

Production of African House Fly (*Musca Domestica*) Maggots Using Decomposed Wastes, Cow Dung and Sawdust As A Sustainable Protein Source for Poultry, Fish and Pig Feeds:

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ABSTRACT

The escalating cost of fishmeal and soybean meal threatens poultry, fish and pig production in Uganda. While poor waste management is affecting fish production in lakes and rivers, human and animal feeds require the same fish. Farmers involved in maggot production, are using black soldier flies. This study evaluated a low-cost maggot production using African house flies that are resistant to the temperature variations. Market waste were collected from Awindiri Market dustbin, crushed and placed in a sealed drum for anaerobic decomposition for 7-18 days. The decomposed matter was exposed to wild African house flies (*Musca domestica*) for natural oviposition. Egg-laden substrate was transferred to open rearing containers and mixed with cow dung and sawdust to enhance growth. Maggots grew to 0.5 to 1.0 inch within 7-14 days, harvested by sieving, sorting and washing. Average 10 kg of waste substrate yielded between 2-4 kg of fresh maggots. Maggots were fed directly to poultry and pigs, showing high palatability. Excess maggots were preserved in a freezer and thawed at 21-36°C before feeding, ensuring continuous availability. The system is simple, low-cost, environmentally friendly, converting market waste into high-quality protein. It is recommended for adoption by farmers in Uganda.

Keywords: *Musca domestica*, maggot meal, Domestic or Market Waste, Amelo Technical Institute, alternative protein, waste valorisation

1.0 INTRODUCTION

Due to the climate changes facing Ugandan farmers, the production of soybean, maize corn, sun flower and fish meal used for animal feeds is decreasing. Rain patterns are now unpredictable to farmers, even after planting, many farmers get low yields. Dry spells are increasingly observed with little rain and because the farmers have not yet embraced mechanised agricultural practices, many farmers are becoming frustrated. Poor waste management in the country is another challenge. Many people depose plastic waste, polythene papers bags and other domestic waste into the rivers, swamps, soil and lakes thus, suffocating the life of fish and plants. The water bodies are becoming smaller, shallower and acidic due to siltation and un regulated dumping of waste into these areas. Human settlement is on the rise on wetland narrowing the habitat for aquatic life among others. These situations and scenarios have made the production of the food for human and animal consumption to be low hence, leading to the increasing cost of animal feeds.

As the population keeps growing in Uganda, domestic waste generated also increases hence, a need to innovate natural mechanisms of utilising this waste to increase food production.

While few farmers in Uganda have embraced the production of alternative animal feed of maggots from black soldier flies, the production requires some skill, some little capital for acquiring the seed maggots and adequate time to manage the production. This is limiting the expansion of black soldier maggot production. Black soldiers need moderate temperature and sufficient humidity for an effective production. When these temperatures rise and humidity decreases, the production is affected. This is the situation faced with farmers in West Nile sub-region of Uganda and particularly Adjumani district. The temperatures are ever high ranging from 29 to 39 degree Celsius while the humidity is very low. The Objectives of the study is to create a mechanism of trapping/harvesting African house flies to lay the larvae, to grow the larvae into maggots for feeding poultry, pigs and fish and to convert waste matter poorly dumped in the markets/towns/cities into fertilizer suitable for increasing the production of crops. This research was prompted when the researcher procured 1 kg of maggots from Kampala Uganda to kick start the production of the maggots and training of agricultural students at Amelo Technical Institute with intension that the students would graduate when they are able to sustain small poultry or piggery or fish agribusinesses. Experts entomologists were also hired by the principal to train the Institute staff and students and set up the structures required for the production of the black soldier maggots and after the training and set up of the production structures were complete, the results were not good. Maggots would hatch into black soldier flies but the mortality rate of the hatched black soldier flies was very high in few days. Disappointed in the set up black soldier maggot production that was failing to achieve the institute objectives, the researcher thought of trying researching on the ordinary African house flies that were readily visible in the environment regardless of the high heat levels and low humidity in Adjumani district.

2.0 LITERATURE

Alternative feeding methods for poultry, piggery and fish is being created in various countries. This has been occasioned by rising human population, decreasing food production and increasing cost of animal feeds in Uganda. While land for production is not increasing, the occupants are rapidly increasing creating more need for housing and food. Black soldier fly farming has become an alternative to traditional feed and fertilizer sources due to its resource efficiency for livestock and fish (Van Huis, 2013, 2019). According to (Tanga, “et al”, 2023), the practice is on the rise in Kenya and Uganda leading in Sub-Saharan Africa. Tanga, “et al”, (2023) also note that more than 80% of insect farms in Africa are producing black soldier flies for animal and fish farming

Insect farming is now seen as addressing the protein deficit in animals and fish since soybean, maize corn, sunflower seed, fish or meat are either expensive or inaccessible to many farmers (Kirya, J. 2025). By appreciating the innovation and cultural acceptance of many communities in producing maggots from black soldier flies, I acknowledge the power of social media and other media channels for disseminating the importance of the innovation. Because of the costs associated to the production of maggots from black soldier flies, coupled with the varying environmental temperatures and humidity in different parts of Africa, there is need to continue searching for more sustainable, low cost feeding alternatives for animal and fish farming.

Turning waste into wealth with Black Soldier Fly farming is not only sustainable but environmentally friendly to the eco-system (Yohane Chideya, 2026). With the increased population in Uganda, the waste produced will also be much and more needs to be done to ensure that all categories of the generated waste

is recycled for increased production and sustainability of our environment.

2.1 PROBLEM STATEMENT

The changing patterns of rains and poor waste management in Adjumani, is causing the rise of costs for poultry, piggery and fish feeds thereby reducing the profitability of the agribusinesses associated to animal feeds. While the waste littered in several parts of Adjumani town and dumped in Awindiri market, is seen as a nuisance to the public, the same could be turned into gold by converting it into soil fertilizer and feeds for African house flies that our local chicken and pigs keep searching and removing from our home steads and nearby environment. It is evident that even with high temperatures and low humidity in Adjumani, African house flies have adopted to these climates and are visible in the environment. What is left of the researchers, is to find out mechanisms of harvesting or trapping these house flies to lay the larvae and grow them into maggots for feeding the poultry, pigs and fish at reduced costs.

3. METHODOLOGY AND APPROACH

The data was collected using observations, experiments and archival searches.

3.1 Observations.

On a particular day, the researcher installed the solar powered camera closer and facing the dustbin located in Awindiri market. The camera observed the dustbin for 10 hours and it was removed for security purposes. This decision was prompted after the researcher noticed that local chicken and pigs from neighbouring homes around the dustbin were ever searching for something using the legs for chicken and the pointed mouth for the pigs. After uninstalling the camera late in the day, a replay and close observation and analysis of the what the local chicken and pigs were searching for in the dustbin was carried on. Whitish and brownish about half inch objects were seen being picked out by the chicken and pigs and also seen being consumed. The researcher returned to the dustbin the next day with tools for opening sections of the dustbin. The waste matter was turned slowly and manually with close observations carried out. As different sections of waste matter were tuned on manually, some larvae were seen and collected into an empty used drinking water bottle. The collected larvae were given to the nearby chicken and pigs and they were eaten off. The maggots found in a more liquid waste matter were smaller in size than those in solid like waste matter

3.2 Experiment

Having observed that the waste from rotten vegetables and fruits opened had more maggots seen during the manual search in them than other waste matter, the researcher collected the dumped tomatoes, cabbages, onions, avocado, mangoes, bananas and water melon. The researcher also collected both fresh cow dung and dry cow dung from the nearby local livestock kraal. Saw dust was also collected from the Amelo Technical Institute wood and furniture workshop

3.2.1 Preparation and Decomposition (7-18 Days)

Wastes were sorted in the research room to remove plastics and polythene waste, crushed into small pieces on the work table using kitchen knives, and placed in a 200-litre drum tightly covered for anaerobic decomposition for 7-18 days until a strong pungent odour developed. The decomposition duration depended on the state upon which the waste was collected

3.2.2 Attraction of African house flies onto the waste matter

The decomposed slurry was exposed in three open plastic bathing basins with each taken to open tree shade environment within the institute. The pungent scent attracted wild African house flies (*Musca*

domestica) which laid eggs on the matter. The researcher also recalled his experience that whenever any animal died in the village and it is dumped in the nearby bushes, flies would gather in large numbers to the carcass. The researcher then bought a small chick, cut it into pieces and distributed the cut chick onto the three basins.

3.2.3 Maggot Rearing (7-14 Days)

In a period of two to three days of exposure of the decomposed waste matter, the odour had reduced drastically and house flies were no longer competing to get in contact with the waste matter. The substrate containing eggs/larvae was transferred into open shallow split water jerrycans and mixed with little cow dung and sawdust. Sawdust served as a bulking agent to prevent waterlogging, while cow dung added nutrients. Maggots reached 0.5 to 1.0-inch-long within 7-14 days.

3.2.4 Harvesting, Utilization and Storage

Maggots were harvested by sieving, manual sorting and washed with clean water and were weighed. The fresh maggots were fed directly to poultry and pigs. Average yield was 2-5 kg of fresh maggots per 10 kg of substrate in each split jerrycan (20-50% efficiency). Excess maggots were preserved in a deep freezer refrigerator and when required for feeding, were exposed to ambient temperature of 21-36°C to defrost. The researcher also dried some maggots, pan fried them, crushed with blender and mixed with grinded soybean, sunflower seed, fine broken maize seeds to produce pellets that were given to fingerlings and rabbits as supplements. It was successful and sustaining. At Amelo Technical Institute today, house fly maggot production, training of farmers, feeding of fish, poultry and pigs with maggots is sustainable. The growth rate of poultry, fish and pigs fed on house fly maggot meal as protein supplement can not be under estimated. Poultry birds fed on sufficient house fly maggots takes an average of 6-8 weeks to reach between 1-2 kgs naturally.

3.3 Scope of the study

Study took place at Amelo Technical Institute, Adjumani District. It targeted all the students and staff of Amelo Technical Institute, farmers in West Nile sub- region and Uganda

4.0 RESULTS

Decomposing tomatoes, onions, water melon, avocado, mangoes, cabbages were used in the experiment
Decomposition period: 7-18 days depending on the nature and state of the waste matter collected

Maggot growth is 0.5-1 inches long in 7-14 days

Substrate input/ waste matter of 10 kg was put in every split jerrycan for maggot growth

Fresh maggot output is 2-4 kg per every 10 kg of growing mixed waste matter in a split jerrycan

Harvest method is by sieving, sorting and washing

Feeding form: Fresh live (poultry, pigs and fish) and also dried, milled and mixed with soybean, maize corn and sunflower seed

Storage: Deep freezer, thawed at 21-36°C and drying in oven

The maggots found in a viscous waste matter were smaller in size than those found in solid like waste matter

5.0 DISCUSSION AND CONCLUSION

The yield of 30-60% of maggots in an average 10kg of waste is highly competitive as this waste is freely collected and processed. Fresh feeding of maggots to poultry, pigs and fish, reduces processing costs.

Similarly, freezing of washed maggots in refrigerators, ensures continuous supply to the farmers. This low-cost production of maggots converts Awindiri Market waste into valuable protein and reduces environmental pollution. The production of maggots from African house flies does not need any costly capital, only time, change of one's attitude and an understanding some knowledge and skills of managing either poultry, piggery or fish. It is all about collecting the identified waste, crushing it, sealing it to decompose, exposing the decomposed waste matter to the open environment to attract African house flies, mixing the cow dung and some saw dust into the decomposed waste to allow the growth of the maggots. Any member of the community can produce the sustainable feeds for a given purpose. African house flies are available in many environments and are adaptable to varying heat levels and low humidity. The maggots found in a viscous waste matter were smaller in size than those found in solid like waste matter. Because of the several frequencies of these revelations of results during the manual search of maggots in the dust bin, it was concluded that maggots grow in the damp/moist waste matter with some aeration, grow quickly and become larger in size than those growing in a viscous waste matter. It is recommended that farmers adapt this technology of maggot production and earn more profits and increase house hold income with low production costs. Training Farmers in this technology is honour, I welcome it.

References

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