Efficiency of Microbial Concoction on the Reduction of Odor and Housefly Population in Quail Farming

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***Abstract*—** *The study focused on evaluating the efficiency of the microbial concoction on reducing the odor distance (m), fly density (per m2), and the number of dead eggs and larval stage of flies in the pit. The result implies that on the day of application the fly population was 391 specks per square meter and decreased to 273 specks on the second day of application. Consequently, the dead egg and larval stage of flies has sudden increase on the second day of application from approx. 335 on the day of application to approx. 349 but decreases on the following days up to zero visibility on the pit. On the other hand, it was shown that there is a decreasing distance point on smelling the odor of the manure until the last application of the concoction. On the day of the first application the odor was smelled 7.7 meters and reduce to 4 meters on the last day of application. The distance was decreased but it has still the same odor until the finished of the experiment. Minimal dead earthworms were also visible on the first three days of the experiment. White spots were also seen from the second day of application until the 5th day of experimentation. The incorporation of odor erasing microbial concoction on the pits of the quail had positively shown its efficiency on the reduction of the fly population and eggs and larval stage. Hence, reduced the distance of smelling the odor.*

Considering its positive result, the manure pits should be place on covered for better experimentation or should be applied immediately on the litter beds for more conclusive results.

***Keywords*— ammonia, fly ash, manure, OEMC, quail.**

I. INTRODUCTION

The Bureau of Animal Statistics (BAS, 2015) and its 2012 special report, reported that quail comes third in the production of poultry products following ducks and broiler as the secondary and primary source, respectively. Despite being only third, quail raising in the country is promising (BPI-NSPRDC, 2010). This can be started with a much lower capital investment as compared to chicken and ducks. Quail, locally known as pugo, is a small and tailless bird found in many parts of Asia. It belongs to the Phasianides family under the order of Galliformes. As commercial birds, quails require minimal space, time, and investment. Moreover, they are quick growers, and fast multipliers (Bolla and Randall, 2012). Also, they are richer in protein, phosphorous and vitamin A. Quails, unlike other fowl, are not delicate birds. These birds do not easily contract fowl diseases common to poultry, especially chickens (Mulemora, 2013). In addition, there is a growing demand on the meat and egg of quail at present.

Quail farming is very profitable like other farming ventures, such as chicken, turkey or duck farming business. Almost all types of weather conditions are suitable for starting quail farming business. Meat and eggs of quail are very tasty and nutritious. Having meeting the demand requires an intensive production. Thus, factors emerged in increasing the production just so to supply the demand of the population.

Having a larger scale of production in any animal of either livestock or poultry maximizes the production of manure. Hence, a serious consideration especially on its environmental impact. Some of these impacts are the strong odor and production of flies due to mishandling of manure produce by the animal). Manure handling practices and environmental conditions also affect chemical and physical properties of the manure, such as chemical composition, biodegradability, microbial populations, oxygen content, moisture and pH (Xin, et al., 2011). According to Ranadheera et. al. (2017), the strong odor is often a result of uncontrolled anaerobic decomposition of manure, feathers, waste feeds and bedding materials. And these odorous smells are a complex mixture of gases. It is important to maintain optimal conditions for production but should not impair human and the animal itself through emission of harmful gases. The high stocking density in the modern poultry barns may lead to reduced air quality with high concentrations of organic and inorganic dust, pathogens and other micro-organisms as well as harmful gases such as ammonia, nitrous oxide, carbon dioxide, hydrogen sulphide, and methane (Ellen, 2005; Gates et al., 2008).

Ammonia (NH3) is the primary basic gas in the atmosphere. Elevated concentrations of NH3 in poultry farms reduce feed intake and impede bird growth rate, decrease egg production, damage the respiratory tract, increase susceptibility to Newcastle disease virus, increase the incidence of air sacculitis and keratoconjunctivitis and increase the prevalence of Mycoplasma gallisepticum (Kristensen, Wathes, 2000). Egg quality may also be adversely affected by high levels of atmospheric ammonia as measured by reduced albumen height, elevated albumen pH and albumen condensation (Xin, et al., 2011). The ammonia concentration in the air plays an important role in the neutralization of atmospheric acids generated by fossil fuel combustion. The reaction product forms a NH4 + aerosol, which is a major component of atmospheric particulates. These NH4 + particulates may be transported long distances from the production site before returning to the surface by dry deposition or precipitation. Animal production produces a significant component of anthropogenic NH3 emissions. Ammonia is also a component of odour (Jelínek, et al., 2011). Ammonia volatilization from manure materials within poultry barns can adversely affect production, and also represents a loss of fertiliser value from the spent litter. It is generated during bacterial decomposition of protein and urea in housing areas and during storage and application of excreta under aerobic and anaerobic conditions (Kristensen et al., 2000). The main source of NH3 is urine of animals. Seventy percent of nitrogenous substances in excrement originate from urine and 30% from feces. Poultry feces contain 60−65% of uric acid, 10% of ammonia salts, 2−3% of urea and remains of creatinine. Especially uric acid is rapidly changed by the microbes to NH3 (Groot Koerkamp, 1994).

The house fly, Musca domestica L., is the major species associated with poultry manure. This fly breeds in moist, decaying plant material, including refuse, spilled grains, spilled feed and in all kinds of manure. Poor sanitation around the poultry facility increases the probability of high house fly populations. House flies prefer sunny areas and are very active, crawling over filth, people and food products. This fly is an important mechanical vector of many human and poultry diseases (protozoa, bacteria, viruses, rickettsia, fungi and worms. But this can be controlled through the integration of nonchemical and chemical control methods. The use of insecticides alone rarely results in satisfactory fly control. An integrated pest management program involving population monitoring, cultural control, mechanical control, biological control and chemical control is recommended (Loftin, Hopkins and Corder, 2014). There is really a need to balance the increase of production and its impact to environment. Giving the fact that microorganism can bat to the reduction of ammonia emission thus have a positive impact to the growth performance in poultry as well as its association to the population growth of flies. Hence, this study.

II. MATERIALS AND METHODS

The farms as site for the experimentation is situated in Brgy. Baraoidan, Gattaran, Cagayan. The manure pit where the concoction was applied is located approximately 100 meters away from the farm. Both of the sidings of the buildings were concrete with mesh screen however, the quails are house on a modern laying cage. The roofing material is corrugated iron sheets equipped with incandescent bulbs as source of heat-light for the birds. The other materials used were feeding and watering equipment, brooding facility, weighing scale, Sticky fly traps (cut to a dimension of 120 cm x 80 cm) and among others. The bird's population consumed 1 bags at 50 kgs a day. The birds were distributed into colony panels inside the building to control feeding and other management activities. The birds were fed in ad libitum manually using tube feeders. Medicated water was made available at all times. All necessary management practices specified by the owner was followed.

The Odor Erasing Microbial Concoction (OEMC) was top dressed into one of the manure pits of the farm. The application was on 260 g per day for seven consecutive days. The concoction was mixed to a fly ash with a ratio of 1:1 to serve as bulking agent. The application was once a day and started after the placement of the dungs in the pits.

The parameter on the distance of odor smell was gathered by measuring the point in all wind direction where the farm owner and the researcher smell the odor up to the location of the pit where the concoction was applied. The estimated housefly density was based on the number of specks counted after exposing the sticky fly trap (120 cm x 80 cm) randomly distributed inside the broiler house every other day throughout the experiment. And the dead eggs and larval stage of fly was approximately counted inside the 1 sq.ft. strings placed in the pit. Hence, other observable scenarios were undertaken.

Descriptive statistics analysis was used in analyzing and interpreting the results of the gathered data.

III. RESULTS AND DISCUSSION

It shows in figure 1 that there is a reduction on the population of flies inside the farm. It implies that on the day of application the fly population was 391 specks per square meter and decreased to 273 specks per square meter on the second day of application. But it was increased again to 321 specks per square meter on the 5th day of application. Thus, decreased to 283 specks per square meter on the last day of application from the 5th day of application. Consequently, the dead egg and larval stage of flies (Fig. 2) has sudden increase on the second day of application from approx. 335 on the day of application to approx. 349 but decreases on the following days up to zero visibility of the eggs and larval stage on the pit. On the other hand, figure 3 signifies the distance from the point of the manure to the point where the odor of the manure as smelled. According to Barroga et al, (2015), When the dung is fermenting the carbonaceous substances produced obnoxious or foul-smelling gases e.g. carbon monoxide, carbon dioxide, methane, etc. It was shown that there is a decreasing distance point on smelling the odor of the manure until the last application of the concoction. The figure provides that, on the day of the first application the odor was smelled 7.7 meters and reduce to 4 meters on the last day of application. The distance was decreased but it has the same odor still until the finished of the experiment. Minimal dead earthworms were also visible on the first three days of the experiment. White spots were also seen from the second day of application until the 5th day of experimentation.

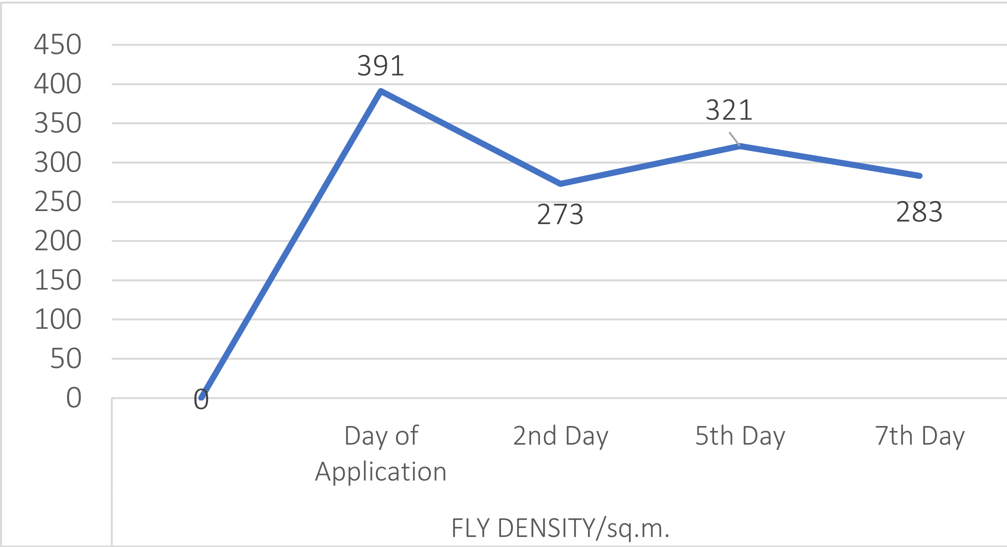

FIGURE 1: Effects of OEMC application on Fly density

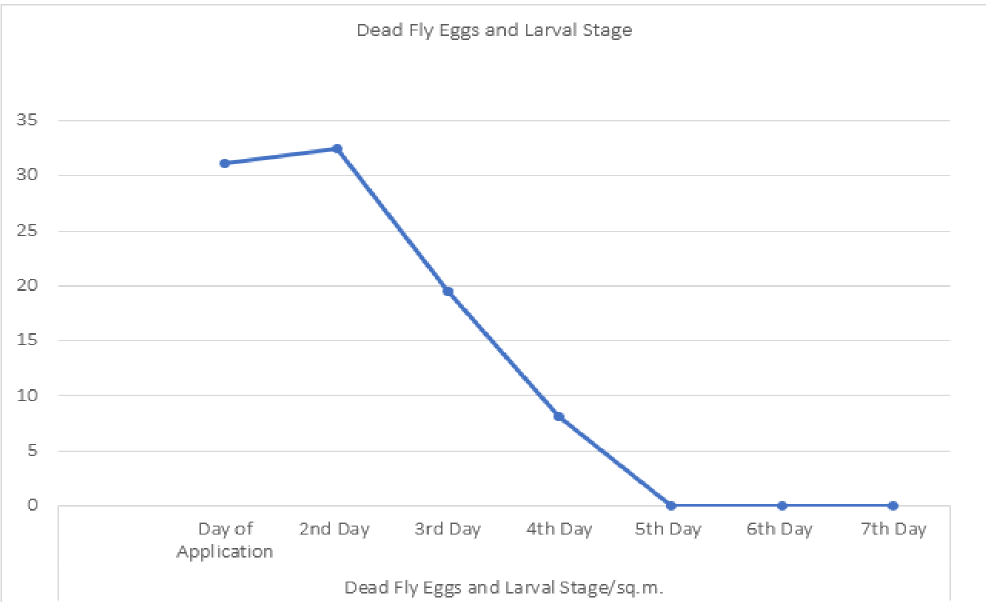

FIGURE 2: Dead Fly Eggs and Larval Stage

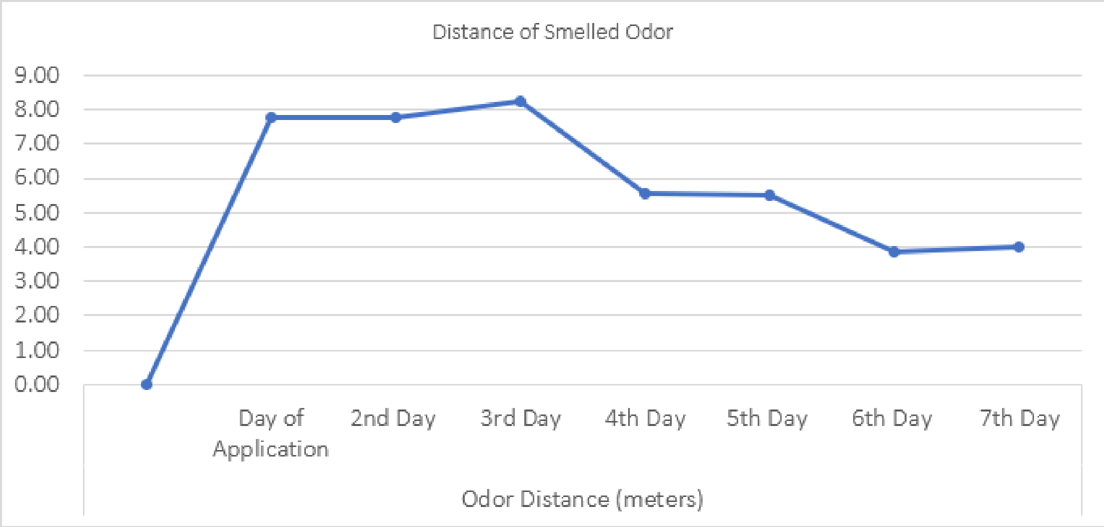

FIGURE 3: Distance of Smelled Odor

IV. CONCLUSION

The incorporation of odor erasing microbial concoction on the pits of the quail had positively shown its efficiency on the reduction of the fly population together with decreasing the eggs and larval stage. Hence, reduced the distance of smelling the odor. Considering its positive result, the manure pits should be place on covered for better experimentation or should be applied immediately on the litter beds for more conclusive results.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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