002	0.002	0.002	0.004	0.013	0.032	0.10

[1/] Standard error of the mean (n = 40)

Mortality rate

The result indicated that there were significant differences across treatments ($p<0.05$) in mortality rates (Table 3.). The mean broiler mortality rates were 32.50 % in group 1, 20.00 % in group 2, 12.50% in group 3 and 10.00% in group 4, 7.50% in group 5 and 15.00 % in group 6. Group 1 (control) had the highest mortality rate (32.50%), followed by groups 2, 6, 3, 4, and 5 with mortality rates of 20, 15, 12.50, 10, and 7.5 % respectively. The broilers in group 5 showed better ($p<0.05$) performance in terms of mortality rate (MR) than the broilers in group 1, 2 and 6 but there were no significant differences ($p>0.05$) from broilers in groups 3 and 4. In group 1, MR was higher ($p<0.05$) than in other groups. Between group 2 and 6, there were no difference ($p>0.05$) but MR of group 2 was significant higher ($p<0.05$) than of group 4, 5 and 6. Among groups 3, 4 and 5, there were no significant differences ($p>0.05$) but their MRs were lower ($p<0.05$) than for groups 1 and 2.

Table 3. Mortality rates of broilers fed diets with varying levels of *Andrographis paniculata* leaf meal or chlortetracycline additive

Group	Rations of *A. paniculata* (%)	Mean of mortality rate (%)
1	0.0	32.50^{a}
2	0.1	20.00^{b}
3	0.2	12.50^{cd}
4	0.3	10.00^{cd}
5	0.4	7.50^{d}
6	chlortetracycline	15.00^{bc}

SEM (standard error of the mean): 18.05

[a,b,c] Means within the same column not having at least one common superscript are significant different ($p<0,05$)

Blood clinical chemistry values

The result indicated that there were no significant differences ($p>0.05$) in the means of glucose, total protein, albumin and globulin levels in serum (Table 4.).

Table 4. Effect of AP or chlortetracycline on blood clinical chemistry values of glucose, total protein, albumin and globulin levels in serum

Parameter	Week	Group						SEM[1/]
		1	2	3	4	5	6	
Glucose (mg/dl)	2	228.69	258.40	246.15	232.74	276.23	290.83	1209.73
	4	215.21	204.55	228.57	205.77	243.56	211.95	881.53
	6	239.53	209.40	201.99	221.82	219.88	208.97	338.62
Total protein (mg/dl)	2	3.20	3.35	2.80	3.10	2.46	2.93	0.42
	4	3.11	3.25	3.23	3.88	3.03	3.32	0.19
	6	2.97	3.63	3.11	3.88	3.51	3.59	0.20
Albumin (mg/dl)	2	0.97	1.19	1.03	1.01	1.05	1.02	0.03
	4	1.66	1.68	1.50	1.59	1.55	1.64	0.02
	5	1.78	1.72	1.68	2.12	1.53	1.34	0.18
Globulin (mg/dl)	2	2.23	2.16	1.77	2.09	1.41	1.91	0.24
	4	1.45	1.57	1.73	2.29	1.48	1.68	0.16
	6	1.19	1.91	1.43	1.76	1.98	2.25	0.32

[1/] Standard error of the mean (n = 8)

Glucose levels ranged from 228.68 – 290.83 mg/dl in group 1 to group 5 in week 2 (Table 4), 204.55 – 243.56 mg/dl in week 4 and 201.99 – 239.53 mg/dl in week 6. Total protein level ranged from 2.46 – 3.35 mg/dl in group 1 to group 5 in week 2, 3.03 – 3.88 mg/dl in week 4 and 2.97 – 3.88 mg/dl in week 6. Albumin levels ranged from 0.97 – 1.19 mg/dl in group 1 to group 5 in week 2, 1.50 - 1.68 mg/dl in week 4, and 1.34 – 2.12 mg/dl in week 6. Globulin levels ranged from 1.41 – 2.23 mg/dl in group 1 to group 5 in week 2, 1.45 – 2.29 mg/dl in week 4 and 1.19 - 2.25 mg/dl in week 6. No special trend could be observed among the values.

Carcass characteristics

The result indicated that there were no significant differences ($p>0.05$) in the mean carcass characteristics of broilers between each group (Table 5.). Live weight at 6 weeks of age ranged from 1414.50 - 1503.50 g/broiler in group 1 to 5. Slaughter weight without feathers ranged from 1224.52 - 1319.62 g/broiler. Carcass weight without inner organ ranged from 1009.53 - 1073.19 g/broiler. Weight of inner organs ranged from 191.42 – 216.06 g/broiler. Liver weight ranged from 42.62 – 49.94 g/broiler in group 1 to 5. No special trend could be observed among the values.

Table 5. Carcass characteristics of broilers fed diets with varying levels of *Andrographis paniculata* leaf meal or chlortetracycline additive

Variable/gram	Group						SEM[1]/
	1	2	3	4	5	6	
Live weight	1414.50	1433.50	1451.50	1460.75	1503.50	1419.50	5472.54
Slaughter weight without feathers	1251.57	1283.66	1264.26	1224.52	1319.62	1254.35	3696.95
Carcass weight without inner organs	1025.99	1033.12	1058.00	1009.52	1073.19	1029.33	4646.08
Inner organs	207.85	191.42	200.13	212.10	216.06	195.83	180.62
Liver	48.61	42.62	45.44	45.19	49.94	44.54	35.94

[1]/ Standard error of the mean (n = 20)

Conclusions

According to this study the use of 0.4% AP leaves as feed supplement can replace the use of antibiotics in poultry production.

References:

HUMAN GESELLSCHAFT FUR BIOCHEMICA UND DIAGNOSTICA MBH. 1998. Max-Planck-Ring 21. D-65205 Wiesbaden. Germany.

SAS. 1986: SAS for Linear Models. A guide to the ANOVA and GLM procedure. SAS Institute Inc, North Carolina. 231p.

STEEL, R. G.D. and J.H. TORRIE. 1981: Principle and procedures of statistics a biometrical approach (2nd Ed.) Mc. Grow-Hill book Company. Singapore.