A Study on the Concept of Reutilization of Litter (Coconut Fibre) In Broiler

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Abstract

Broilers are known to offer the cheapest source of protein among the non-vegetarian diet and it is widely accepted by everyone. The short incubation time, low risk and quick yield has made many animal agriculture farmers to adopt rearing broilers. The rapid growth in this sector makes it inevitable to address the environmental issues that arise due to it. The inefficient management of wastes from the poultry farms poses serious threat to our environment. Poultry litter is the major solid waste generated from a farm. This paper discusses on devising a methodology by which the litter could be re-used for multiple batches of birds within the same farm.

Keywords: *Broilers, Chicken, poultry litter*

1. Introduction

Poultry Farms Chicken is the cheapest source of animal protein that is being widely accepted and consumed in our country. Poultry industry is the fastest growing sector of Indian agriculture and proves to be a lucrative enterprise for farmers. According to the Poultry and Poultry Products Annual 2016 report, from Global Agricultural Information Network, India's chicken meat consumption for the year 2017 is projected as 4.49 million metric tonnes which is 7% higher than the year of 2016. As the industry continues to expand and increase in concentration, the need to address environmental issues is more critical. Though the need for chicken is inevitable, livestock production in India poses a grave environmental concern in terms of carbon emissions, land and water usage and pollution. It is high time that we ensure that the infrastructure, rearing processes and waste disposal techniques in poultry farms are economical and environmentally sustainable. This study would open a new gateway for poultry litter management in India thereby lowering the stress of waste disposal on our environment. This study revolves around developing a methodology for reutilization of poultry litter that Enhances litter management in poultry farms which reduces waste formation in farm, decreases the demand on fresh bedding material

2. Methodology

2.1 Decaking of litter

Broiler litter reutilization refers to the usage of the same bedding material to cover the house floor for several batch of broiler flocks. The generally used methods are Composting, Windrowing and Chemical Treatment. The project is to be carried out in a poultry farm at Palamedu, Madurai. The farm capacity is 8000sq.ft housing 6000 birds as four batches with 1500 birds in each batch. Sample was collected from the poultry litter from the batch of 45 day old broiler birds. One 100 gm was collected from center of poultry house and other 4 samples of 100gm each was collected from the corners of the poultry house.

Fig 1: Untreated Litter Sample

An area of 500sq feet within the litter house was selected for litter treatment. This procedure was done within first 24 hours after the birds were removed. This ensures that the core floor temperature is maintained maximizing ammonia release. The depth and location of cake was evaluated. The house was kept aerated to prevent condensation. A pitch fork was used to break down the caked litter into smaller constituents. This was done without disturbing the complete layer of litter. Once the caked litter was broken down the litter was leveled to a uniform height.

2.2 Chemical Treatment of Litter

The house was fully ventilated prior to application to exhaust ammonia levels within the house. Once the house was ventilated the side wall curtains were drawn closed to prevent the wastage of sodium bisulphate on the released ammonia. 11kg of sodium bisulphate was now applied uniformly over the selected region (22kg/1000sqft.). The treated litter was left undisturbed for 24 hours for the chemical to take effect.

3. Analysis

3.1 Moisture Content

The container with the sample was placed in oven for 24hours maintained at a temperature of 1050C. After 24 hours the container was removed from the oven and allowed to cool at room temperature. Once cooled the soil with container was weighed. The percentage of moisture content in treated litter was found to be significantly lower than untreated litter. Ideally the percentage of moisture in untreated litter should not exceed 30%. The litter before treatment contained about 12.8% of moisture content in it. However, after treatment the percentage of moisture reduced by about 2.3% to 10.5%.

3.3 Nitrogen Content

The nitrogen content in the untreated sample was determined by Kjeldhals method of analysis. The untreated litter was found to contain high nitrogen content of about 2.5% (i.e. 25000ppm). This would result in a large amount of ammonia volatilization within the poultry house if the litter is to be reused without treatment. However, the chemically treated litter was found to have a nitrogen content of 3%. There was a drastic increase in the nitrogen content of litter after treatment.

3.4 pH

pH of the sample was determined at room temperature using the pH meter. The pH of litter should be ideally lower (i.e. 4 – 5). The lower pH prevents the growth and accumulation of various pathogenic organisms. Untreated used litter was found to have a pH of 7.4 facilitating the growth of microorganisms. The treated litter resulted in a considerably lower pH of 5, making this method of treatment seem feasible.

3.5 Microbial Count

The moisture content and pH levels of untreated litter made it suitable for microorganisms to thrive. The total plate count of untreated litter resulted in 8 x 108 CFU/g. However, there was a slight decrease in the microbial count after treatment and it resulted in 6 x 107 CFU/g.

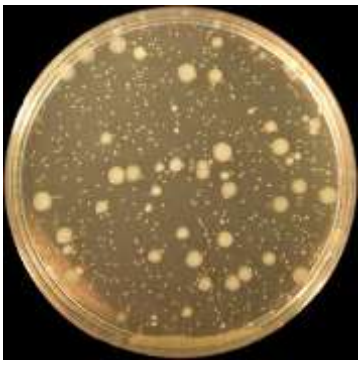

Fig 2: Colonies through spread plate method

Table 1. Litter Parameters

Parameters Analyzed	Units	Untreated Litter	Litter after Treatment
Moisture Content	%	12.8	10.5
Nitrogen Content	%	2.5	3
pH	--	7.4	5
Microbial count	CFU/g	8×10^8	6×10^7

4. Discussion

The moisture content, pH, microbial count and nitrogen levels are the four most essential parameters that are to be studied to adopt a reuse strategy of litter. The chemical treatment of litter using sodium bisulphate results in the significant lowering of pH, moisture content and nitrogen content of the litter. Sodium bisulphate is a dry acid salt which is non-hazardous less toxic food – grade

substance and falls under the category of Generally Regarded as Safe (GRAS) chemicals. It is found to be helpful in lowering the ammonia levels and odour emissions within the poultry house. This method of treatment is quite feasible to be performed in house as sodium bisulphate is relatively nontoxic and has been during times of bacterial challenge, prior to an expected challenge such as gangrenous dermatitis, or before processing to decrease carcass contamination. This reduces the risk of removing the poultry litter and replacing it after treatment. This methodology of treatment of litter for reuse is relatively time saving than the conventional composting methods. The composting techniques require at least two weeks time to make the litter fit for re-use. Whereas, sodium bisulphate could be applied merely 24 hours before the litter is to be reused.

5. Conclusion

In accordance with the discussion the chemical treatment of litter using sodium bisulphate proves to be a relatively simple strategy for litter reuse. The availability of the chemical, the time factor and potential use of treated litter as a valuable fertilizer makes this method of treatment alluring and more promising. The re-use strategy is bound to reduce the amount of waste generated from the farm as the litter is not left untreated but, put to use again within the same poultry house.

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