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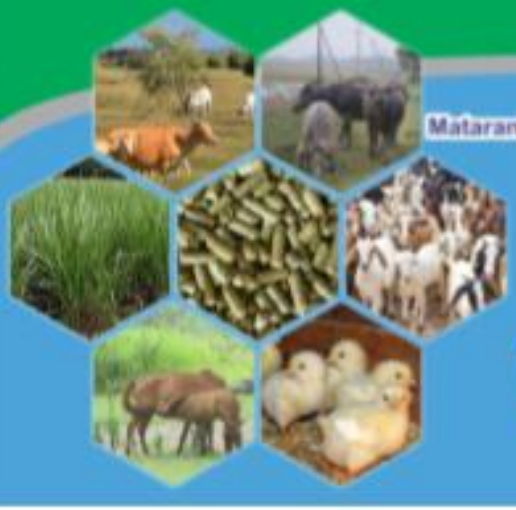
Improving Livestock Productivity, Quality and Safety to Respond to the Increasing Demand from Upper and Middle - Class Consumers

PROCEEDINGS

The 5th International Seminar of Animal Nutrition and Feed Sciences



Mataram - Indonesia, 7 - 9 November 2017

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Application of Feed Supplement to Increase Eggs Production and Quality in Small Farm in Lombok Island

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ABSTRACT

The purpose of the experiment was to investigate the optimum level of Layer-Feed-Supplement (LFS) that can be incorporated in feed for laying hens. The research was conducted based on completely randomized design. Four types of feed supplements were applied as dietary treatments i.e., T1 (a mixture of 1% Top Mix and 2% minerals), T2 (1% LFS), T3 (2% LFS) and T4 (3% LFS). Each treatment had five replications consisted of ten hens each. Analysis of variance was used to analyze the effect of treatment, and the differences between treatments were tested using Duncan's multiple range tests. The result of the study showed that average hens day production (HDP) of treatment T2 and T4 were 83.34 ± 5.52% dan 83.60 ± 4.56% which were significantly ($p<0.05$) higher than T1 dan T3 (78.34 ± 5.97% dan 79.23 ±4.31%). Eggs weight for treatment T4 was 66.38 ± 1.36 g significantly ($P<0.05$) higher than. T1, T2, and T3 were 61.75 ± 0.95 g, 62.49 ± 2.03 g and 62.11 ± 1.20 g. Eggs quality was not significantly affected by types of feed supplement except for the weight of albumen. It can be concluded that LFS can be used up to 3% to increases egg production and eggs quality.

Keywords: *Layer feed supplement, eggs weight, production,*

INTRODUCTION

The population and production of laying chicken in West Nusa Tenggara since 2014 to 2015 increased by 41.14%, the highest compared to other regions in Indonesia (Directorate General of Animal Husbandry and Health 2015). It was due to the high demand for chicken eggs, so the farmers are interested to do business in the field of chicken egg production. In addition, the demand and supply of chicken eggs in the province of West Nusa Tenggara is still unbalance where the need for eggs as much as 1.3 million eggs per day while the local production is only 300,000 eggs per day. This means that farming egg producing chicken has a pretty good prospect to be developed in this province.The main factor that often occurs in some laying chickens farmers, especially in West Nusa Tenggara is the availability and the quality of feed ingredients with the appropriate price. The high price of commercial feed encourages farmers to find innovate way by producing their own feed using available feed ingredients,

Consequently feed given to chickens often defficient in some nutrientssuspected as the cause of low productivity of chicken especially on the weight and size of egg produced.

Poultry business in Indonesia can be divided into 4 groups of business namely large and modern scale (sectors 1 and 2) as well as small and conventional scale (sectors 3 and 4). The scale of business and management in West Nusa Tenggara Province are included in sectors 3 and 4, with the average number of 100-2000 hens with conventional rearing system. Therefore, the productivity and quality of eggs produced is still low. Asnawi *et al*. (2015) reported that the production of chicken eggs reared by farmers in East Lombok regency averaged 63.37% ± 1.37%, with peak production of 79.20 ± 1.17% achieved for 2 months. Laying hens feed in East Lombok consist of a mixture of corn, bran and laying concentrate with ratio 50: 30: 20, with protein content 15-17%, 2800 kcal energy, 3 - 4.5% fat, crude fiber 5 - 10%. Although the major nutrients provided in feed is sufficient, egg production is still categorized as low. This is presumably because the protein consumed deficient in essential amino acids, especially lysine and methionine.

Feed supplement that are rich in essential amino acids, vitamins, and minerals need to be added into the feed in order to improve production of laying chicken. One of the the feed supplement have been formulated in collaboration with LPPM-IPB is Layer Feed Supplements (LFS). The objective of this study was to evaluate the effectiveness of LFS in increasing egg production and egg quality of laying hens on conventional Farm in Lombok Island.

MATERIALS AND METHODS

One conventional egg producing poultry farmer in East Lombok who were willing to cooperate and agree that his chicken were selected for the application of LFS. Two hundreds layer were selected and allocated into four dietary treatments according to complete randomized design , i.e: diet supplemented with commercial feed supplement commonly applied by farmers (T1), diet with 1% LFS (T2), diet with 2% LFS (T3) and diet with 3% LFS (T4). Each treatment consisted of five replications ten chickens each. Nutrient content of feed ingredients dietary treatments are presented in

Table 1. Nutrient content of feed ingredients used in the study

Feed ingredients	EM (kcal/kg)	PK (%)	LK (%)	SK (%)	Ca (%)	P.Total (%)	Meth (%)	Lys (%)
Corn	3200	8.9	3.8	2.5	0.01	0.28	0.18	0.16
Rice Bran	1900	11	5	12	0.06	1.5	0.29	0.51
FLS					24.8	3.06	2.8	5.3
Top Mix[1)]							3	3
Mineral[1)]					32,5	1		
Concentrate Laying[2)]	1650	33,5	5	4	9-12	1-2		

Table 2. Composition and nutrient content of dietary treatments

Feed ingredients	Treatment			
	T1	T2	T3	T4
Corn (%)	40	40	40	40
Rice bran (%)	30	30	30	30
Concentrate for layer (%)	30	30	30	30
LFS (%)		1	2	3
Top Mix (%)	1	-	-	-
Mineral (%)	2	-	-	-
Calculated chemical Composition				
Energi (kkal/kg)	2345	2345	2345	2345
Protein (%)	16.91	16.91	16.91	16.91
Crude fat (%)	4.52	4.52	4.52	4.52
Crude fiber (%)	5.8	5.8	5.80	5.80
Ca (%)	3.172	3.42	3.668	3.916
P (%)	1.5	1.48	1.48	1.48
Methionine (%)	0.999	1.029	1.059	1.089
Lysine (%)	1.807	1.837	1.867	1.897

All hens were housed in individual battery cages equipped with feed through and lighting during the night. They had free access to a nipple drinker. The feed in mash form was provided *ad libium.*

Egg production (HDP) and feed consumption were noted daily, while feed conversion was calculated at the end of feeding trial. Egg quality in terms of egg weight, egg index, shell thickness, yolk color were also measured, and Haugh Unit (HU) was calculated using the following formula:

$$HU = 100\log\left(H - \left[\sqrt{G}\,(30W^{0.37} - 100)/100\right] + 1.9\right)$$

in which H = height of thick egg white (mm) W = egg weight (g) G = graphitisation constant 32.2

Table 3. Composition of Layer Feed Supplements (LFS)

No		Component	Unit	Value
A		**Amino acids**		
1		Methionine	%	2.8
2		Lysine	%	5.3
B		**Macro Mineral**		
	1	Ca	%	24.8
	2	P available	%	3.06
	3	NaCl	%	2.6
	4	Mg	%	0.48
C		Micro Mineral		
	1	Fe	ppm	30
	2	Mn	ppm	17
	3	Cu	ppm	12
	4	Zn	ppm	8
	5	I	ppm	2
	6	Co	ppm	0,25
D		**Vitamine Fat Soluble**		
	1	A	IU/kg	100.000
	2	D3	IU/kg	20.000
	3	E	IU/kg	20
	4	K	ppm	8
E		Vitamine Water Soluble		
	1	Nicotine Amide	ppm	180
	2	C	ppm	100
	3	D-Pantothenate	ppm	85
	4	B2	ppm	30
	5	B12	mcg/kg	25
	6	B1	ppm	20
	7	B6	ppm	15
F		**Palatability Enhancer**	%	4
G		Anti Oksidan	%	0.3
H		Anti Fungi	%	0.3
I		Anti Unit	%	1

Data were tabulated with Microsoft Excel, then analyzed using statistical software, Proc ANOVA (Sas, 2001) the differences between treatment means were separated using Duncan's new new multiple range test.

RESULTS AND DISCUSSION

Production performances.

The egg production, feed consumption and feed conversion ratio are showed in Table 4.

Table 4. Productivity of Laying hens

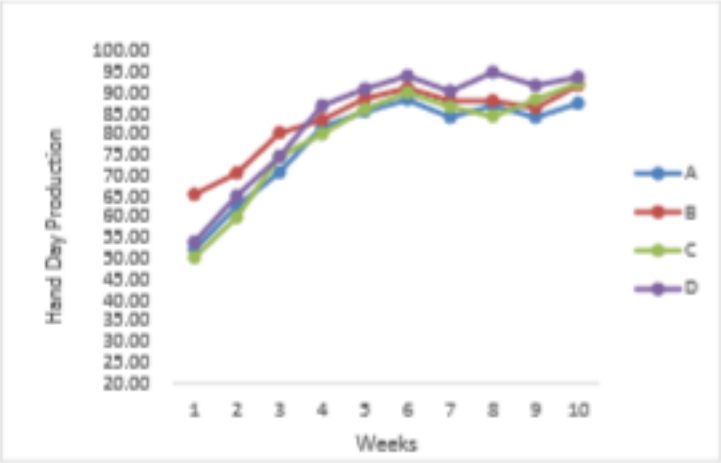
Variables	Treatments			
	T1	T2	T3	T4
Hans day production (HDP) %	78.34 ± 5.97[a]	83.34 ± 5.52[b]	79.23 ±4.31[a]	83.60 ± 4.56[b]
Feed consumption (g/hen)	111.92 ±4.64	111.61 ±5.42	112.74 ±4.06	112.68 ±3.35
Feed conversion	2.45 ±0.13	2.31 ±0.07	2.50 ±0.19	2.30 ±0.12

[a,b]Different superscripts in the same row indicates significant different (P <0.05).

The hens day production (HDP) of layers chicken given LFS was higher (P <0.05) compared with those fed on diet supplementd with commercial feed supplement. This was due to lysine and synthetic methionine contents of the supplement which is easily absorbed digestive tract of the chicken. Channaprayatna (2016) states that synthetic amino acids can be entirely digested by chickens, while those contained in the feed ingredients are not entirely available for production. Besides, LFS contains macro and micro minerals that play important function in egg formation.

The low production of T3 (2%LFS) compared to T2 (1%LFS 1%) and T4 (3%LFS) was a result of the slow reached the peak of production as shown in Figure 2.

Figure 1. Pproduction of laying hens on each treatment



One of the most important feed ingredients for laying hens is DL-Methionine. Methionine is an essential amino acid containing sulphur, playing an important role in both human and animal metabolisms, such as participating in synthesizing other sulfur-containing amino acids (Troen 2003), and as a precursor of carnitine and glutathione which protect cells from oxidative stress (Faang *et al.*, 2002; Li *et al.*, 2007 and Jankowski *et al.*, 2013). Grimble 2006, Baker 2009 and Wu 2010 stated that methionine plays an important role in metabolism in humans and animals for growth and nitrogen balanced. Methionine is included in functional amino acids that play a role in the body's metabolism to improve the health, growth, and development of reproductive organs. Insufficient amount of methionine in poultry feed can affect weight gain, feed conversion, and carcass quality. The addition of methionine in the low protein ration (14%) was 0.26% at worst compared to the 0.30 or 0.44% level. Addition of 0.44% methionine can increase daily egg production and egg weight, with equal to 0.38% methionine diet with containing 16% protein. The addition of methionine in the diet can provide benefits for chickens that are kept in hot climates, especially in reducing mortality and improving thickness of the shell (Bunchasak and Silapasorn, 2005). Increased egg production in this study was a result of higher consumption of methionine, as well as an increase in energy (Harm and Russell 1998).

Egg quality

The results of study showed that adition of LFS in feeds gave better egg quality compared to those fed on diet supplemented with commercial supplement usually

practiced by farmers (P <0.05). The quality of egg produced by chicken given diet with adition of 3% LFS can be seen (Table 5).

Table 5. Quality of hens Provided by Feed Layer Supplements (FLS)

Independent variable	Treatment			
	T1	T2	T3	T4
Egg Weight (g)	61.75 ± 0.95[a]	62.49 ± 2.03[a]	62.11 ± 1.20[a]	66.38 ± 1.36[b]
Eggs Index	78.92 ±1.56	77.75 ±1.45	78.05 ±1.14	78.14 ±1.93
Egg shell thickness (mm)	0.43 ±0.01	0.44 ±0.03	0.44 ±0.04	0.44 ±0.02
Albumin Weight (g)	37.26 ±1.91[a]	38.55 ±1.61[a]	38.08 ±1.44[a]	42.10 ±1.30[b]
Yolk weight (g)	13.53 ±0.69	14.14 ± 0.26	14.02 ± 0.73	14.06 ±0.47
Yolk color	8 ±0.69	9 ±1.03	9 ±1.28	9 ± 0.60
Haught unit (HU)	91.90 ±0.14	92.01 ±0.35	91.87 ±0.33	92.51 ±0.20

[a,b]Different superscripts in the sam row indicates significantly different (P <0.05)

Supplementing layer diet with LFS significantly improved egg weight (P<0.05). The heaviest egg was produsd by the chicken whose diet was supplemented with 3% LFS. It seems that the weight of albumin contributed most in determining the overall weight of the egg. This is due to the addition of important nutrient for the formation of eggs such as Ca, P, amino acid, lysine, and methionine. Bowmaker and Gous (1991) reported that adding as much as 520 mg /hen/day of methionine into broiler breeder hens diet could increase the mean of egg weight. Chickens given 0.1% methionine in diet with 14% and 16% crude protein had better egg egg weight and higher hen day production than those not supplemented Amrullah (2003).

CONCLUSIONS

The conclusion of the research was that the addition of Layer Feed Supplements up to 3% can increase the production and quality of eggs.

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