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Effect of Using Israel Napier Grass in Feed Ration on Growth Performance of Local Chicken of Cambodia

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Abstract: This study investigated the effect of Israel grass in feed formulation on growth performance of local chicken. The study was conducted from October 2023 until January 2024 in Kampong Chheutel Institute of Technology. The CRD (Completely Randomized Design) was used with 4 treatments and 4 replications. The local chicks were purchased from local famer at 1 day old and kept in whole pen by feeding commercial feed. At 21 days old the total 320 chicks were allocated into experimental treatments. The 4 feed formulas based on the level of Israel grass added such as 0, 5%, 7% and 9%, were called T1 (control), T2, T3 and T4 respectively. The result showed that body weight gain, feed intake, ADG (Average Daily Gain) and FCR (Feed Conversion Ratio) in all treatments were not significantly different ($p > 0.05$). However, there was strong correlation between living weight with carcass of al treatments, but no difference among carcass percentage of local chicken for all different diet in this study. In conclusion, the Israel grass did not affect growth performance of local chickens and can be used to replace some expensive feed ingredient, such as rice bran.

Key words: Israel grass, growth performance, carcass, local chickens.

1. Introduction

Local chickens are an economic species that is resistant to disease and has a good resistance to the climate in Cambodia. On the other hand, they can eat a wide range of feeds, have the ability to produce large amount of chick, and are easy to care for when reaching at 5 to 8 months old, because they can scavenge for feed in natural with less input. Nowadays, local chicken meat is most popular by consumers because it is delicious and contains more protein than other meats. Chicken manure is rich in nutrients that can make a good fertilizer for the crop [1]. Besides, through the scavenging by themselves, the farmer supplements the small amount of whole rice, white rice, broken rice or kitchen waste which are low quality. In order to increase the productivity and profitability, the farmers should provide feed with rich nutrient to their requirement, using available local feed resources or new high-protein feed [2].

The broken rice is a product from rice mill used as starch source, containing 9% protein, 9% to 10% lipid and cellulose 92.48% in dry matter, 13.49% ash, 0.92% phosphorus and 0.10% calcium. Rice bran contains about 10% of whole rice, the chemical composition in each 100 g of rice bran consists of 13.35 g of protein, 316 kcal of calories, 20.85 g of fat and 49.69 g of carbohydrate [3]. Molasses contains 1,963 kcal of energy, and is a by-product from an industrial plant of sugarcane that produces white sugar. It was used for making silage grass or used for other feed additives to add a source of carbohydrates as well as an important ingredient to help in the fermentation process faster, because it helps to create bacteria, produce acid and add flavor to food as well. Minerals are essential for all kinds of animals such as Ca, K, Na, P, Cl, Mg, Fe, Cu, Zn, Se and so on. There are two types of minerals, the macro and micro-minerals that each animal needs in small amounts, but is important for the growth of the skeleton, body weight, reproductive function, egg

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production, egg quality and rate of hatching. Vitamins are divided into two types: water-soluble vitamins such as vitamin C, vitamin B12 and fat-soluble vitamins such as vitamins A, D, E, K. Animals need very little of these vitamins, but it is essential because it benefits growth, eating, and keeps animals healthy [4]. Israeli grasses belong to the *Dwartnapier genus*. Dwarf napier is 100 to 150 cm tall, well branched, short-stemmed, many-leafed. This variety gives 1 to 2 times higher yields than Russian grass and has higher nutrients content than Russian and Neptune grass. A 45-day-old Israeli grass contains 15 percent protein, 12 percent non-fiber carbohydrates, higher than Neptune Green and Neptune Pak Chong 1 [5]. The Napier grasses was used as chicken fee in some limited amount without causing any effect to the chicken [6].

In conclusion, Israeli grasses could be used in appropriate amount to replace some expensive ingredient in chicken feed.

2. Material and Method

2.1 Study Area and Period

This study was conducted at Animal Experimental Station of Animal Sciences Department, Kampong Chheuteal Institute of Technology, Kampong Thom province, Cambodia. The study lasted 10 weeks and commenced from 27 October 2023 until 4 January 2024.

2.2 Experimental Animal and Design

The local chicks, 1 day old, were purchased from the hatchery of smallholder farmers at Prasat Sambo District, Kampong Thom Province. When arriving the Institute, all the chicks were fed the same feed, commercial feed for chicks, until reaching 21 days old.

The CRD (Completely Randomized Design) was used, including 4 treatments and 4 replications, with 16 plots or cage. Twenty chicks, 21 days old, were allocated into each plot. The size of each cage was 1.5 × 2.5 m surrounding by nylon net with 1.5 m height. The rice husk was used for litter.

2.3 Feed and Feeding

Israeli grass planted behind the broiler farm of the Department of Animal Science at Kampong Chheu Teal Institute of Technology, was cut at 60 days old. The grasses were chopped into small pieces then dried in the sun for 2 days, then milled into powder. All ingredients were mixed manually in 4 different feed formulas, called as experimental treatment. The 21 days old chicks were fed 3 times a day at 7:00, 12:00 and 17:00. The vitamin was administered through diluting in drinking water and was provided half hour prior feeding.

The four treatments as following:

1. Treatment 1 (T1) is the control group with zero Israel grass;
2. Treatment 2 (T2) is the testing feed with 5% of Israel grass;
3. Treatment 3 (T3) is the testing feed with 7% of Israel grass;
4. Treatment 4 (T4) is the testing feed with 9% of Israel grass.

The formula and chemical composition of each treatment are shown in Tables 1 and 2.

Table 1 Feed formula (kg of DM (Dry Matter)).

Ingredients	T_1	T_2	T_3	T_4
Bran	18.60	13.72	11.76	9.80
Broken rice	53.45	53.48	53.49	53.50
Concentrated feed	27.29	27.30	27.31	27.31
Premix vitamin and minerals	0.22	0.22	0.22	0.22
Salt	0.22	0.22	0.22	0.22
Israel grass	-	4.84	6.78	8.72
Molasses	0.22	0.22	0.22	0.22
Total	100	100	100	100

Table 2 Nutrient containing in each formula (% DM).

Parameters	T_1	T_2	T_3	T_4
CP	18.03	18.55	18.14	18.07
GE	3336	4230	4219	4207
CF	6.51	6.88	7.02	7.31
Ash	4.86	6.42	6.68	6.90
EE	2.73	2.42	2.33	2.23
DM	89.18	89.00	88.81	89.14

CP = Crude protein, GE = Gross Energy, CF = Crude Fiber, EE = Ether Extract, DM = Dry meter.

2.4 Data Collection

The ammount of feed offered was weighed every day, prior to feeding chicken, while the feed residue was collected and weighed every day at 7:00 AM before feeding the new ration, then the pooled sample of feed residue was prepared every one week. The body wieght of chicken was weighed every 2 weeks and recorded.

2.5 Data Analysis

The data were recorded in excel program and ANOVA (Analysis of Variance) was conducted by DMRT (Duncan's New Multiple Range Test), using Microsoft Excel to analyze the data, and $\alpha = 0.05$.

In these six treatments, 48 chickens were selected for carcass study, 2 chickens in 1 replication. The chickens were slaughtered at the age of 90 days and underwent processing, namely scalding, plucking and removal internal organ (liver, heart, and gizzard).

3. Result

3.1 Chemical Composition

The chemical composition of Israel grass has second range of higher protein contain, 13.24%, after concentrated feed. However, it has higher CF amount and similar rice bran (Table 3).

3.2 Body Weight Gained

The results of body weight of all experimental period, 10 weeks, showed no significant difference ($p > 0.05$), and it ranged from 945.95 g/head to 971.90 g/head for the last week of experimental period (Table 4).

Table 3 Chemical composition of some important ingredients.

Ingredient	DM (%)	Ash (%)	EE (%)	CP (%)	CF (%)	GE (kcal)
Rice bran	90.14	12.97	6.37	10.19	23.21	3,917
Broken rice	86.23	0.64	0.74	7.53	0.74	3,706
Concentrated feed	90.57	12.97	4.3	43.86	5.15	4,093
Israel grass	91.21	20.75	0.91	13.24	22.92	3,335

Table 4 Body weigh gain of local chicken at the end of experiment (g/head).

Period	T_1	T_2	T_3	T_4	*p*-value
Week 0	169.13	170.75	177.13	171.50	0.664
Week 2	233.52	244.24	243.36	250.06	0.743
Week 4	341.19	337.69	353.36	342.24	0.948
Week 6	544.03	516.67	542.42	557.86	0.909
Week 8	792.12	777.33	785.69	781.33	0.996
Week 10	950.06	971.90	945.95	960.75	0.957

Table 5 ADG (g/head/day).

Period	T_1	T_2	T_3	T_4	*p* value
Week 2	4.60	5.25	4.73	5.87	0.662
Week 4	7.69	6.67	7.86	7.97	0.791
Week 6	14.49	12.78	13.50	15.40	0.726
Week 8	17.72	18.62	17.38	15.96	0.679
Week 10	11.28	13.90	11.44	12.82	0.629

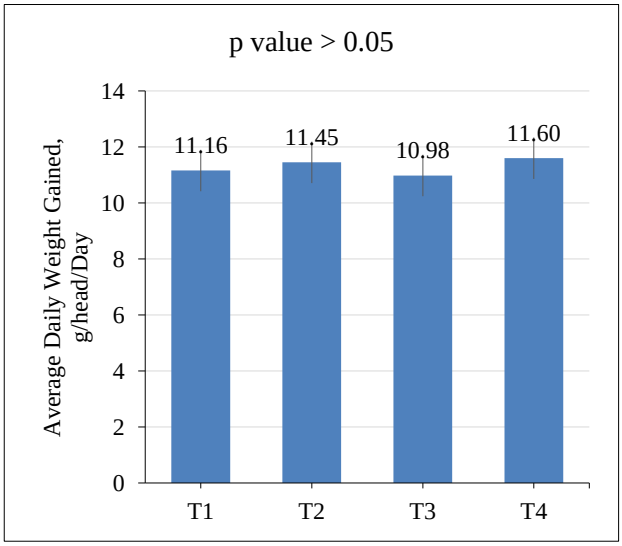

Fig. 1 Average daily weight gained of chicken in the whole experiment.

3.3 ADG (Average Daily Gain)

It was the same result for the ADG for all treatments, no significant difference ($p > 0.05$), and in average it ranged from 10.98 to 11.60 g/head/day (Table 5 and Fig. 1).

3.4 Feed Intake

The feed intake was also not significanly different among the treatments ($p > 0.05$) and it increased with the age of chick (Table 6). At the week 10, the chicken

consumed from 90.44 to 91.68 g/day/head (Table 6). For the whole experient, the average daily feed intake of chicken was not significantly diferent as well (p value > 0.05) and it ranged from 55.72 to 56.69 g/head/day (Fig. 2).

3.5 FCR (Feed Conversion Ratio)

According to Table 7, the FCR of those treatments was not significantly different (p > 0.05) in all period (Table 7) and it was the same for the average of FCR which ranged from 4.89 to 5.73 (Fig. 3).

3.6 Proportion of Carcass Yield

Fig. 4 showed that there was strong correlation between living weight with carcass accounting for 83.90% (R^2 = 0.839) (Fig. 4).

Table 6 Feed intake of each phase (g/head/day) calculated in DM basic.

Periods	T_1	T_2	T_3	T_4	p value
Week 2	22.33	23.05	21.29	23.49	0.400
Week 4	34.68	33.90	34.87	34.76	0.725
Week 6	57.22	56.27	58.84	59.97	0.179
Week 8	77.74	73.72	72.83	72.02	0.071
Week 10	91.50	91.68	91.61	91.53	0.927

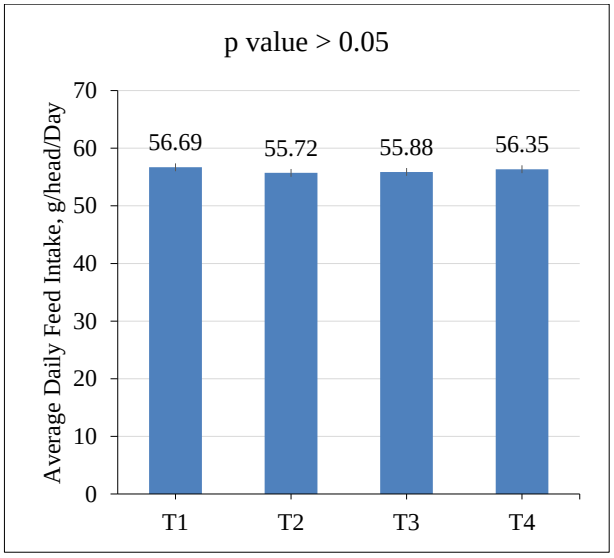

Fig. 2 Average daily feed intake of chicken in the whole experiment (in DM).

Table 7 FCR (per head).

Period	T_1	T_2	T_3	T_4	p value
Week 2	5.35	4.69	4.71	4.19	0.725
Week 4	4. 92	5.36	4.67	4.01	0.786
Week 6	4.87	4.43	4.53	3.93	0.878
Week 8	4.49	4.05	4.28	4.65	0.750
Week 10	9.02	7.13	8.51	7.29	0.641

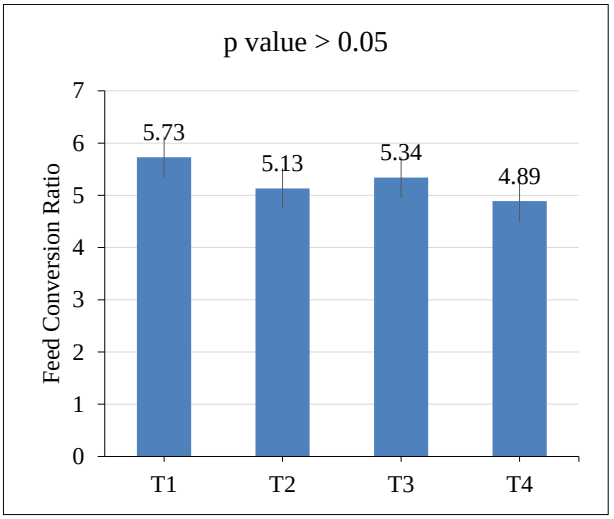

Fig. 3 Average FCR in the whole experiment.

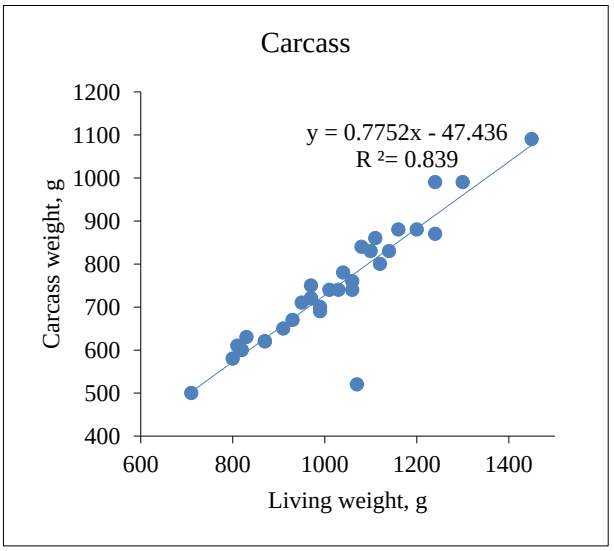

Fig. 4 Correlation between living weight with carcass weight.

The carcass percentage of local chicken for all different diets in this study was not significantly different and ranged from 70.16%-74.30% (Fig. 5).

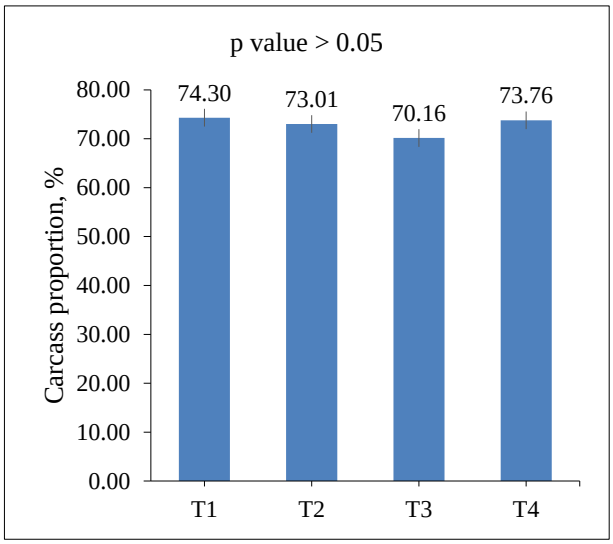

Fig. 5 Carcass proportion of all treatments.

4. Discussion

The finding of daily weight gained in this study with different the level of Israel grass showed no significant difference, supporting the finding using 10% of Napier grass fed Thai Lavo chickens which showed no difference [7]. One researcher in 2017 [8] had used fermented Israel grass in different levels 0, 5%, 10% and 15 % and the result was not significant interm of growth performance of CP 707 chickens. However, the use of diferent grass spescies such as *Brachiaria* spp. in 0, 5%, 7%, 9% and 10% showed significant difference at the level 5% with the high gain of ADG and good FCR [9], however they had no effect on feed intake which was simillar to some researchers' satement using Barbed grass [10], Napier grass, Khun grass and Kini grass [6]. The supplementation of mulato grass at 0, 5, 7.5 and 10 percentage, was not significantly different from average daily feed intake. However, the final weight, weight gain and ADG of the chickens fed 5% mulato grass were better than one researcher and also FCR of chickens fed with 5% mulato grass had better results [9]. It contrasted with one researcher who found the good level of using fresh Ruzzi grass at 5% which can increase growth weight of chicken [11]. FCR in our finding was higher than one researcher on Ugandan local chicken from 4.0 to 4.2 [12].

For the carcass yield and proportion, this finding was in agreement with the finding of one researcher working on the carcass yield of Chinese Betong native chickens, who reported that carcass yield was not affected by the varying dietary containing different ingredients [13]. The percentage of carcass yield of T1, 74.30%, was similar with Cobb breed but a bit lower than Lohmann breed [14]. But it has relatively similar carcass yield which can be interchanged for livestock farming, since the different characteristics of strains would produce relatively similar carcass or it was known that there is no interaction between strain and feed [15].

5. Conclusion

The using at different level of Israel grasses 0, 5, 7 and 9% was not significant different on growth performance and feed intake. In recommendation for area where there is uncultivated land, growing Israel grasses should be considered for using as feed for ruminant or nonruminant, since the grasses are tolerant to the local climate and grow fast, especially it can be used to feed chicken up to 9% to replace the rice brand without any effect on local chicken performance.

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