Effect of Low Grade Vegetable Soybean on Performance of Days Old Broiler Chicken

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Abstract. This experiment aimed to examine the effect of low grade vegetable soybean (LGS) via drinking water on performance of days old chicken. Two hundreds day old boiler chicken (unsexed) were randomly assigned into completely randomized design, using 4 treatments (Non=0% LGS, Vit=vitamin, LG5=5% LGS, and LG10=10% LGS solution) and 5 replication. Data were collected from day-1 until day-7. LGS significantly (p<0.05) affected final body weight and weight gain of broiler chicken not feed conversion ratio (p>0.05). The results showed that LGS of 10% can be applied via drinking water to improve performance during initial phase of broiler chicken rearing period.

1. Introduction
The use of phytochemicals appear to be widely applied in many sectors, including livestock and broiler management. It has positive impact not only on performance but also on the health status of animals. The banned of antibiotic inclusion in feed in many country has been pushing some actors, such as researchers, producers, and farmers to look for alternative ways in its replacement. Phytochemicals, i.e. substances derived from secondary metabolites of plants, are considered to be safety and nature friendly for meat consumers.

Amongst phytochemicals, flavonoids groups (for example genistein and daidzein of isoflavone) are well studied. Some legumes and fruits such as soybean, alfalfa, apple, and Citrus Limon are source of flavonoids. In human, flavonoids were known as compounds that act as anticancer [1]. Polyphenolic compounds showed biological activities and processes that are dysregulated during cancer development[2]. In poultry, isoflavones play a role in reproductive performance and carcass traits. For example supplementation of 10 mg/kg daidzein in feed increased laying rate of broiler breeder. Also, commercial broiler chicken given grade level of soy isoflavone showed decreasing abdominal fat [3].

Vast majority research of the utilisation of flavonoids in poultry (for example [2]–[4]) were delivered through feed either as single supplement or combination with other substance. From practical point of view, this might be difficult for farmer due to its low level of applications need accuracy in weighting. Thus this experiment aimed to examine the effect of low grade vegetable soybean given through drinking water on performance of days old broiler chicken.
2. Material & Method

2.1. Animal and rearing management
This experiment was conducted in Politeknik Negeri Jember during August through October 2021. The amount of 200 day old broiler (DOB) having initial body weight (IBW) 40.10 ± 0.81 g were purchased from local poultry shop. The bird were kept in opened housing system following breeder management guide.

2.2. Experimental setup
DOB were randomly assigned in completely randomized design. Chicken were given 4 treatment i.e. Non= 0% LGS, Vit=vitamin, LG5=5% LGS, and LG10=10%LGS solution. Each treatment was replicated 4 times. LGS solutions were prepared by grinding low grade edamame (from local producer) and then mixed with water accordingly. Treatments were delivered as broiler drink. During experiment, feed (Table 1) was given ad libitum.

| No | Ingredient            | Percentage |
|----|-----------------------|------------|
| 1  | Maize                 | 60.91      |
| 2  | Soybean meal          | 24.85      |
| 3  | Meat and bone meal    | 7.00       |
| 4  | Corn gluten meal      | 3.00       |
| 5  | Palm oil              | 2.00       |
| 6  | CaCO₃                 | 0.64       |
| 7  | NaCl                  | 0.15       |
| 8  | Premix                | 1.00       |
| 9  | Methionine            | 0.24       |
| 10 | Lysine                | 0.21       |
|    | Total                 | 100        |

Calculated composition:
- Metabolisable energy (kcal/kg) 3,118.88
- Crude protein (%) 22.25

2.3. Performance calculation
Feed intake (FI) = feed given subtracted by residue of feed; Body weight gain (BWG) = final body weight at day 7 (FBW) subtracted by IBW; Feed conversion ration = FI divided by BWG.

2.4. Data analysis
All data were analysed using one way anova of SPSS 22 for Mac. All data were ensured having variance homogeneity and normally distributed. FBW and BWG were tested using Tukey HSD post hoc.

3. Results & Discussion
Performance of broiler during 7 days is presented in Table 2. Treatments affected FBW and BWG (P<0.05). Booth have the same trend, in which broiler given LG10 showed the highest value compare others. IBW, FBW, and FCR is not affected by treatment (P>0.05). Data also showed that the use of low grade vegetable soybean (LG5) was comparable to Vitamin or even better in LG10. This finding might be better in minimising management cost. Similar FCR in all treatments could be addressed to relatively the same feed intake. LGS in the present experiment was expected to increase broiler performance by increasing ability of chicken to face stress in open housing system.
Table 2. Performance of broiler chicken until 7 days

| Parameters          | Non   | Vit   | LGS5  | LGS10 | P value |
|---------------------|-------|-------|-------|-------|---------|
| IBW (g/bird)        | 39.67 | 40.27 | 39.13 | 40.60 | 0.25    |
| FBW\(^1\) (g/bird)  | 117.97\(^a\) | 123.77\(^ab\) | 118.90\(^a\) | 130.93\(^b\) | 0.02 |
| BWG\(^1\) (g)      | 78.30\(^a\) | 83.50\(^ab\) | 79.77\(^a\) | 90.33\(^b\) | 0.03 |
| FI (g/bird)         | 140.30 | 141.10 | 140.10 | 140.33 | 0.99 |
| FCR (g feed/ g BAG) | 1.80  | 1.69  | 1.76  | 1.56  | 0.32 |

\(^1\)Means value in a row with unlike letters were significantly different (P<0.05)

Improvement of FBW and BWG found in this experiment confirmed the results of previous workers who used flavonoid as supplement for chicken [5] [6]. One of mode of actions regarding the role of phytochemicals is reducing oxidative stress which may allow chickin to show better performance. The value of FCR is comparable than common days old broiler chicken performance. There were no significant difference in FCR due to the amount of FI was also similar but BWG was better in chicken given LGS10.

![Figure 1. Second order polynomial between feed intake and body weight gain during 7 days.](image)

Instead of linear, the relationship between FI and BAG is quadratic (Figure 1), in which after chicken reach as much as 148.43 g of feed consumption, the growth is declining. Factors affecting FI are rearing temperature, age of bird, and genetic traits. In this case our data showed (unpublished) that temperatur appeared to affect feed intake as we used opened housing system.

4.Conclusion
LGS significantly (p<0.05) affected final body weight and weight gain of broiler chicken not feed conversion ratio (p>0.05). The results showed that LGS can be applied via drinking water to improve performance during initial phase of broiler chicken rearing period.
Acknowledgement

Authors acknowledge State Polytechnic of Jember, providing research grant in the scheme of Penelitian Dasar PNBP 2021 managed by Pusat Penelitian dan Pengabdian Masyarakat.

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