A Dietary Inclusion Made of Papaya (*Carica papaya* L.) Leaf Powder in Feeding toward the Performance and Carcass Quality of Local Chickens

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**Abstract.** This study aimed to evaluate the performance and carcass quality of local chickens given by dietary inclusion, composing of papaya (*Carica papaya* L.) leaf powder. The experimental free-range chickens used 200 chickens, by the age of 16 weeks and average body weight of 780.58±9.34 gr. Feed was made from corn, rice bran, fish flour, concentrate, and papaya leaves. The research applied Completely Randomized Design (CRD) with 5 treatments and 8 replications. The treatments comprised of R0 = 100% based diet (BD) + 0% papaya leaf powder (PLP), R1 = 97% BD + 3% PLP, R2 = 94% BD + 6% PLP, R3 = 91% BD + 9% PLP, and R4 = 88% BD + 12% PLP. Parameters were final weight, carcass weight, and carcass percentage. The result showed that feather performance and carcass quality were not significantly different (P 0.05) against final weight (gr), carcass weight (gr) and carcass percentage (%). In conclusion, papaya leaf can be used as dietary component in feeding to improve carcass quality without negative impact on performance of productive local chickens.

1. **Introduction**

Recently, Indonesia has not been able to satisfy food necessity of animal-based protein sources. Some of them are actually imported, particularly cattle, having increasing number of imports, in order to fulfill national necessity. Meanwhile, poultry have the biggest component in satisfying animal-based protein course nationally has been able to satisfy it independently. Around 60% of national meat necessity is sufficiently covered by poultry. Food production derived from poultry is dominated by broilers. The rest is contributed by local breed chickens, originally derived from local chickens, ducks, quails, and other local chickens. A role of poultry in the national development is significantly strategic, since poultry aspect in Indonesia is in the front-line of necessity fulfillment on animal-based consumption. Chickens have currently contributed of 60.73% and followed by meat of 21.94%. From total poultry, 67% is provided by broilers and 23% is supplied by local chickens. Besides that, poultry is able to provide job opportunities and give additional income for society, mainly in rural areas.

Supplying activity in satisfying local chickens need for people is increasing annually. As consequence, productivity improvement of local chickens is highly required. A superior local chicken is the result of cross-breeding between female egg-layer and a well-built posture cock of free-range chicken. Protein and energy required for local chickens in the starting phase of 0-12 weeks are respectively 15-17% (protein) and 2600 kcal (energy). While in the growing phase of 12-22 weeks,
protein required is 14% and energy is 2400 kcal; and, protein required is 14% and energy is 2400-2600 kcal during the laying phase, more than 22 weeks.

Local chickens can grow rapidly whereas they are fed by rations sufficiently for their nutrition requirement. Maintaining of superior local chicken in the growing phase results higher body weight and carcass quality. Calculatedly, 70% of diets cost is the biggest determining factor in local chicken. In addition, feed quality has affected husbandry productivity. It is said that qualified diets comprise of composition of feed substances and its balance in accordance with husbandry needs. Thus, balance of significant feed substances is considerably deemed in designing poultry feed, a balance of its protein and energy.

Further, one of materials used in feeding is papaya leaves. The underlying reason is that many papaya leaves are wasted during harvest period in order to regenerate papaya plants. Waste of papaya leaves is used as medicines and healthy purposes. If it is used for feeding to egg-layers in the form of powder, it can improve yolk color. Papaya leaves had papain, having capability in forming protein and plastein, a result of protein hydrolysis [1]. Papaya also contained various substances, such as polysaccharide, vitamin, mineral, enzyme, protein, alkaloid, glycosides, fat, oil, lecithin, saponin, and flavonoid [2]. Based on that, this research focused on a dietary inclusion made of papaya (Carica papaya L.) leaf powder in feeding toward the performance and carcass quality of local chickens is highly necessary performed.

2. Materials and methods

2.1. Making papaya leaf powder
The waste of papaya leaves was from Village of Tatelu, Sub-district of Dimembe, District of North Minahasa. Then, leaves were sliced and dried under sunlight for 3-5 days. After getting dried, 100 kg of dried papaya leaves grinded that resulted 40 kg of papaya leaf powder. This color of powder was greenish white. Chemical composition of papaya leaf powder of 8.86% (protein), 6.63%(fat), 14.94 % (water), 15.53 % (raw fiber), and 3661.5 Kcal/kg (gross energy).

Moreover, poultry used was 200 local chickens by the age of 2 months (unsexed) and average initial weight was 40 ±12.50 gram. In this research, a battery system of cage, 40 cm x 60 cm x 35 cm, utilized 25-unit cages. The ration structure consisted of corn (58%), rice bran (14%), fish flour (15%), and fiber residue of coconut (13%). In each treatment level, papaya leaf powder was given as follows R0 = 100% based diet (BD) + 0 % papaya leaf powder (PLP), R1 = 97% BD + 3 % PLP, R2 = 94 % BD+ 6 % PLP, R3 = 91 % BD + 9 % PLP, and R4 = 88 % BD + 12 % PLP. Composition and nutrients of diet were shown in following Table 1.

2.2. Variables

2.2.1. Final body weight
Final body weight (living weight) was calculated by means of weight by the end of this research.

2.2.2. Carcass weight
Carcass weight (gr/chicken) was measured without its blood, feather, head, legs, neck and internal organs.

2.2.3. Carcass percentage
The carcass percentage was measured by following formula:

\[
\text{Carcass percentage} \times 100\% = \frac{\text{Carcass weight}}{\text{Final body weight}} \times 100\%
\]
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Table 1. Nutrients composition of the diet

| Treatment | R0  | R1  | R2  | R3  | R4  |
|-----------|-----|-----|-----|-----|-----|
| Basal diet| 100 | 97  | 94  | 91  | 88  |
| Papaya Leaf Powder (PLP) | 0   | 3   | 6   | 9   | 12  |

Feeding substances:
- Protein (%): 19.23, 18.92, 18.61, 18.3, 17.99
- Crude Fiber (%): 6.43, 6.70, 6.97, 7.25, 7.52
- Fat (%): 7.11, 7.08, 7.07, 7.06, 7.04
- Ca (%): 0.95, 1.1, 1.2, 1.3, 1.4
- P (%): 0.77, 1.06, 1.05, 1.05, 1.04
- ME (kcal/kg): 2876, 2867, 2857, 2848, 2838

Note: ME = 70% x GE

2.3. Statistical analysis
The data were analyzed by SPPS Statistics 22 software. Data were subjected with One-Way Analysis of Variance. It was continued by Duncan’s Multiple Range Test [3].

3. Results and discussion
Table 3 presented the result of measurement on final body weight, carcass weight, and carcass percentage from each treatment given during this research. According to the Table 3, average final body weight of local chickens of R₃ (739.99 g) was the highest and R₀ (728 g) was the lowest average.

Table 2. Average of final body weight, carcass weight and carcass percentage

| Parameters                   | 0 %           | 3%           | 6%           | 9%           | 12%          |
|------------------------------|---------------|--------------|--------------|--------------|--------------|
| Final Body Weight (gr)       | 728±18.73     | 725.90±16.23 | 724.60±16.52 | 739.99±16.10 | 735.93±8.95  |
| Carcass Weight (gr)          | 416.55±8.25   | 414.16±8.20  | 428.36±12.02 | 404.10±13.10 | 401.25±8.54  |
| Carcass Percentage (%)       | 69.90±0.80    | 67.74±1.02   | 70.22±1.30   | 70.10±1.84   | 71.17±1.45   |

Note: NS = non-significant

In addition, the carcass weight derived from local chickens i.e. the highest was 428.36 gr (R₂) and the lowest was 401.25 gr (R₄). The highest carcass percentage was derived from R₄ (71.17 %) and the lowest was R₁ (67.74 %). Based on mix treatment test, 12% of papaya leaf powder gave similar result against final body weight, carcass weight, and carcass percentage. Carcass is the main part of poultry butchering and it is gained through butchering, feather cleansing, and cutting-off head up to neck, blood, legs, and internal contents of chicken’s abdomen from living chicken [4]. The determining factors of carcass weight is quality and quantity of feed, age, sex, body weight and treatment while delivering into market, so that carcass percentage resulted is non-actual difference [5]. A relatively similar balance of protein and energy results on similar carcass percentage. This carcass percentage is influenced by two factors, namely rations quality and poultry growth acceleration. The balance of protein and energy in accordance with local chickens’ necessity results on a better body weight than improper balance of protein and energy with its needs[6]. Final body weight of local chickens is affected by various substances, such as rations nutrition, being significantly determining factor of final body weight, beside its age itself. The carcass percentage derived from superior local chickens by the age of 18 weeks ranges of 63.70% – 65.48% [7.] Carcass percentage is affected by rations nutrition contents, environment
factors, butchering age of chicken and chicken strains [8]. Coconut oil of 2.5% in the chicken feed mix for 5 weeks of chicken resulted carcass percentage of 66.86% [9].

The result of this research was still under standard of chicken carcass percentage, for about 65% - 75% of final body weight. A better final body weight resulted a better carcass percentage. Contrastingly, a lower carcass percentage would be always followed by a higher final body weight. A better carcass will be followed by the growth of final body weight or vice versa, decreasing carcass will result on lowering final body weight [10].

4. Conclusion
Utilization of papaya leaf powder in feeding up to 12% local chickens provides similar result with their final body weight and carcass percentage.

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