

Effects of *Andrographis Paniculata* and *Zingiber Cassumunar* Mixture on Productive Performance and Carcass Quality of Broiler Chickens

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Abstract. The experiment investigated the effects of *Andrographis paniculata* and *Zingiber cassumunar* mixture (Mu-Plus[®]) on productive performance and carcass quality of broiler chickens. A total of 480 one-day-old chicks assigned to five dietary treatments with four replications of 24 chicks each. The basal experimental diet supplemented Mu-Plus[®] at 0 (T1), 0.05 (T2), 0.10 (T3), 0.15 (T4) and 0.20% diet (T5). Body weight gain, feed intake, and productive index had improved higher than the control group in broilers fed 0.05 % diet group. Survival rate was significant ($P < 0.05$) higher in Mu-Plus[®] 0.05 % diet fed broilers when compared with the control birds (100 vs 94.51 %) in finisher period, but not differed in the whole period. Dressing percentage, total edible meat and abdominal fat value as a percentage of live body weight had no any affect ($P > 0.05$) by level of Mu-Plus[®]. However, Mu-Plus[®] 0.05 % diet fed broilers had shown the higher in dressing percentage and total edible meat of broilers with lower abdominal fat and higher return on investment (ROI).

Keywords: *Andrographis paniculata*, *zingiber cassumunar*, broilers, return of investment.

1. Introduction

Herbs feed additives had widely used on their effective active compounds and varying on many factors and the environment. The herbal mixture is being actively researched and shown better efficacy responding more than the single use in the animal industry and production. Bioactive ingredients and botanical feed additives can be grouped by intended function in feed and their main function cover on pathogen resistance within antimicrobial and antifungal activity, antioxidant activity as in control of metabolic auto-oxidation, hepatoprotective activity within mycotoxin tolerance and liver function, digestive donor by stimulation of endogenous enzyme activity and nitrogen absorption as well as beneficial physiological and morphological effects, pollution control within manure and ammonia control and nitrogen binding activity [1]-[6]. Therefore, the objective of the study was to determine the efficacy *Andrographis paniculata* and *Zingiber cassumunar* mixture (Mu-Plus[®]) on performance and carcass quality in broilers.

2. Materials and Methods

Four hundreds and eighty one-day-old commercial broiler chickens (Arbor Acres) used in the study. The chicks allotted to completely randomized design (CRD) and divided into five dietary treatments, four replications and 24 chicks per each replication. The basal experimental diet divided into three periods; starter,

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grower and finisher period with 22% CP, 20% CP and 18 % CP, respectively. The five dietary treatments (T) supplemented *Andrographis paniculata* and *Zingiber cassumunar* mixture at 0.00, 0.05, 0.10, 0.15, 0.20 % diet into T1, T2, T3, T4 and T5, respectively. The chicks housed on the floor-pen open house and provided water and feed *ad libitum* throughout the experiment. Feed offered in mash form to all groups in whole periods.

The final body weight, body weight gain, feed intake and feed conversion ratio per treatment were recorded at the end of each period interval (21 days, 35 days and 42 days of age). Feed efficiency was calculated as feed intake per unit of body weight gain. Mortality was recorded daily while occurrence. At the end of the experiment, two chickens (one male and one female) per replication were randomly selected, slaughtered, and eviscerated to evaluate carcass quality (dressing percentage and percentage of breast, thigh, drumstick, wings). Organ weights (liver, heart, gizzard, spleen, abdominal fat, bursa, thymus yield) were recorded to calculate per live body weight.

2.1. Statistical Analysis

Data were subjected to analysis of variance by using ANOVA procedure according to a completely randomized design. The means of different treatments were compared with Duncan's multiple range tests (DMRT) procedure of the Statistic Analysis System Institute [7]. Significance was considered at $p < 0.05$ levels.

3. Results and Discussion

Growth performance in body weight (BW), body weight gain (BWG), feed intake (FI), feed conversion ratio (FCR), the percentage of survival (SR) and product index (PI) were computed and analyzed for three cycle periods (days 1-21, 22-35 and days 36-42) and whole periods (days 1-42) are presented in Table 1.

Table 1. Effects of Mu-Plus® in the diet of broilers on growth performance and productive index

Treatments	Mu-Plus® % diet	BW (g)	BWG (g)	FI (g)	FCR g/g	SR (%)	PI*
1-21 days							
T1 (Control)	-	853	813	1,098	1.352	100.00	287
T2	0.05	885	845	1,117	1.322	98.96	301
T3	0.10	855	815	1,075	1.318	100.00	295
T4	0.15	845	805	1,071	1.331	97.92	285
T5	0.20	864	824	1,088	1.321	98.96	294
Pooled SEM		40.456	40.558	55.781	0.038	1.615	19.253
P-value		0.690	0.687	0.770	0.701	0.736	0.769
22-35 days							
T1 (Control)	-	2,041	1188	2,172	1.780	96.88	464
T2	0.05	2,099	1214	2,126	1.755	100.00	497
T3	0.10	2,024	1203	2,096	1.797	97.92	454
T4	0.15	2,057	1212	2,122	1.762	98.86	491
T5	0.20	2,095	1231	2,175	1.774	100.00	499
Pooled SEM		185.132	155.755	223.053	0.097	2.318	80.989
P-value		0.970	0.981	0.990	0.975	0.292	0.902
36-42 days							
T1 (control)	-	2,373	332	1,070	3.120	94.51 ^b	146
T2	0.05	2,428	329	978	2.984	100.00 ^a	159
T3	0.10	2,395	398	1,000	2.835	100.00 ^a	203
T4	0.15	2,397	340	996	3.032	98.96 ^{ab}	170
T5	0.20	2,478	383	1,086	2.855	97.87 ^{ab}	189
Pooled SEM		211.636	91.173	160.448	0.403	2.958	70.594
P-value		0.976	0.882	0.890	0.834	0.099	0.792
1-42 days							
T1 (control)	-	2,373	2333	4,359	1.817	91.67	282
T2	0.05	2,428	2388	4,221	1.767	98.96	319
T3	0.10	2,395	2428	4,170	1.775	97.92	309
T4	0.15	2,397	2357	4,190	1.780	96.88	305
T5	0.20	2,478	2438	4,349	1.784	97.92	319
Pooled SEM		211.636	241.825	396.419	0.054	4.749	39.761
P-value		0.976	0.976	0.972	0.735	0.257	0.675

^{a,b} Values in the same column with a common letter are significantly different at $P < 0.05$

*Productive index (PI) = (BWG x Survival rate) ÷ (Age x FCR)

The results from this study reveal that broilers fed with Mu-Plus[®] showed both greater ($P>0.05$) BW and BWG in all periods. Similar results were found by [8] and [9] who reported that *Andrographis paniculata* fed broilers improved to increase in live weight of broilers. [10] and [11] also reported that *Zingiber cassumunar* fed broilers had a greater in BWG. There were improved ($P>0.05$) to increase feed efficiency and PI after feeding with four graded levels of Mu-Plus[®] for three cycle periods and whole period when compared to the control no added Mu-Plus[®] group. [12], [13] and [14] reported that animals that fed *Andrographis paniculata*, *Zingiber cassumunar* and *Curcuma longa* mixture diet were decrease FI and FCR. Furthermore, survival ratio was significant ($P<0.05$) higher in four graded levels of Mu-Plus[®] fed birds in finisher period when compared to the control group. Thus, these herbal mixtures are being actively investigated as natural growth promoters (NGPs) and can be used in the diets to minimize the use of anticoccidials. This finding is in agreement with [8], [9] and [15] reported *Andrographis paniculata* leaf supplementation reduced mortality among broiler treatments. The carcass percentage, total edible meat and abdominal fat value (Table 2), based on carcass after removal of feet and head, were similar ($P>0.05$) among treatments. Similar report made by [9] who reported that *Andrographis paniculata* fed broilers had a similar value of carcass characteristics. [16] also reported that *Zingiber cassumunar* fed birds had no found any effect ($P>0.05$) on carcass characteristics percent and dressing percentage between treatments. [13] and [17] also reported that *Andrographis paniculata*, *Momordica charantia* and *Curcuma longa* mixture fed birds was not significant ($P>0.05$) in dressing percentage, carcass characteristics percent. Feeding Mu-Plus[®] with four levels in control diet showed higher economic benefit returns (Table 2). The results from this study showed that the economic benefit returns on salable bird return from feed cost showed higher when compared with the control no added group. In addition, four graded levels of Mu-Plus[®] showed a higher return on investment (ROI) when compared with the control no added grip and showed the highest of ROI when added at the level of 0.05% diet.

Table 2. Effects of Mu-Plus[®] in the diet of broilers on carcass quality and on economic benefits returns at termination (42 days of age)

Parameters	Control T1	Mu-Plus [®] , (% diet)				Pooled SEM	P-value
		0.05 T2	0.10 T3	0.15 T4	0.20 T5		
Carcass quality							
Dressing percentage	85.41	86.62	87.02	86.56	85.57	2.028	0.438
Total edible meat*, (%)	53.94	54.73	54.06	52.97	54.65	2.176	0.502
Abdominal fat, (%)	1.20	1.14	1.16	1.17	1.17	0.307	0.988
Economic benefits returns							
FCG1, (Baht/bird)	65.00	60.58	61.47	63.39	65.60	6.422	0.765
FCG2, (Baht/kgBW)	27.52	24.98	25.66	26.41	26.53	6.607	0.341
SBR, (Baht/bird)	90.19	92.27	91.01	91.09	94.17	9.182	0.976
NPR1, (Baht/bird)	25.19	31.69	29.54	27.70	28.57	5.475	0.567
NPR2, (Baht/kgBW)	10.48	13.02	12.34	11.59	11.47	1.732	0.341
ROI1, (Baht/bird)	-	+6.50	+4.35	+2.51	+3.38	-	-
ROI2, (Baht/BW)	-	+2.54	+1.86	+1.11	+0.99	-	-

*Total edible meat = Breast + Drumstick + Thigh + Wing,

Dressing percentage = (New York dressing weight ÷ Survival BW) x 100

Feed cost per gain (FCG1) = ((FI x feed cost, FC) ÷ Survival) x 100

Feed cost per gain (FCG2) = FCG1 ÷ BWG

Salable bird return (SBR) = Price of live chicken (38 Baht) x BW

Net profits return per bird (NPR)

NPR1 = SBR – FCG1

NPR2 = NPR1 ÷ BW

Return on investment by comparing with the control group (ROI)

ROI1: NPR1 (added Mu-Plus[®]) – NPR1 (control)

ROI2: NPR2 (added Mu-Plus[®]) – NPR2 (control)

4. Conclusion

Feeding *Andrographis paniculata* and *Zingiber cassumunar* mixture 0.05 % diets had improved to increase final body weight, body weight gain, productive index and survival rate of broilers with lowering feed intake and feed conversion ratio over the control group in whole periods. Carcass characteristics were improved by the level of concentrate at 0.05 % diet that led to the higher in dressing percentage and total

edible meat of broilers with lower abdominal fat and higher in return on investment (ROI) when compared to the control group.

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6. References

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