

Technical Instructions for Utilizing Chicken Waste as A Bokashi Organic Fertilizer in Lepo-Lepo Village, Barug a District, Kendari City

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Abstract.

Increasing the population of chickens nationally and regionally will increase the waste generated. If the waste is not managed properly, it has the potential to cause environmental pollution, especially from manure that is produced by livestock every day. Livestock rearing produces a lot of waste/manure which is abundant and has not been used properly by the community. Chicken is one of the animals or livestock whose livestock manure contains nutrients and organic matter which is quite high and has the potential to produce organic fertilizer which is needed for the maintenance of soil fertility. Organic fertilizers produced from the fermentation of organic materials such as compost and manure using the help of effective microorganism technology (EM4) are known as bokashi. The purpose of this activity is to provide guidance and counseling in managing and utilizing chicken manure waste as organic bokashi fertilizer as well as providing economic benefits and benefits to farmers/breeders. The activity approach method is carried out by (1) lectures and discussions about the prospects and benefits obtained from chicken manure processing technology, (2) demonstrations in providing in-depth understanding and introduction of ingredients used in the manufacture of organic bokashi fertilizer, (3) the practice of making organic bokashi fertilizer using EM4 technology. The counseling material presented received a positive response and the participants were quite enthusiastic, considering that so far, the manufacture of fertilizers has been carried out without a touch of technology. It was concluded that the practice of making organic bokashi fertilizer in addition to increasing livestock production can also increase the income of farmers from the sale of organic bokashi fertilizer.

Keywords: Native chicken, EM4, bokashi fertilizer, technology.

I. INTRODUCTION

Increasing the population of chickens nationally and regionally will increase the waste generated. If the waste is not managed, it has the potential to cause environmental pollution, especially from the manure produced by livestock every day. Indiscriminate disposal of livestock manure can cause water, soil, and air pollution (odor), have an impact on environmental quality, the quality of life of farmers and their livestock, and can trigger social conflicts. Chicken manure is one of the wastes produced by native chickens, laying hens, and broilers that have great potential as organic fertilizer. The composition of manure varies greatly depending on the

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physiological properties of the chicken, the diet eaten, the cage environment including temperature and humidity. Chicken manure is one of the organic materials that affect the physical, chemical, and plant growth properties. Chicken manure has high levels of nutrients and organic matter and low water content. Chicken manure contains 5% N, 3.9% P, and 2.4% K and 70% moisture [1]. Poultry manure can provide nutrients to plants and also improve soil quality when applied wisely because its high organic matter content can be combined with available nutrients for plant growth [2]. Chicken manure has the potential to produce compost which is needed for maintaining soil fertility.

Farmers' dependence on inorganic (commercial) fertilizers, which are increasingly expensive and scarce, can be reduced because organic fertilizers (compost) can be used as additional fertilizers and have the potential to increase the cost-efficiency of maintaining crops. Therefore, it is necessary to make efforts to increase the usability of the soil by using organic bokashi fertilizer. Bokashi is a word in Japanese that means "fermented organic material" so organic fertilizer bokashi is the result of fermenting organic matter from agricultural waste (rice straw, rice husks, sawdust, grass, livestock manure, and others) which is processed using the EM-4 fermenter [3]. Effective Microorganisms (EM-4) is a mixed culture of various types of beneficial microbes originating from the soil environment and can be used as inoculants to increase soil microbial diversity to improve soil health, soil quality, physical, chemical, and biological environment of the soil, suppress growth soil pests and diseases [4].

The role of bacteria in EM-4 is 1). Photosynthetic bacteria play a role in synthesizing nitrogen compounds so that they can be absorbed directly by plants; 2). *Lactobacillus* sp.: can suppress pathogenic microorganisms and decompose organic matter quickly; 3). *Streptomyces* sp.: secretes enzymes that are toxic to harmful pests and diseases; 4) yeast: produce bacteria that are useful for cell growth and root division; 5). *Actinomycetes* sp.: to suppress fungal and bacterial pathogens [5]. The purpose of this activity is to provide guidance and counseling in managing and utilizing chicken manure waste as organic bokashi fertilizer as well as providing economic benefits and benefits to farmers/breeders that are not only obtained from livestock products but also livestock manure.

II. METHODS

This community service activity was carried out from the beginning to the end of December 2021 for livestock farmer groups in Lepo-Lepo Village, Baruga District, Kendari City. The participants of this service training group are the group of native chicken farmers in Lepo-Lepo Village, Kendari City. The materials used are chicken manure, rice bran, fermenter solution (EM4), granulated sugar, and well water. The tools used are buckets, buckets, shovels, and tarpaulins.

This activity begins with a direct survey in the field, then socialization and technical guidance are carried out at the location of the livestock farmers' stables in Lepo-Lepo Village. This service activity was attended by several groups of livestock farmers, youth, and community leaders. The activity approach method is carried out by (1) lectures and discussions about the prospects and benefits obtained from chicken manure processing technology, (2) demonstrations in providing in-depth understanding and introduction of ingredients used in the manufacture of organic bokashi fertilizer, (3) the practice of making organic bokashi fertilizer using EM4 technology.

III. RESULT AND DISCUSSION

Self Service Implementation

Preparation for the implementation of this service begins with a meeting of the Lepo-Lepo Village livestock farmer group to discuss the plan for implementing activities. This visit was made by the service team to provide information about the latest innovations that were not yet known by the farmer-livestock group. Through this activity, an agreement was obtained for the implementation of making organic bokashi fertilizer from chicken manure on December 4, 2021. The service team prepared all the equipment and materials needed for the implementation of this service. The equipment and materials that will be provided by the service team are buckets, tarpaulins, shovels, buckets, chicken manure, rice bran, fermenter solution (EM4), well water, and granulated sugar.



Fig 1. Servant Team and Group Members of Training Participants Learning Activities and Demonstration of Making Bokashi Organic Fertilizer

The learning activity began by providing material about bokashi organic fertilizer. The speaker discussed the stages of making organic bokashi fertilizer derived from chicken manure waste using fermentation technology using simple and easy-to-obtain ingredients. Learning activities are carried out using direct discussions between farmers and the service team. The number of participants who took part in the activity

from beginning to end was 15 people representing 3 farmer groups in Lepo-Lepo Village. The members of the training group were very enthusiastic because the previous fertilizer production was carried out modestly without a touch of technology so it took a long time to produce fertilizer. This can be seen from the questions that were directly asked during the presentation of the material and the FGD. Through the discussions, it was seen that the farmers wanted to immediately demonstrate/practice the manufacture of bokashi fertilizer. Learning activities are presented in Figure 2.



Fig 2. Submission of Materials for Making Bokashi Organic Fertilizer

Demonstration activities are carried out together in the home of one of the members of the training group. Before the demonstration, the chicken manure used was first separated from rice husks and other ingredients mixed with chicken manure and in dry (not moist) conditions. The fermenter used is EM4 which can be obtained from farmer shops in Kendari City. The manufacture of bokashi fertilizer is carried out by directly involving farmers, which aims to make farmers able to make their own. The activity was continued with training on processing animal manure into packaged organic fertilizer as follows: 1) The first stage was preparing equipment in the form of tarpaulins for mixing chicken manure and bran as well as fermentation containers, buckets/jerricans for mixing EM-4 solution. 2)

Preparation of materials to be used in the form of chicken manure, rice bran, EM-4 fermenter solution, and granulated sugar. 3) Preparation of fermenter solution by mixing well water (1000 ml): granulated sugar (10 grams): EM4 (10 ml) evenly and then allowed to stand for 24 hours for optimal results. 4) Mix the fermenter solution that has been made previously with chicken manure and rice bran until evenly distributed. 5) Tightly cover the dough made with a tarpaulin while controlling the temperature of the mound of the material, if the temperature increases, then maintain the temperature at 45-50°C by turning the dough. 6) When finished, the bokashi is ready to be used as organic fertilizer by drying it first [6;7]. The practical activities went well, as seen from the active participation of the participants in each stage of making bokashi organic fertilizer. A demonstration of making organic bokashi fertilizer from chicken manure is presented in Figure 3.



Fig 3. Demonstration/Practice of Making Bokashi Organic Fertilizer from Chicken Manure (A). Preparation of materials, (B) Preparation of fermenter solution, (C) Mixing of fermenter solution with chicken manure, (D) Mixing with rice bran, (E) Mixing all ingredients evenly and homogeneously, (F) Covering tightly the ingredients that have been mixed thoroughly evenly with tarpaulin. Evaluation of the results of the practice of making organic bokashi fertilizer was carried out for 21 days after the extension, FGD and practice activities were carried out while waiting for the fermentation process to take place.

The consideration of the 21-day fermentation time is to maximize the degradation process of organic matter in feces into organic compounds that are important for plants. EM-4 can ferment organic matter in a fast time (3-4 weeks), does not emit gas and the fermentation process produces organic compounds (protein, sugar, lactic acid, amino acids, alcohol, and vitamins) that are easily available to plants [8;9]. As also stated, [10] that the benefits of EM4 include increasing the availability of nutrients and soil organic compounds, improving soil physical, chemical, and biological properties, accelerating composting of organic waste or animal manure, providing nutrients needed by plants, and increasing crop production and maintaining production stability. The results of making organic bokashi fertilizer from chicken manure are presented in Figure 4.



Fig 4. Bokashi Organic Fertilizer

The color of bokashi into mature compost is black. The color change from light brown at the beginning of making bokashi to black in mature fertilizers is due to the decomposition of organic matter by the activity of various microorganisms. The aerobic decomposition process is indicated by a change in color to black [11].

IV. CONCLUSION

The training participant group has been able to apply the counseling material provided by the service team in the form of making bokashi organic fertilizer manufacturing practices from chicken manure waste. The practice of making organic bokashi fertilizers has produced fertilizers of good quality, thus in addition to increasing livestock production, it can also increase farmers' income from the sale of organic bokashi fertilizers, which indirectly helps reduce pollution due to odors caused by livestock manure.

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