



(RESEARCH ARTICLE)



STUDY ON USING PROTEIN SOURCE FROM *LEUCAENA LEUCOCEPHALA* ON GROWTH PERFORMANCE OF CROSSBRED CHICKEN

Phonevilay Silivong *, Vongpasith Chanthakoun and Sangkhom Inthapanya

Faculty of Agriculture and Forest Resource, Souphanouvong University, LuangPrabang Provine, Lao PDR.

* Corresponding Author

ORCID Details

Sangkhom Inthapanya: <https://orcid.org/> ID: 0000-0002-7310-6450

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ABSTRACT

The objective of this study was to evaluate on feed intake and growth performance of crossbred chickens by using different level protein source from *Leucaena* leaves meal at 0; 4%; 9% and 14%. The experiment was conducted at Faculty of Agriculture and Forest Resources, Souphanouvong University. There were four treatments and four replicates, arranged in a Randomized Complete Block Design.

The experiments were evaluated on feed intake, average daily gain and feed conversion ratio, this involved recording feed offered and refused, weighing the animals every 10 days, and actual data collection period spanning 60 days.

The experimental results show that:

- The protein content in *Leucaena* leaves was higher than corn meal and rice bran.
- Regarding ash content in rice bran was highest level, followed by *Leucaena* leaves, while corn meal was lowest.
- There were no significant on total feed intake or feed intake relative to body weight.
- Growth performance was high by increasing the level of *Leucaena* leaves of 14%; 9%; 4%, and 0%, respectively.
- Supplementing the diet with *Leucaena* leaves affects growth and feed conversion ratio, specifically, including a high percentage of *Leucaena* leaves in the feed promotes good growth rates while resulting in a low feed conversion ratio.

Keywords: *Leucaena* Leaves, Crossbred Chicken, Protein Source, Growth Performance

1 INTRODUCTION

Poultry production is a common activity in Southeast Asia, and is a major source of livelihood for over a million people in the rural areas (Chein and Jui, 2001).

Livestock rearing is a crucial component of farmers' livelihoods, with nearly 50% of income derived from this activity, farmers' livestock-rearing systems remain underdeveloped and lack the application of scientific techniques; consequently, production is not commercially oriented but rather remains at a subsistence level-focused on meeting household needs with only small surpluses sold. Their rearing methods particularly in poultry farming do not involve calculating feed intake or assessing the specific nutritional requirements of the animals. Chicken farming plays a significant role in the livelihoods of farmers and the Lao people in general particularly the raising of black-bone chickens, as many believe this breed offers superior health benefits compared to other types of chicken. Chickens are easy to raise and require little space; however, proper management is essential, including the construction of suitable coops, vaccination, parasite control, and providing feed that meets their nutritional needs (Laosaket, 1997).

Therefore, feed management is crucial, particularly the use of locally available ingredients such as rice bran, broken rice, and maize; while these are easily accessible, they are low in protein and may not fully meet the chickens' nutritional requirements. *Leucaena* leaves are considered an easily obtainable and excellent protein source for chickens (Khamvongxay et al., 2016); ground *Leucaena* leaves have been used as a protein source in raising native chickens, resulting in an Average Daily Gain (ADG) of 8-12g.

In the research reported here, it was hypothesized that: (i) the growth performance of crossbred chicken would be improved by supplementation with *Leucaena* leaves.

Objectives

To compared the different level of protein source from *Leucaena* leaves meal on feed intake, feed conversion ratio and growth performance of crossbred chicken.

2 MATERIALS AND METHODS

2.1 Location of the study area

The experiment was conducted in the Animal Science Farm of the Faculty of Agriculture and Forest Resource, Souphanouvong University, LuangPrabang Province, Lao PDR. The site is located 7.5 km from LuangPrabang Town to the South-west, at an altitude of 385m above sea level. The experiment was conducted from October 2024 to January 2025.

2.2 Treatments and experimental design

The experiment was arrangement in a Randomized Completely Block Design (RCBD) with 4 treatments and four replications.

2.3 The treatments were:

- T1 = RB 40% + CM 33% + CF 27%
- T2 = RB 40% + CM 31% + CF 25% and LM (4%)
- T3 = RB 40%+ CM 29% + CF 22% and LM (9%)
- T4 = RB 40% + CM 26% + CF 20% and LM (14%)

Note: RB= Rice bran

CM = Corn meal

CF = Complete feed (Pig feed)

LM = leucaena leaves meal

Table 1: Composition of the diets (DM basis)

Ingredient	T1	T1	T3	T4	Protein (%)
Rice bran	40	40	40	40	8
Corn meal	33	31	29	26	11
Complete feed (Pig Feed 219)	27	25	22	20	29
leucaena leaves meal	-	4	9	14	23
Total protein (%)	14.66	14.78	14.84	15	

2.4 Animals and management

Crossbred (n=48 heads) were used with initial body weight about 500 g/head and 4 weeks of age (Figure 1). They were purchased from farmers and raised in pens (3 heads per pen, Figure 2). Chickens were vaccinated against and de-warmed before the start of the experiment, which was constructed of local materials such as grass leaves, small wood and bamboo as dimension of width 0.8m, length 0.8 and height 0.9m and there were spaces in the pen floor to let the feces drop.

**Figure 1: Chickens were used in the experiment****Figure 2: Chickens confined in the pens**

2.5 Feed and management

Rice bran was purchased from rice mill, Corn meal and Complete feed were purchased from farmers and agriculture shop. Leucaena leaves was collected daily from natural stands and sundry until dry and then gride with grinder. All feeds were mixed together (According in the proportion showed in table 1), and put in the feed trough. Water was supplied ad libitum in a plastic bucket. The feed was given two times per day at 7:30AM and 16:00 PM, the feed was fed ad libitum.

2.6 Data collection

Live weight was recorded in the morning before feeding at the beginning and at the end of each period. 7 days per period, until to 10 periods (70 days). The sample of feed offer and residues were record daily and store in the refrigerator. At the end of each period a sub-sample were mixed together for DM analysis. The experiment lasted 80 days, excluding adaptation and organizing periods

2.7 Chemical analyses

Feeds offered and refused were analyzed for DM, N and ash according to AOAC (1990) methods.

2.8 Statistical analyses

Data for feed intake, live weight and feed conversion ratio were analysed with the General Linear Model option of the ANOVA program in the MINITAB software (Minitab 2000) Source of variation were: Chickens, periods, treatment and error

3 RESULTS AND DISCUSSION

3.1 Chemical composition

Protein and ash were highest in complete feed as pig feed No 219, rice bran and corn meal were lowest protein content (Table 2).

Table 2: The chemical composition of feed (% in DM, except DM which is on fresh basis)

Items	DM (%)	N*6.25 (%)	Ash (%)
Rice bran	93.5	9.3	6.58
Corn meal	87.6	11.5	1.59
Leucaena leaves meal	92.2	20.7	7.16
Complete feed (Pig Feed 219)	91.9	29	9.89

3.2 Feed intake, growth rate and feed conversion

Actual feed intake data collected throughout the trial (presented in Table 3) indicates that there were no significant differences in total feed intake or feed intake relative to body weight; however, differences were observed in the feed conversion ratio, with the treatment involving increased levels of dried Leucaena leaves meal demonstrating a superior feed conversion ratio compared to the other experimental treatments.

Table 3: Mean values for feed intake by crossbred chickens

	T1	T1	T3	T4	SEM	P
Total DM intake, g/day	324	325	327	329	3.2	0.62
Intake/kg LW	160	150	153	153	4.345	0.484
DM feed conversion	10.89 ^c	10.96 ^c	10.88 ^b	9.71 ^a	0.15	<0.001

Note: Superscript letters (^a, ^b, ^c) in the same row indicate a statistically significant difference.

Data on the growth performance of the crossbred chickens are presented in Table 4. The results show that while there was no difference in initial weight, final weight and weight gain were significant ($P < 0.001$) and increasing the level of dried Leucaena leaf meal affected on growth performance.

Table 4: Mean values for live weight change, feed DM intake and DM feed conversion for ducks fed rice bran and rice supplemented with water spinach, water hyacinth and banana stem

	T1	T1	T3	T4	SEM	P
Live weight, kg						
Initial	492	513	517	514	10.69	0.363
Final	2,275 ^c	2,296 ^c	2,323 ^b	2,549 ^a	24.20	<0.001
Weight gain, g/head	1,783 ^c	1,783 ^c	1,807 ^b	2,035 ^a	25.68	<0.001
Daily gain, g/day	9.91 ^c	9.90 ^c	10.04 ^b	11.31 ^a	0.14	<0.001

Note: Superscript letters (^{a, b, c}) in the same row indicate a statistically significant difference.

4 DISCUSSION

Growth performance and feed conversion ratio were high by increased the level of protein source from leucaena leave meal, if compared with found by Khamvongxay et al. (2016), shown: feed intake and growth performance were higher and was high than 5% of growth rate. But increasing leucaena leave meal to 10% of the growth rate was higher than this study (12 g/day).

However, when compared with found by Khamnor et al. (2014) which utilized different varieties it is evident that the nutritional value of the feed influenced on average daily gain and was higher than this study, because the total protein was higher.

Future more, if compared with found by Atteck et al. (1983); Ayed et al. (2015); Brue and Latshaw (1985); Das et al. (2014); Donaldson. (1985) shown: growth rate was lower than found in this study, however feed intake was higher and also similar with found by Firman et al. (2008); Hanen et al. (2015); Hui et al. (2016); Ketals and Groote et al. (1989); Leeson and Summers. (2005) the feed intake and average daily gain were higher with high total protein in the dietary, but feed conversion ratio was lower.

5 CONCLUSIONS

Increasing the protein source from leucaena leave meal were increased on feed intake, average daily gain, but feed conversion ratio was lower. In this study can be said, leucaena leaves meal would be improved the growth performance of crossbred chicken and trend to use as protein source for chicken production.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

Regarding the publication of this manuscript, the authors declare that this work does not conflict with the interests of others.

REFERENCES

- [1] Atteck, J. D., S. Lesson and R. J. Julian. (1983). Effect of dietary level and types of fat on performance and mineral metabolism of broiler chicks. *Poult. Sci.* 79:51-59. *Thai Journal of Animal Science The 10th National Animal Science Conference of Thailand VOL. 3 SUPPL. 1 (2022)*
- [2]

- [3] AOAC. (1990). Official Methods of Analysis. Association of Official Analytical Chemists. 15th Edition (K Helrick editor). Arlington pp 1230.
- [4] Ayed, H.B., H. Attia and M. Ennouri. (2015). Effect of oil supplemented diet on growth performance and meat quality of broiler chickens. *Adv. Techniq. Biolo. Med.* 4(1): 1-5.
- [5] Brue, N. R. and J. D. Latshaw. (1985). Energy utilization by the broiler chicken as affected by various fats and fat levels. *Poult. Sci.* 64: 2119-2130.
- [6] Chein, T and Jui, J. L. T. (2001). Future Prospects of Duck Production. *Asia. J. Poult. Sci., Vol. 38: 99-112. (2001), from http://www.jstage.jst.go.jp/article/jpsa/38/1/99/_pdf*
- [7] Das, G. B., M. E. Hossain and M. A. Akbar. (2014). Performance and economic feasibility of using soybean oil, palm oil and fish oil in broiler diet. *Iran. J. Appl. Anim. Sci.* 4:827-833
- [8] Donaldson, W. E. (1985). Lipogenesis and body fat in the chick: Effect of calorie protein ratio and dietary fat. *Poult. Sci.* 64:1199- 1204.
- [9] Firman, J. D., A. Kamyab and H. Leigh. (2008). Comparison of fat sources in ratios of broilers from hatch to market. *Int. J. Poult. Sci.* 7(12):1152-1155.
- [10] Hanen, B. A., H. Attia and M. Ennouri. (2015). Effect of oil supplemented diet on growth performance and meat quality of broiler chickens. *Adv. Tech. Biol. Med.* 4(1):1-5. Hopkin, D. T. and M. C. Nesheim. 1976. The linoleic acid requirement of chick. *Poult. Sci.* 46:872-881.
- [11] Hui, S. T., Idrus, Z., Abdoreza, S. F., Yong, M, G., Evi, C., Sarathi, K. P and Ah, K. T. (2016). Effect of Exogenous Emulsifier on Growth performance, Fat Digestibility, Apparent Metabolisable Energy in Broiler Chickens. *J. BIMB. Vol.4, No. 1:7-10.*
- [12] Ketals, E. and G. D. Groote. (1989). Effect of ratio of unsaturated to saturated fatty acids of the dietary lipid fraction on utilization and metabolizable energy of added fats in young chicks. *Poult. Sci.* 68:1506-1512.
- [13] Khamvongxay, S., Kobi, T and Silivong, P. (2014), Growth performance of black-bone chickens (Yunnan breed) fed diets with varying protein levels. Final reported, Department of Animal Science Farm and Faculty of Agriculture and Forest Resource, Souphanouvong University. Lao PDR.
- [14] Khamvongxay, X., Inthavong, P and Silivong, P. (2016), Effect of providing a protein source from *Leucaena* leaves on the growth of native chickens fed a basal diet of ground corn and fine rice bran. Final reported, Department of Animal Science Farm and Faculty of Agriculture and Forest Resource, Souphanouvong University. Lao PDR.
- [15] Laosaket, P. (1997). Poultry raising. Konkean University, Thailand.
- [16] Leeson, S. and J. D. Summers. (2005). Commercial Poultry Nutrition. Nottingham University press. Nottingham, UK.
- [17] Minitab. (2000). Minitab Software Release 16.