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Nutrient digestibility of vegetables waste flour on male quail
(Coturnix coturnix japonica)

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Abstract. The aim of this research is to determine the nutrient digestibility of vegetables waste flour on male quail. Four hundred male quails were divided into four groups with five replications. The experiment is Completely Randomized Design and the data were analyzed by analyses of variants. The experimental diets were P0 = basal diet, P1 = 97% basal diet + 3% vegetables waste flour, P2 = 94% basal diet + 6% vegetables waste flour, and P3 = 91% basal diet + 9% vegetables waste flour. The observed variables were the digestibility of dry matter, crude protein and extract ether. Result showed that the addition of vegetable waste flour in the diet had no effect on crude protein digestibility (P>0.05), however shown significant effect on dry matter (P <0.01) and extract ether (P <0.01) digestibility.

1. Introduction
Male quail is a type of poultry that has potential to be developed for protein source. Feed is one of important factor in quail management [1]. Feed cost is one of the highest costs in poultry breeding, ie 70 - 80% of all components of production costs incurred [2]. The scarcity of feed ingredients and the high price of feed caused the problem on farmers. The efforts to minimize feed cost is by using feed materials based on agricultural waste as alternative feed [3]. Vegetables waste is cheap that can be obtained from the market for example cabbage, mustard green and chicory [4]. Physically the vegetables waste is decayed because contains high of water, but chemically contains vitamins and minerals which required by quail [5].

Vegetables waste has a low crude protein content of 1-15%. This vegetable waste will be more valuable if used as a feed through processing. The through processing of vegetable waste flour is an alternative effort to save the nutrient content and can be used for a long time [6]. The digestibility can be used to see the benefits of vegetable waste flour as feed materials. Measurement of digestibility value of vegetable waste flour as feed material in diet can be done directly, because quail has fast growth [7]. Therefore, the aim of this study is to evaluated the digestibility of nutrient that is provided by the addition of vegetables waste flour in the diet at different level on male quail diet.
2. Methods

2.1. Sample preparation

Four hundred of 7 days male quail were employed in this study with the initial body weight is 14.72 + 1.51 gram (cv = 10.23%). Diet treatments were given when quail at 8 - 42 days consisting of basal diet and vegetables waste flour with calculated composition. The experiment consists of four treatments i.e.: P0 = basal diet 100%, P1 = basal diet 97% + 3% vegetables waste flour, P2 = basal diet 94% + 6% vegetables waste flour and P3 = basal diet 91% + vegetables waste flour 9%. Each treatment was repeated 5 times and each replication consisted of 20 quails. The nutrient content of feed ingredients for the diet can be seen in Tables 1 and 2.

| Feedstuff                      | Metabolic Energy (Kcal/kg) | Crude protein (%) | Extract ether (%) | Crude fiber (%) | Ash (%)     | Ca (%)     | P available (%) |
|--------------------------------|---------------------------|-------------------|-------------------|-----------------|-------------|------------|----------------|
| Yellow corn                    | 3958.33                   | 6.89              | 2.83              | 0.94            | 1.55        | 0.02       | 0.08           |
| Dedak halus                    | 3607.00                   | 10.02             | 10.57             | 7.21            | 6.85        | 0.07       | 0.21           |
| Bungkil kedelai                | 3827.10                   | 37.65             | 1.20              | 7.83            | 8.08        | 0.29       | 0.27           |
| Tepung Ikan                    | 2258.32                   | 30.90             | 2.78              | 11.63           | 19.91       | 5.11       | 2.88           |
| Limestone                      |                           |                   |                   |                 |             |            |                |
| Premix                         |                           |                   |                   |                 |             |            |                |
| NaCl                           |                           |                   |                   |                 |             |            |                |
| Mustard green waste            | 3879.49                   | 2.27              | 0.36              | 0.36            | 1.45        |            |                |
| Cabbage waste                  | 3876.37                   | 1.30              |                   | 0.34            | 1.09        |            |                |
| Chicory waste                  | 3862.23                   | 1.09              |                   | 0.32            | 1.48        |            |                |

Source: 1) NRC (1994) [8]
2) Analysis Laboratory of Center for Food and Nutrition Studies of Gadjah Mada University, Yogyakarta (2017)
3) Sibbald et al. (1980). [9]
EM = 3951 + (54.4 x EE) – (88.7 x CF) – (40.8 x Ash)

Table 2. Feedstuff composition and nutrient content of treatment diet

| Feedstuff               | Proportion (%) | P0 | P1 | P2 | P3 |
|-------------------------|----------------|----|----|----|----|
| Basal diet              |                | 100| 97 | 94 | 91 |
| Vegetables waste flour  |                | 0  | 3  | 6  | 9  |
| Jagung kuning           |                | 46.5| 43.5| 40.5| 35.5|
| Dedak halus             |                | 17 | 17 | 17 | 19 |
| Bungkil kedelai         |                | 25 | 25 | 25 | 25 |
| Tepung Ikan             |                | 10 | 10 | 10 | 10 |
| Limestone               |                | 1  | 1  | 1  | 1  |
| Premix                  |                | 0.25| 0.25| 0.25| 0.25|
| NaCl                    |                | 0.25| 0.25| 0.25| 0.25|
| Flour of Mustard Green Waste |          | 0  | 0  | 0  | 0  |
| Flour of Cabbage Waste  |                | 0  | 0  | 0  | 0  |
| Flour of Mustard White Waste |        | 0  | 1.8| 3.6| 5.4|
| Total                   |                | 100| 100| 100| 100|

Nutrient content *)

| Metabolic Energy (Kkal/kg) | Crude protein (%) | Extract ether (%) | Crude fiber (%) | Ash (%) | Calcium (%) | P available (%) |
|---------------------------|-------------------|-------------------|-----------------|---------|-------------|----------------|
| 3427.67                   | 17.41             | 3.69              | 4.78            | 5.90    | 0.98        | 0.43           |
| 3425.14                   | 17.26             | 3.61              | 4.77            | 5.89    | 0.98        | 0.43           |
| 3422.61                   | 17.11             | 3.53              | 4.75            | 5.89    | 0.98        | 0.42           |
| 3413.05                   | 17.02             | 3.61              | 4.86            | 5.99    | 0.98        | 0.42           |

*) Calculated based on the diet nutrient content in Table 2 and percentage of Table 3
2.2 Data analysis
Data obtained in current study were analyzed using ANOVA.

3. Result and Discussion
The results of analysis of dry matter, fat, protein and ash digestibility were presented in Table 3.

Table 3. Digested nutrients of male quail by adding vegetable waste flour in diet to 9% concentrations

| Parameter               | Treatment | P0     | P1     | P2     | P3     | P value |
|-------------------------|-----------|--------|--------|--------|--------|---------|
| Dry Matter Digestibility|           | 11.76  | 11.64  | 11.55  | 11.48  | <0.05   |
| Extract Ether Digestibility|       | 0.50   | 0.50   | 0.51   | 0.51   | <0.05   |
| Crude Protein Digestibility|     | 1.43   | 1.46   | 1.49   | 1.48   | 0.08    |
| Ash Digestibility       |           | 0.09   | 0.11   | 0.12   | 0.11   | 0.97    |

3.1 Dry matter digestibility
The result of variance analysis showed that there is an effect by giving of vegetables waste flour in diet to dry matter digestibility (Table 3). The value of dry matter digestibility P0 was 11.76, while dry matter values P1, P2, and P3 respectively were 11.64; 11.55; and 11.48. The results showed that the dry matter value of digested basal diet was greater than basal diet supplemented with vegetables waste flour. The higher concentration of vegetables waste flour which is supplemented in basal diet can be reduce the value of dry matter digestible. Dry matter digestibility in broiler chickens increases as the digestibility of organic matter increases [10].

3.2 Extract ether digestibility
Supplementing of vegetables waste flour in the diet to a concentration level up to 9% showed significant different results on extract ether digestibility. The extract ether digestibility values P0, P1, P2, and P3 are respectively 0.50; 0.50; 0.51; and 0.51. The extract ether digestibility is influenced by fat composition, animal age, species and diet composition [11]. Treatments diet have extract ether content of between 3.97-5.99% so the quail can still increase the extract ether digestibility.

3.3 Crude protein digestibility
Supplementation of vegetables waste flour up to 9% concentration in basal diet had no effect on crude protein (Table 3). Protein digestibility of this research is relatively similar due to the protein content in the same diet [12]. Crude protein digestibility is not significant may be due to the protein content in the diet meet with the requirement therefore supplementing of vegetables waste flour in the quail diet did not increase the activity of phytase to hydrolyze protein with phytate.

4. Conclusion
Supplementation of vegetables waste flour in the diet up to 9% concentration has no effect on crude protein digestibility (P>0.05), however the supplementation give significant effect on dry matter (P<0.01) and extract ether (P<0.01) digestibility of male quail.

References
[1] Mahfudz L D, Ratnawati Y, Suprijatna E and Sarengat W 2009 Performance of male quail carcass caused by Distribution of Alcoholic Beverage Distillation in Ransum. Proc. Nat. Seminar on Livestock Rising. Faculty of Animal Husbandry. Diponegoro University pp 589 – 595.
[2] Sari D T I, Sudjarwo E and Prayogi H 2014 Effect of addition fresh earthworm (Lumbricusrubellus) in Feeding on Egg Weight, Haugh Unit (HU) and Thickness of Mojosari Ducker Shell J. Tropical Livestock 15 23-30
[3] Kurniawan D, Widodo E and Natsir M H 2014 Effects of Tomato Flour as a Feed Material on the appearance of quail production. (Malang: Brawijaya University) J. Animal Science pp 1 – 7

[4] Hadiwiyoto S 1983 Handling and Waste Utilization (Jakarta: Indayu Foundation)

[5] Abun R D and Deny S 2015 Effect of Organic Vegetable Waste Treatment on Digestibility Value in Ayam Kampung Super JJ-101 (Bandung: Padjajaran University) J. Animal Science pp 81 – 86

[6] Susangka I, Haetami K and Andriani Y 2015 Evaluation of Nutritional Value of Vegetable Waste Product Different Processing Way and Its Influence on Tilapia Growth (Bandung: Padjajaran University)

[7] Hamid S A 2013 Protein and Energy Digestibility in Village Chicken Rations with Several Levels of Tofu tofu Differentiated with Yeast Tape (Makassar: Hasanuddin University)

[8] National Research Council 1994 Nutrient Requirements of Poultry Eighth Revised Edition (Washington DC: National Academy of Sciences)

[9] Sibbald I R 1980 Metabolic plus endogenous energy ad nitrogen losses of adult cockerels: the correction used in bioassay for true metabolizable energy Poultry Science 60 805-811

[10] Abun D Rusmana and Indriani N P 2003 The determination of the digestibility of the ration contains the garut bulb dregs (Maranta arundinacea Linn.) In broiler chickens by the method of cutting J. Bionatura 3 227–238

[11] Leeson S 1993 Recent advances in fat utilization by poultry. In: Recent Advance in Animal Nutrition in Australia, Farrell, D J (Ed.) (Australia: University of New England) pp: 170–181

[12] Widodo A R, Setiawan H, Sudiyono, Sudibyo dan R Indreswari 2013 Nutrient digestibility and quill performances (Coturnix coturnix japonica) males dregs tofu fermented in rations J. Tropical Animal Husbandry 2 51-57