Campus Intellectual Product Business Development Program (PPUPIK): Utilization of Herbs as Phytobiotic in Broiler Chicken

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Abstract. The implementation of PPUPIK Organic Broiler aims at maximizing the use of agricultural and fisheries wastes in North Maluku area as feed for broiler in order to minimize the feed costs as well as utilizing herbs such as turmeric (Curcuma domestica), Java ginger (Curcuma xanthorrhiza Roxb), nutmeg leaves (Myristica frangrans Houtt) and clove (Syzygium aromaticum L) as phytobiotic in place of antibiotic to allow the production of healthy, safe-to-consume organic broiler chickens. The extensive use of antibiotic results in residue in animal husbandry products. The resistance of pathogenic microbe in humans to antibiotic has been the main health issue in the society. Animal husbandry industry should reduce the use of antibiotic in their production animals and find another alternative in controlling diseases to replace the use of antibiotic. Herbs can be used as a phytobiotic in place of antibiotic. The activity results show that the use of agricultural and fisheries wastes as well as herbs in feed can increase the broiler chicken’s productivity and reduce production costs.

Keywords: PPUPIK, organic broiler, phytobiotic, antibiotic, feed

1. Introduction
The increasingly greater demand to fulfill the need for animal protein should be followed by adequate availability of this animal protein itself. Broiler chicken as a foodstuff from which protein can be obtained is demanded to have abundant availability so that the people’s need for protein can be fulfilled. However, it is hard to realize it for the price of broiler chicken ration is expensive and tends to fluctuate, thus there is a need for an effort to utilize non-conventional ration materials to be broiler chicken rations.

The raw material of poultry rations basically competes with human needs. This results in an increased ration price and becomes an obstacle for newly emerging people’s animal husbandry. One effort to deal with this obstacle is to utilize non-conventional ration materials which can easily be found around animal husbandry area. Leaves of white leadtree (Leucaena leucocephala), moringa (Moringa oleifera) and quick stick (Gliricidia sepium) are those leaves from leguminosae plants commonly found in North Maluku. Also commonly found there are fish wastes and other agricultural wastes.
Leguminosae belongs to those plant and shrub species the livestock animals cannot reach. The utilization of leguminosae plants as poultry ration materials requires human help. The leaves of these plant species can be processed into leaf flour to enable its consumption by broiler chicken. Despite the limited leaf flour addition to the ration formulation, it is still expected that it can improve the production cost efficiency.

From a nutrition analysis, it is found that the crude protein content of leaves of white leadtree (*Leucaena leucocephala*), moringa (*Moringa oleifera*) and quick stick (*Gliricidia sepium*) respectively are 9.05%, 13.05% and 11.03% (Sapsuha and Sjafani, 2007). Based on this nutrition potential, quantitatively the flour of leaves of white leadtree (*Leucaena leucocephala*), moringa (*Moringa oleifera*) and quick stick (*Gliricidia sepium*) can be used as ration materials for broiler chicken.

The utilization of phytobiotic as *Natural Growth Promoters* or NGPs have been identified as an effective alternative for antibiotic. Phytobiotic as NGPs has been extensively developed as *feed additive*, immunities, to increase performance and highly effective in improving digestive tract health (Panda et al., 2009). Not many have researched the utilization of phytobiotic in ration as a probiotic candidate. This research is conducted aiming at discovering the potential combination of nutmeg powder and clove as phytobiotic to serve as probiotic candidate which is isolated from broiler’s digestive tract and to eventually produce probiotic to improve broiler’s productivity and quality and to serve as NGPs.

Phytobiotic is a feed additive obtained from a plant’s derivative product used in livestock animal feed in order to improve this livestock animal’s performance (Windisch et al., 2008). The active substance from medicinal plants is generally found in secondary metabolite form. One medicinal plant usually produces more than one secondary metabolites (*phytoalexins*, organic acid, essential oil and antioxidant), it is possible for one medicinal plant to have more than one pharmacological effects. The combination of several active substances shows higher work effectiveness as compared to the use of single active material (Ulfah, 2006).

The use of additive of nutmeg (*Myristica fragrans* Houtt) fruit flesh flour (Utami, 2011) gives positive response to broiler chicken’s performance at different cage density, and according to US Food and Drugs Administrative (FDA), nutmeg oil is known as GRAS (*Generally Recognized As Safe*), which is used as essential oil, oleoresin (free of solvent), and natural extract (including distillate) (CFR, 2005), and due to the pharmacological potential it has, nutmeg oil is used as antibacterial material (Ojechi et al., 1993).

Broiler chicken is one livestock animal with high ability in converting the ration it consumes into meat. This allows quick fulfillment of people’s need for animal protein. The extensive use of antibiotic leads to residue in the animal husbandry product. The resistance of pathogenic microbe in humans to antibiotic has been the main health issue in the society. The animal husbandry industry should reduce the use of antibiotic (Conway and Wang, 2000) in production animal and find another alternative in controlling diseases to replace the use of antibiotic. Probiotic can improve individual health and unlike antibiotic, probiotic does neither produce residue nor resistance (Lopez, 2000).

In this PPUPIK program, a programmed broiler chicken maintenance and feeding management system is implemented, where the feed is formulated from the flour of leaves commonly found in North Maluku area as well fish wastes as the source of protein and wastes from other agricultural products. Since these methods have not been performed by farmers in general, it is therefore expected that the implementation of proper maintenance method and balanced feeding will result in more quality guaranteed productivity of broiler chicken as compared to those produced by farmers in general. These maintenance method and balanced feeding can be broken down into as follows:
1. Quality feed from agricultural industry wastes and utilization of leaf flour.
2. Low-fat safe organic broiler meat free of chemical residues resulting from the use of antibiotic and other drugs.
3. Quality organic fertilizer.

2. Method of implementation
   2.1. Raw Materials
   a. Broiler DOC
      The DOCs used in this program are day one broiler chicken (DOC) whose sex is not distinguished (unsex) obtained from UD. Tani Satwa is as the Work Partner in this project.
   b. Concentrate
      Concentrate is needed as the raw material of feed to prepare the ration of tofu dregs, cassava dregs, corn, coconut cake, bran, premix (micro mineral and vitamins A, D, and E). These materials are commonly found in the society around the campus.

   2.2. Production process
   The broiler chickens are kept in an elevated cage of 1000 chickens capacity. The tools used include feeding and drinking supplies, medical devices, feed and animal livestock scales, shovels, forks, broomsticks, ropes and water pumps. In the first year, 5,000 DOCs will be kept for 5 periods where each period has 1000 DOCs. The production process of this IbIKK (IbIKK or PPUPIK) can be seen in Figure 1.

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![Flow chart of ppupik organic broiler production](image)

**Figure 1.** Flow chart of ppupik organic broiler production
2.3. Marketing
The broiler products are marketed to:

1. Livestock collectors and traders in Ternate Municipality (work partners). These collectors and traders sell them to the people in Ternate Municipality and other cities in North Maluku Province (Halmahera, Tidore Municipality, Sula Islands Regency and so forth).
2. Fulfill special demand from Khairun University's academic members, hotel/café/restaurants in Ternate Municipality.
3. Trainings for alumni or surrounding people which constitute indirect marketing targets of this program, particularly those who later are interested to follow it up by running a business in organic-based broiler husbandry.
4. The secondary products of this program in the forms of organic fertilizer is marketed specifically to individual (flower sellers, household).

The marketing plan scheme is presented in Figure 2.

![Figure 2. PPUPIK marketing plan scheme](image)

3. Result and discussion
3.1. General Condition of Organic Broiler Husbandry
This organic broiler project in Khairun University is performed within the Khairun University environment, at the Husbandry Laboratory of Animal Husbandry Study Program of Agriculture Faculty to be precise. The distance from the organic broiler cage to the classroom of Agriculture Faculty is around 500 meters. The organic Broiler cage is approximately 0.50 ha in wide, consisting of two 2 cage unit of 1000 chicken capacity and a production room.
This PPUPIK project has added a physical building of organic broiler cage for 1000 chickens (Figure 3). Most facilities in the organic broiler cage complex at this Animal Husbandry laboratory have not been used optimally. This can be seen from the fact that the cage had been built since 2005. Most of these broiler cages are still vacant despite its twice renovations in 2009 and 2013.

3.2. Number of broiler livestock

This PPUPIK Organic Broiler project has been commenced early January 2016. Until May 2018, 14 periods of maintenance (6 periods of maintenance each year) have been completed at a production capacity per period of maintenance of 2000 chickens. The detail on the number of broiler livestock for the maintenance period (January 2016 to May 2018) can be seen in Table 1.

| No. | Maintenance Year | Number of DOCs | Number of dead during maintenance | Total Broiler harvested | Organic Mortality Percentage (%) |
|-----|------------------|----------------|----------------------------------|-------------------------|----------------------------------|
| 1.  | 2016             | 6101           | 87                               | 6014                    | 1.43                             |
| 2.  | 2017             | 8159           | 153                              | 8006                    | 1.87                             |
| 3.  | 2018             | 6102           | 97                               | 6005                    | 1.57                             |
| **Total** | **20,362** | **337** | **20,025** |                           | **1.65**                         |

Based on Table 1, it can be seen that until May 2018, the total number of organic broilers kept until their harvest is 20,025 chickens divided into those periods in 2016 (6014 chickens), 2017 (8006 chickens), and 2018 until May Mei 2018 (6102 chickens).

During their maintenance, it is found that the mortality of broiler chicken is very low (under 2%). This indicates that during this PPUPIK project using herbs as phytobiotic the broiler chicken’s performance has been excellent. Kartasudjana and Suprijatna (2006) add that the poor performance shown by broiler chickens is influenced not only by the maintenance factor, rather it is also influenced by the DOC’s quality. Furthermore, the ideal temperature for broiler chickens is 23°C–26°C. This factor also influences the broiler chicken’s growth (Fadilah, 2004).
During their maintenance, the broiler livestock are given the feed which has been added with clove leaf flour and nutmeg fruit powder at a percentage of 2% of the total feed. This feeding of cloved leaf flour and nutmeg flesh flour as phytobiotic aims at improving the broiler livestock’s productivity. As reported by Sapsuha, et al (2015), the feeding of clove leaf and nutmeg leaf each 2% and their combination can increase the weight gain of broiler livestock.

In addition to feeding of cloved leaf of flour and nutmeg flesh flour, during the term of project, Lactobacillus sp bacterial isolation from broiler chicken’s intestine is added to the drinking water at 1 ml in 1000 ml. It is done for the production efficiency purpose. As suggested by Sapsuha et al. (2015), treatment group R1, i.e. with an addition of 1 ml Lactobacillus sp bacterial isolation from broiler chicken’s intestines to drinking water, shows the highest weight gain at 1401 gr/chicken, and the lowest one is found in treatment group R0 or control group with a mean of 1251.0 gram/chicken.

During the term of PPUPIK project (from 2016 to 2018), the amount of organic broiler carcass sold is 20,025 chickens for Rp. 35,000.00/chicken. Thus, the total sales of organic broiler carcass is Rp. 700,875,000.

3.3. Organic fertilizer
The organic fertilizer produced is named Pupuk Organik-IBO Pluss. The production process begins after the organic broilers are harvested. The first production process of this organic fertilizer was in 2016 and produced 1200 kg fertilizers. Currently the fertilizer production process is regularly commenced after the harvesting of organic broiler. The average production of fertilizer is 750 kg, and in September 750 kg fertilizer is under production process.
The fertilizer production process is done using such raw materials as broiler chicken's litter at 90%, rice bran at 10% plus EM4. All these materials are stirred evenly and added with EM4 which has been diluted at 1:20 ratio with water. After all materials are evenly stirred, it is covered tarpaulin and plastic to make it air-tight. This mixture is let idle for 3 weeks (28 days).

The fertilizer packaging uses plastic of 5 kg size. The mean price of this fertilizer is Rp. 1500 per kg in the fertilizer production site. Until May 2018, the total fertilizer produced is 8,550 kg, with its total sales value of Rp. 12,825,000. The data on fertilizer sales during the term of PPUPIK project can be seen in Table 2.

| Number | Year | Production (kg) | Price (Rp)   |
|--------|------|-----------------|--------------|
| 1.     | 2016 | 1,800           | 2,700,000    |
| 2.     | 2017 | 4,500           | 6,750,000    |
| 3.     | 2018 | 2,250           | 3,375,000    |
| Total  |      | 8,550           | 12,825,000   |

4. Conclusion and suggestion

4.1. Conclusion

1. The use of herbs as phytobiotic can be used in broiler feed to minimize the feed costs as well as to reduce the use of antibiotic.

2. The maintenance of broiler livestock is done for three years with a total number of organic broilers which have been harvested until May 2018 is 20,025 chickens for Rp. 35,000/chicken and a total amount of sales of organic broiler amounting to Rp. 700,875,000

3. The total organic fertilizer produced during the maintenance (January 2016 – May 2018 period) is 8,550 kg with a total sales value of Rp. 12,825,000.

4.2. Suggestion

The use of herbs as flour (clove leaves and nutmeg fruit) as phytobiotic in the place of antibiotic needs to be performed in animal husbandry industry, particularly broiler livestock in order to reduce the antibiotic residues in the products being produced.
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