

Growth response curve of local chicken fed Paper mulberry leaf (*Broussonetia papyrifera*) silage as protein source and increasing levels of paddy rice

Sangkhom Inthapanya, Somphanh Bounyavong

Animal Science Department, Faculty of Agriculture and Forest Resource

Souphanouvong University, Luang prabang province, Lao P D R

inthapanyasangkhom@yahoo.com

pbounyavong@yahoo.com

Abstract

Growth of local (400-700 g of live weight) chickens (n= 24) was studied in a Random completely Block design with 4 treatments, 2 replications: The treatment were: protein source of Paper mulberry leaf silage (*Broussonetia papyrifera*) and increasing of Paddy rice. The local chickens were housed in individual in cages made from bamboo and wood.

Paper mulberry leaf silage was lower in DM and higher in crude protein than both feeds as paddy rice and rice bran. The proportion of the diet DM consumed as supplements of each level was in the range of 33.3 to 51.3 %.The supplements increased the growth rates on both levels as: 5 % and 25%, but 15 % in paddy rice was the growth rate lower than, with apparent differences between on both levels supplements. Growth rates were better for paper mulberry leaf silage plus 5% of paddy rice than for Paper mulberry leaf silage only and supplements another level. DM feed conversion was better on 25 % of paddy rice supplement than two level of supplement treatments compared with the no supplement treatment.

Key words: *PMLS: Paper mulberry leaf silage, PR: Paddy rice, RB: Rice bran, DM: Dry matter, OM: Organic matter, CP: Crude protein Crude protein, feed conversion, feed intake, tropical forages*

Introduction

In Lao PDR, livestock production in the villages is generally based on traditional management methods and the species kept are goats, cattle, pigs and poultry (Phengsavanh 2003). The animals are grazed on flatland, roadsides, forest land and on land not used for agriculture using the free range systems (Xaypha 2005). Livestock production also more important for tradition ceremony in some countries (wedding, traditional festivals, etc) the overall, combination with quality of feed resource

The indigenous chickens are predominantly kept in traditional family-based free-range scavenging system (Alemu and Tadelle 1997). Chicken production plays an important role in the agriculture of the Mekong Delta, which accounts for 28 % of the total chicken products in the country (Khang 2003). The feed resource base for the chickens is scavenging. It consists of household wastes, anything edible found in the immediate environment and small amounts of grain supplements provided by the farmers. Therefore, the scavenging feed resource is not constant. Thus, the birds are left to depend primarily on what nature offers. According to Kabatange and Katule (1989) feed supplies from home and the environment varies with farming activities such as land preparation, sowing, harvesting, grain availability in the household, season of the year and the life cycle of insects and other invertebrates.

Scavenging chicken systems are a popular and widespread traditional farming system in developing countries throughout the world. There are about 3 billion chickens, kept by villagers in developing countries (Roberts, 1995). In Africa, they account for more than 70% of the poultry population

(Sonaiya, 1990), and in Ethiopia it has been reported that they account for 98.5 and 99.2% of the national egg and poultry meat production, respectively (Dessie *et al.*, 1996). In Vietnam, village systems are estimated to produce about 65% of the total chicken meat, from about 70 million chickens per annum (Vang *et al.*, 2000).

Paper mulberry (*Broussonetia papyrifera* moraceae) is a tree that is common in the northern area of Lao. The leaves have crude protein content from 22.6 to 28.5% in DM, according to Napaserth *et al* (2007). The leaves could be a potential feed resource for rabbits, according to Inthapanya. S *et al* (2009) as some farmers say the leaves can be fed to pigs, presently the bark of Paper mulberry is used in the handicraft industry to make paper and envelopes. The leaves would thus be a by-product from this process.

The objectives of the present study were to evaluate the effect of different level of paddy rice supplementation feed on growth performance, feed intake to local chicken fed paper mulberry leaf silage as protein source.

Hypothesis

The hypothesis to be tested is that:

- The paddy rice will be affected in good growth in local chicken when used as supplements to paper mulberry leaf silage.

Objectives

- ◆ To study effect of paddy rice as supplementation feed on growth performance of local chicken fed paper mulberry leaf silage.

Materials and methods

Location

The experiment was conducted at the experimental area of Souphanouvong University, Laos, about 07 Km far from city centre and was covered the period 01 March to 15 April 2010.

Animal and Housing

Twenty four young of local chicken with an initial average live weight of 400 - 700g were housed in an individual. The cages made from bamboo and wood with dimension: width 0.5 m, length 0.5 m and height 0.5 m. There were spaces in the cage floor to let the faeces go through.



Photo 1: Hanging the foliage in the cage

Experimental design

The young of local chickens were arranged in a random completely block design (RCBD) with 04 treatments, 2 replications. 24 local chickens with six animals per treatment and was arranged in 24 cages. The individual treatments are:

- PMLS: Paper mulberry leaf silage alone
- PMLS-P05: Paper mulberry leaf silage + paddy rice 05 % LW (DM basis)
- PMLS-P15: Paper mulberry leaf silage + paddy rice 15 % LW (DM basis)
- PMLS-P25: Paper mulberry leaf silage + paddy rice 25 % LW (DM basis)

All feed of paper mulberry leaf silage were mixed molasses at 4% in fresh basis when make silage and fed freely a day and were used rice bran 4% of LW (DM basis).



Photo 2. Paper mulberry leaf silage



Photo 3. Paddy rice

Feeding and management

Paper mulberry leaf silage was bought from farmer area and paddy rice was bought from the market. The paper mulberry leaf silage were supplied ad libitum and offer freely times a day. Paper mulberry leaves were make silage. After harvested the paper mulberry was chopped it into small piece around 1-2 cm of length and exposed and dried in sunlight for 24 hours to reduce the

moistures then make silage. The ensile paper mulberry leaf were contain in plastic bags and stored for 21 days before will be fed to the chicken.

The paddy rice were put in small feeder, made from plastic and were tied to individual cage wall and the paddy rice were fed difference levels, 05, 15 and 25% of LW (DM basis). Waters were supplied free available during the whole periods.

Data collection and analyses

The local chickens were weighed at the beginning, at the end and every 5 days. Feeds offered and feed refusals were measured daily for estimating total DM intake. Samples of feeds and refusals were taken every 5 days and analyzed for DM by micro-wave radiation (Undersander *et al* 1993), ash and crude protein (AOAC 1990).

Statistical analysis

The data were analyzed according to the General Linear Model option of Analysis of variance (ANOVA) using procedure of the Minitab software (version 13.1). Sources of variation are: feed, block and error.

Results and Discussion

1. Feed characteristics

Paper mulberry leaf silage was lower in DM and higher in crude protein than both feeds as paddy rice and rice bran (Table 1).

Table 1. Feed characteristics (% dry basis, except for DM which is on fresh basis)

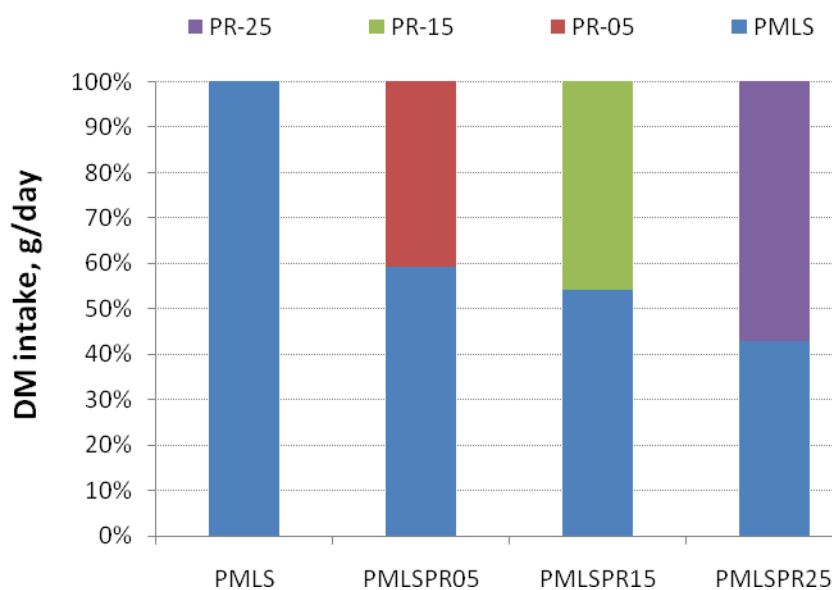
Items	DM	MT	Ash	OM	CP
Paper mulberry leaf silage	68.2	31.8	14.0	86.0	16.8
Paddy rice	91.7	8.30	6.32	93.7	7.18
Rice bran	91.6	8.40	21.5	78.5	5.12
Molasses	65.5	34.5	10.4	89.6	4.13

2. Feed intake

The proportion of the diet DM consumed as supplements of each level was in the range of 33.3 to 51.3 % in the case of paddy rice for three levels as 5 %, 15 % and 25 % (Table 2; Figures 1 and 2). Feed total DM intake was higher for the diets with 25 % of paddy rice supplement compared with two level of supplementation but there were no differences among supplements, as in the treatments with supplements, the local chicken ate much of the paper mulberry leaf silage only compared with supplement group.

Table 2. Mean value for intakes of diet ingredients individual treatment

	PMLS	PMLSPR-05	PMLS PR-15	PMLS PR-25	SEM	Prob
Fresh feed intake, g/day						
Paper mulberry leaf silage	44.1	40.2	39.4	36.4	0.65	0.001
Paddy rice-05	-	19.4	-	-	0.82	0.001
Paddy rice-15	-	-	23.2	-	0.82	0.001
paddy rice-25	-	-	-	32.2	0.82	0.001
Rice bran	19.5	11.4	10.8	6.40	0.50	0.001
DM intake, g/day						
Paper mulberry leaf silage	28.6	25.6	25.2	22.4	0.55	0.001
Paddy rice-05	-	17.7	-	-	0.75	0.001
Paddy rice-15	-	-	21.2	-	0.75	0.001
paddy rice-25	-	-	-	29.8	0.57	0.001
Rice bran	17.9	10.6	9.85	5.88	0.46	0.001
Total DM intake	46.4	53.2	56.2	58.1	1.06	0.001
Paddy rice	-	33.3	37.7	51.3		
Intake, g/kg BW	0.09	0.09	0.10	0.11	0.001	0.001

**Figure 1.** Proportions of diet ingredients consumed by the local chicken (DM basis) fed paper mulberry leaf silage as protein source.

The proportion of the diet DM for intake, g/kg LW consumed as supplements of each level was in the range of 0.09 to 0.11 g/kg LW in the case of paddy rice for three levels as 5 %, 15 % and 25 % (Table 2; Figures 2).

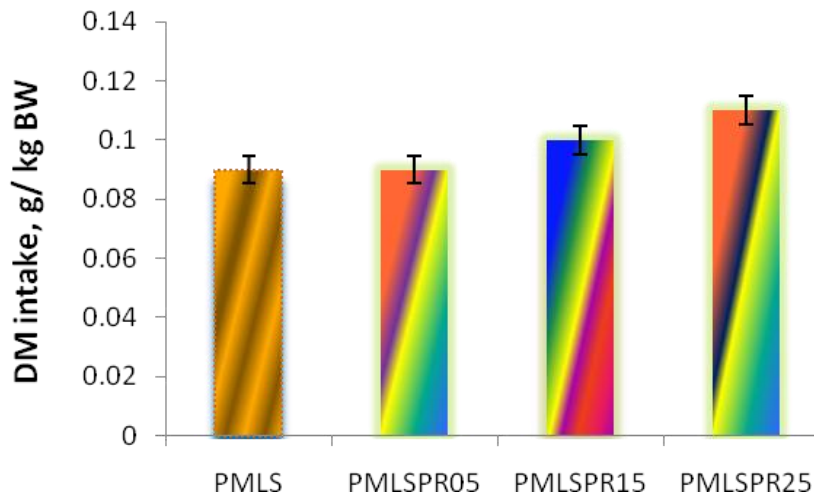


Figure 2. Mean values for DM intake, g/kg BW of local chicken fed paper mulberry leaf silage as protein source.

3. Growth and feed conversion

The supplements of three level of paddy rice increased the growth rates on both levels as: 5 and 25%, but 15 % in paddy rice was the growth rate lower than (Table 3; Figure 3), with apparent differences between on both levels supplements. On average (Table 3), growth rates were better for paper mulberry leaf silage plus 5% of paddy rice than for Paper mulberry leaf silage only and supplements another level. As a result, DM feed conversion was better on 25 % of paddy rice supplement than two level of supplement treatments compared with the no supplement treatment.

Table 3. Mean values for changes in live weight and DM feed conversion for Chicken fed paper mulberry leaf silage as protein source and increasing levels of paddy rice.

	PMLS	PMLSPR-05	PMLS PR-15	PMLS PR-25	SEM	Prob
Live weight, g						
Initial	534	517	518	516	20.1	0.89
Final	586	580	565	596	31.6	0.92
Daily grain, g/day	1.79	2.49	1.76	2.41	0.75	0.84
FCR	46.4	42.9	44.8	39.1	13.2	0.98

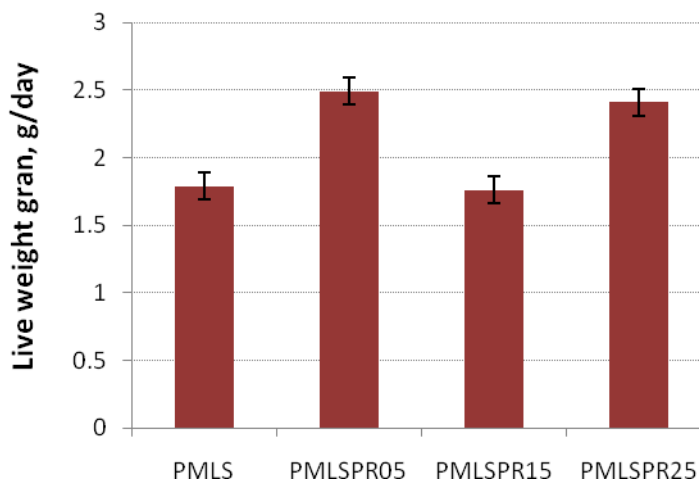


Figure 2. Mean values for growth rates of local chicken fed paper mulberry leaf silage as protein source and increasing levels of paddy rice.

There appear to be no reports in the literature on the nutritive value of Paper mulberry leaf silage for monogastric animals, including chickens. The results of the present experiment indicate that it is consumed readily and when combined with increasing of paddy rice gives similar performance to paper mulberry leaf silage although as the sole diet supports poor growth rates. The positive effect on growth of a supplement of paddy rice is in agreement with the report of Nguyen Thi Thuy *et al* (2007). However, in the report of those authors the paddy rice represented 44.0, 44.3 and 48 g/day of the diet DM compared with the levels of 17.7, 21.2 and 29.8 % in the present experiment. The result of the present experiment can show that increasing of three level of paddy rice in live weight gain was better on 5 % of supplement than both levels as: 25 % and 15 % of paddy rice supplement.

Conclusions

- Supplementation with different levels of paddy rice can improve in the growth rate in local chicken fed paper mulberry leaf silage.
- It is concluded that the observed in live weight gain on 5 % of paddy rice supplement was better on 15 % and 25 % fed paper mulberry leaf silage.

Acknowledgments

Thanks are given to Souphanouvong University, Faculty of Agriculture and Forest Resource, Animal Science Department for providing infrastructure support and laboratory assistance.

References

AOAC (Association Official Analytical Chemists) 1990 Official methods of analysis. Association of Official Analytical Chemists, Arlington, Virginia, 15th edition, 1298 pp.

Alemu Y and Tadelle D 1997 The state of poultry research and development in Ethiopia. Poultry Research Bulletin, Debre Zeit Agricultural Research Center, Alemaya University of Agriculture, Debre Zeit, Ethiopia, No. 4, Pp62.

Chhay ty and Julio Ly 2001 Manual laboratory. Center for livestock and agriculture development, UTA. Cambodia.

Dessie, T., Ogle.B. 1996 Studies on village poultry production systems in the central highlands of Ethiopia. MSc. Thesis. Swedish University of Agricultural Sciences. Department of Animal Nutrition and Management.

Inthapanya S and Preston T R 2009 Effect of supplementation with sweet potato root and paddy rice on growth performance of local rabbits fed water spinach (*Ipomoea aquatic*) and paper mulberry (*Broussonetia papyrifera*) as basal diets. Livestock Research for Rural Development. Volume 21, Article #176. <http://www.lrrd.org/lrrd21/10/sang21176.htm>

Kabatange M A and Katule A M 1989 Rural poultry production systems in Tanzania. In: Proceedings of an International Workshop on Rural Poultry in Africa 13-16 November. Sonaiya E B (Editor) Conference Centre, Obafeni Awolowo University Ile-Ife Nigeria 171-176

Khang N T K 2003 Use of Duckweed (*Lemna Minor*) as a protein supplement for local (Tau Vang) chicks, and growing and laying hens, MSc Thesis, Department of Animal Nutrition and Management, SLU, Uppsala, Sweden

Napasirth V and Sivilyay B, Kongmanila D and Inthapanya S 2007 The study of chemical composition and nutritive value of animal feed resource in northern Lao PDR: Luang prabang and Sayaboury province.

Phengsavanh P 2003 Goat production in smallholder farming systems in Lao PDR and the possibility of improving the diet quality by using *Stylosanthes guianensis* CIAT 184 and *Andropogon gayanus* cv Kent. MSc. Thesis. Department of Animal Nutrition and Management, Swedish University of Agricultural Sciences, Uppsala, Sweden

Roberts, J.A. 1995 Sustainable rural poultry production in Africa. Proceeding of an international workshop held on June 13-16, 1995 at the International Livestock Research Institute, Addis Ababa, Ethiopia, pp 40-52.

Sonaiya, E.B. 1990 Feed resources for smallholder poultry in Nigeria. World Animal review, Volume 82, pp 25-33.

Thuy N T and Ogle B 2007: Effect of supplementation on the growth and laying performance of confined and scavenging local chickens. Livestock Research for Rural Development. Volume 19, Article #30. <http://www.lrrd.org/lrrd19/2/thuy19030.htm>

Undersander D, Mertens D R and Theix N 1993 Forage analysis procedures. National Forage Testing Association. Omaha pp 154

Van Soest, P.J, J.B. Robertson, and B.A. Lewis., 1991 Method for dietary fiber, neutral detergent fiber and non starch polysaccharides in relation to animals. J. Dairy Sci.74:3583-3579.

Vang, N.D., Son, N.T. 2000 Chicken sector in Vietnam. National poultry project. [Http://www.vcn.vnn.vn/sp_paper/spec_00_10_20_7.htm](http://www.vcn.vnn.vn/sp_paper/spec_00_10_20_7.htm).

Xaypha S 2005 Goat production in smallholder farming systems in lowlands Lao PDR and an Evaluation of different forages for growing goats MSc. Thesis. Department of Animal Nutrition and Management, Swedish University of Agricultural Sciences, Uppsala, Sweden. <http://www.mekarn.org/msc2003-05/theses05/sophacont.htm>