Productivity and Intestinal Profile of Boilers fed with Fermented Dragon Fruit Ration

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Abstract. The objective of this research was to determine the ration containing dragon fruit peel meal fermentation for productivity and intestinal profiles of broiler as been implemented for 4 weeks. The study design used is completely randomized design (CRD) where used with 3 treatments and 5 replications of each has 10 birds. A number of 150 of one weeks age broiler were used in this experiment. The treatments were R0= control diet without dragon fruit peel meal fermentation, R1= diet with 5% fermentation dragon fruit peel meal ; RD2= diet with 7% fermentation dragon fruit peel meal. The variables studied were: feed consumption, feed conversion, body weight gain, carcass weight, intestines profile. The results of this study indicate that feed consumption, feed conversion, weight gain, carcass weight, carcass percentage, intestines profile were not significant (P> 0.05) effect after treatments of R0, R1, R2 but feed conversion ratio (FCR) and final body weight for R2 treatment has a significant effect (P<0.05).

It can be concluded that the use of 3%-7% fermented dragon fruit skin flour was significantly different to the final body weight and FCR.

1. Introduction
Feed is very influential on the production and productivity of livestock, because it has contribute70-80% of the cost of production of a farm. Any attempt to improve commercial poultry production and increase its efficiency need to use of locally available new ingredient. The high feed costs due to raw materials derived from imported commodities and its use compete with humans. The high price of feed is indirectly require that farmers are looking for alternative feed ingredients so it can lower the feed costs and maximize revenues.

In the first week after hatch, chick’s digestive system is not fully developed and the utilization of common feed ingredient, such as cereals and plant protein sources are limited [1]. The digestive system during this period develop at a very fast rate and which suffer significant size, weight, and morphology changes [2]. Digestible ingredients are required to support the fast growth rates of the digestive system.
and of the body of broiler chickens and to enhance the immune system to protect their health [3]. Those authors suggest that dragon fruit skin can be included in the diet as an alternative to antioxidant, due to its high content to antibodies. Several literature studies evaluated the inclusion of alternative ingredient for starter broiler feed. According to Ref. [4] part of the dragon fruit between 30-35% is the fruit component and 40-70% are dragon fruit skin the still rarely or even not been fully utilized, although some studies have reported peel dragon fruit contains high antioxidant and content phenolics in the dragon fruit peel amounted 28.16 mg/100 g, in addition to having antioxidant also contain anthocyanin [2].

Dragon fruit is a key raw material in the manufacture of juices, jams, syrups, chips or other food ingredients. Dragon fruit peel is agricultural waste which has not been widely used by the community, especially in Indonesia [5]. An increase in the value of dragon fruit skin can be done by applying bio fermentation by utilizing microbial services, is utilizing the ability of the yeast Sacharomyces cerevisiae contained in tape yeast (Indonesia). Sacharomyces cerevisiae yeast can increase fibrous fibre digestibility and can act as a probiotic in poultry [6]. At the time of fermentation by yeast, the crude fibre content of ration can be degraded, so it can be utilized by poultry. Another benefit of fermentation products is to suppress the enzyme activity of 3-hydroxy-3-methylglutaryl Co-A reductase that serves to synthesize cholesterol in the liver [7].

The research on dragon fruit peel for livestock feed is still rarely done according to Ref. [3] dragon fruit peel can be given up to the level of 1%. While for the fermentation product has been done, according to Ref. [8] dragon fruit feed meal fermented until 6% on the diet gave no significant effect for broiler productivity. According to Ref. [9] that dragon fruit meal fermentation until 7% on the diet gave no significant effect for Kampung chicken productivity but treatment usage dragon fruit 9% have significant different on FCR final body weight, non-carcass compared with others treatments (5% and 7%). The purposes of this research were to evaluate ration containing dragon fruit peel meal fermentation for the productivity and intestinal profiles of broiler.

2. Materials and Methods

2.1. Design, Feeding Trial
This research was carried out for 4 weeks at Teaching Farm, Campus Bukit Animal Science, University of Udayana, Bukit Jimbaran, Denpasar–Bali. Indonesia. The study used 150 broiler with 1 week age. Dietary treatments were formulated by recommendation [11] (Table 1). This research uses a completely randomized design (CRD) with 3 treatments and 5 replications, every unit is filled with 10 chickens. Treatments were as follows: R0= Ration without used dragon fruit skin flour (control); R1= Ration with 5% fermented dragon fruit skin flour ; R2 = Ration with 7% fermented dragon fruit skin flour. All feed and water were provided ad libitum. The variable studied were: feed consumption, feed conversion ,final body weight , body weight gain, intestinal profiles. Feed intake and body weight for individual chicks were recorded weekly. Slaughter weight is obtained by weighing a live chicken at the end of the study after were fasted for 12 hours. Broiler of carcasses are obtained by cutting by dividing body parts such as feathers, neck, viscera, head and two legs. Percentage of intestine, caecum, gizzard, crop were obtained by weighing than weight multiplied 100% [9] and [3].

Data were analysed statistic by ANOVA and when there are significant differences continued test Duncan [11]. The data were analysed using statistic application program SPSS 17.
Table 1. Composition of Ration and Nutrient Content

| Ingredients (%) | Composition (%) | R0     | R1     | R2     |
|-----------------|----------------|--------|--------|--------|
| Corn            |                | 43.57  | 41.39  | 40.86  |
| Fish Meal       |                | 8.00   | 8.00   | 8.00   |
| Soybean Meal    |                | 18.44  | 18.49  | 18.51  |
| Race Brand      |                | 25.00  | 21.93  | 20.43  |
| Dragon Fermented|                | 0.00   | 5.00   | 7.00   |
| Coconut Oil     |                | 4.79   | 5.00   | 5.00   |
| Premix          |                | 0.10   | 0.10   | 0.10   |
| CaCO₃           |                | 0.10   | 0.10   | 0.10   |
| Nutrient of Diets* |   |        |        |        |
| Energy Kcal/kg  |                | 2900.00| 2900.00| 2900.00|
| Crude Protein (%)|          | 20.00  | 20.00  | 20.00  | 20.00  |
| Crude Fat (%)   |                | 10.35  | 10.14  | 9.95   | 6-11   |
| Crude Fibre (%) |                | 3.08   | 3.73   | 3.90   | 3-5    |
| Calcium/Ca (%)  |                | 0.65   | 0.73   | 0.77   | 0.90   |
| Phosphor/P (%)  |                | 0.67   | 0.64   | 0.62   | 0.60   |

Note:
1. R0 = Ration without used dragon fruit skin flour (control); R1 = Ration with 5% fermented dragon fruit skin flour
2. R2 = Ration with 7% fermented dragon fruit skin flour and RD03 = Ration with 9% fermented dragon fruit skin flour
3. Ref. [8]
* Standard [10]

3. Results and Discussion

3.1. The effects of ration for productivity

The effects of ration for the productivity of broiler aged 1 – 5 weeks is summarized in Table 2. The results of the study showed that broiler fed R2 consumed feed (1376.66 g/4 weeks) and produced better productivity as their body weight gain (1258.28 g/4 weeks) with their feed conversion ratio (1.40) (P<0.05) compared with their fed R0 and R1. The body weight gain of broiler chickens were higher with better feed utilization indicated that they were given the rations with used 7% dragon fruit skin flour fermentation improved the process of digestion of feed in their digestive tract. This is likely due to dragon fruit skin flour fermentation containing various microbes that degrade fibre and probiotic microbes so it will be able to increase the ration digestibility and metabolism. According to Ref. [12] that the material having the antioxidant content of livestock can reduce the effects of free radicals such as increasing feed consumption. According to Ref. [5], it is because free radicals can cause oxidative stress in livestock resulting in lower feed consumption. Oxidative stress is a state of imbalance between
the amount of free radicals and antioxidants in the body, that can trigger the occurrence cell damage and lowered immune system [2]. The Table 2 shows that dragon fruit peel inclusion in the starter diet of broiler affected some jejenum parameters. Relative intestinal length increased when broiler were fed fermented dragon fruit skin flour all of those studies indicated that high nutrient level are required to support the growth of digestive tract (intestinal) [13].

Table 2. The Effect of Treatment for Performance and Intestinal Profile of Broiler

| Variables                        | R0       | R1       | R2       | SEM  |
|----------------------------------|----------|----------|----------|------|
| Body weight (5 week/g)           | 1363.56a | 1373.04a | 1376.66a | 12.13 |
| Body weight gaining (g)          | 1215.40b | 1243.27a | 1258.28a | 10.21 |
| Feed consumption                | 1853.53a | 1837.44a | 1839.69a | 18.26 |
| Feed conversion                 | 1.53a    | 1.47b    | 1.46b    | 0.02  |
| Carcass                          |          |          |          |      |
| Slaughter weight (g)             | 1354.50a | 1354.00a | 1354.84a | 10.21 |
| Carcass weight (g)               | 918.0a   | 922.07a  | 921.15a  | 4.2   |
| Carcass (%)                      | 67.77a   | 68.10a   | 67.99a   | 2.34  |
| Crop (%)                        | 2.34a    | 2.49a    | 2.06a    | 0.5   |
| Intestine (%)                    | 3.89a    | 3.66a    | 3.72a    | 0.9   |
| Gizzard (%)                      | 2.73a    | 2.76a    | 2.88a    | 0.56  |
| Caecum (%)                       | 0.43a    | 0.44a    | 0.47     |      |

This difference is due to the age, chicken strains and the type of feed given. The factors that affect the percentage chicken carcass such as age and body weight [8]. Analysis of variance showed no significant differences (P>0.05) on carcass percentage. According to Ref. [2], the carcass weight is closely associated with slaughter weight and body weight gain. It is also likely caused by the composition of the feed used in this research has a balance of protein and energy are the same. Energy is required for all activities of life and the production of meat, so that the energy shortage can cause stunted growth [9]. This value which average difference was likely caused by differences in the strains Kampung chickens used. The use of dragon fruit peel flour was not significantly (P>0.05) effect on the chicken slaughter weight, carcass weight, and carcass percentage.

Results of analysis of variance showed that the feeding treatment did not significantly difference effect on carcass percentage (P>0.05). The results showed that all treatments are relatively the same effect on the carcass percentage. The carcass percentage is directly determined by carcass weight [7].

3.2. Effect of Treatment intestinal profile

The weights percentage of intestine, gizzard, crop, cecum were not significantly (P>0.05) by ration with ration non fermented dragon fruit skin flour, 3% fermented dragon fruit skin flour, 7% fermented dragon fruit skin flour did not affect the percentage of intestine weight percentage because the intestine of mature broiler the villi is no developing. The carrying capacity of digestion of feed and nutrient absorption is affected by the area of epithelial intestine, epithelial folds, the height of villi, as well as amount of villi and microvilli that broaden the area of absorption [14].

The weight percentage of gizzard, crop, caecum were similar in control and treatments groups. The not significant effects of ration gave Ration with 3% fermented dragon fruit skin flour, 7% on the weights percentage of gizzard, crop, caecum are due to the types of those organs that are not inhabited by microbes which are benefited by the use of without fermented dragon fruit skin flour. According to
Ref. [9], there is a tendency of increasing weight of gizzard along with the increased crude fibre content of diet.

4. Conclusions
It can be concluded that the use of 3% -7% fermented dragon fruit peel meal on the ration did not a significant effect on broiler productivity and intestinal profile but the treatment with 7% fermented dragon fruit skin flour was significantly different to the final body weight and FCR.

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