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## Food Waste To Poultry Feed

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### ABSTRACT

The amount of waste that is being generated in the form of solid and liquid is becoming a topic of concern. The waste management practices embedded in sustainable development principles are resource conserving, durable and assure equal access to resources by all human beings. In rural India, for instance, approximately 0.3 to 0.4 million metric tons of organic recyclable solid waste are believed to be produced on daily basis while 88% of the disease burden comes from lack of clean water supply systems as well as sanitation and improper solid waste management. In India, food wastage is a major issue with an estimated loss of 68.76 million tonnes annually which is equivalent to about 50 kilogrammes per capita per annum. Food wastage contributes significantly to environmental degradation in many ways; when foods get spoilt they decompose releasing methane gas into the atmosphere which has twenty five times more heat trapping capacity than carbon dioxide Food wastage also leads to water pollution because it leaches into rivers thereby contaminating them with nutrients that result in harmful algal blooms. It would be important therefore, if we appreciate that this variation exists depending on where one looks at it in the value chain. The purpose of this investigation is thus classify types of rubbish produced by restaurants and hotels, their sources or originators, negative effects on human health and environment, besides current strategies for treating waste materials.

Keywords— Waste management, Sustainable development, food waste, Rural India waste generation

### 1. Introduction

Food waste is a major global problem, with an estimated one-third of all food produced for human consumption wasted each year. This amounts to 1.3 billion tonnes of food waste annually, enough to feed 2 billion people. Food waste occurs at every stage of the food supply chain, from production to consumption. In developing countries, most food waste occurs at the production and post-harvest stages, due to poor infrastructure and storage facilities. In developed countries, most food waste occurs at the retail and consumer stages, due to overstocking, poor planning, and consumer behaviour. Food waste has a significant impact on the environment. When food is wasted, it decomposes and releases methane, a greenhouse gas that is 25 times more potent than carbon dioxide at trapping heat in the atmosphere. Raising awareness of the issue of food waste.

### 2. Literature Review

Nutritional Value of Food Waste :-Food waste, despite its discarded nature, contains essential nutrients that can support animal growth and health. The nutritional composition of food waste varies depending on its source, but it generally contains proteins, carbohydrates, fats, vitamins, and minerals. Fruit peels, for instance, are rich in fibre and vitamins, while vegetable scraps provide valuable vitamins and minerals. Bread waste, though often considered low in protein, can still contribute carbohydrates and energy to animal diets.

Utilization of Food Waste in Animal Feed:-Research has demonstrated that food waste can be successfully incorporated into animal diets for various livestock species, including pigs, poultry, cattle, and fish. Pigs, in particular, have shown adaptability to diets containing high levels of food waste, with studies indicating that they can consume up to 50% food waste without compromising growth performance or nutrient utilization. Poultry, including chickens and turkeys, have also shown positive responses to food waste-based diets, exhibiting comparable or even improved growth performance compared to conventional feed. Cattle, while typically fed on forage-based diets, can also benefit from food waste supplementation, with studies showing that dairy cows can consume up to 20% food waste without affecting milk production. Fish, such as tilapia and carp, have also been successfully fed diets containing food waste, with studies demonstrating that they can utilize food waste as a viable protein source.

Environmental Benefits of Food Waste to Animal Feed:-Diverting food waste to animal feed offers numerous environmental benefits. By reducing the amount of food waste sent to landfills, greenhouse gas emissions associated with decomposition are minimized. Additionally, the reliance on conventional feed ingredients, which often require intensive agricultural practices and resource consumption, can be diminished. Replacing conventional feed with food waste can conserve land, water, and energy resources, contributing to a more sustainable food system.

### 3. Methodology

The methodology for a project on food waste to animal feed in India will encompass a comprehensive approach to evaluating the effectiveness and feasibility of utilizing food waste as animal feed in the Indian context. The main focus of our methodology is to collect food waste from different domestic sources our study will meticulously deal into the integrate aspects of food waste processing animal feeding trials nutritional analysis economic consideration and regular framework.

From the raw material storage godown, the various ingredients of feed are taken in a batch mixer in accordance with feed formulation. After mixing all raw materials in ground to a uniform particle size of 1-2 mm. The ground material is further mixed the material that has been ground is mixed further. Such types of materials used for formulation as vitamins, minerals are combined in same proportions, urea and common salt etcetera. Are mixed in mixture and storage in one of the storage bins. Ground material and molasses are mixed simultaneously in a twin-screw type mixture. Usually, molasses is added at the rate of 10% in the poultry feed. However, if the cost is very high some sweetening agents could be used in place of molasses. Molasse feed is mixed with the dry steam before pelleting. Also steam feeds conditions the animal feed by helping to kill some pathogens that may be present. The temperature at which steam is fed into the feed lies between 75 to 80 degrees centigrade. These steamed feeds are therefore pressed through a cylindrical die and press roller into pallets. Usually, 1-2 mm is used for the production of pelleted feed for poultry. Pelleted feed thus produce is passed through pellet cooler before packaging in bags. If food waste is not collected in time, the decomposition process has already begun, and the food waste is directly shifted to vermicomposting farm for vermicomposting.

#### Objectives

1. Identify sources of unprocessed food waste disposal.
2. Define characteristics of food waste.
3. Investigate animal food nutrient requirements.
4. Analyze nutrient requirements.
5. Study methods for processing food waste into animal feed.
6. Assess associated expenses.

#### Scope of the Study

Long years ago, there are some conventional foods preserving techniques which are time consuming, complicated and risky. In this sun heating is most common method to remove moisture content of food. Food processing Industries are the one of rising industries but the waste generation is also more. Generally, the waste is barrack into ground. To avoid this wastage, we can convert it into pedegree for animals.

#### Identifying methods to reduce food waste

- Informal staff discussions
- Setting out different bins for various food items
- Record keeping on different foods wasted
- Reviewing invoices and other relevant documents.

#### Process to convert Food Waste to poultry feed

1. Collection of Food Waste from Various Sources
2. Segregating the waste to identify components with high nutrient value, such as vegetable scraps and organic residues.
3. Transfer the segregated waste into the anaerobic digestion system through the inlet funnel. This system is equipped with a blade and motor for mixing the waste, ensuring uniform distribution within the

digester. Inside the digester, a heating coil above a mesh net helps to dehydrate the waste, reducing moisture content. An exhaust fan located above the net removes excess moisture, maintaining optimal conditions for digestion.

4. Testing of the processed waste is essential to guarantee its quality and safety. Supplementing the digested waste with additional nutrients as needed to meet the nutritional requirements for animal feed. This ensures a balanced diet for the animals consuming the final product.
5. Inside the digester, a heating coil above a mesh net helps to dehydrate the waste, reducing moisture content. An exhaust fan located above the net removes excess moisture, maintaining optimal conditions for digestion.
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#### Raw material

- Grains: wheat, maize, oats, sorghum, rice, barley, sorghum, jowar, bajra, selected millets, corn etc
- Brans: Rice polish, Deoiled rice bran, Wheat bran, Maize bran etc.
- Protein Meals: Rapeseed meal, Soy bean meal, Cotton seed meal, Sunflower meal, Groundnut meal, Coconut meal, Safflower meal, palm kernel cake. Sesame oil cake, Linseed oil cake, Maize germ oil cake, Safflower meal, Guar gum powder etc
- Chunnis: Guar, Tur, Urad, Mung gram and chunnis of other locally available pulses.
- Agro-industrial by products: Molasses, Babul chunni, Tamarind seed powder, Mango kernel extraction, Tapioca sago wastes etc
- Minerals & Vitamins : Mineral mixture, Calcite powder, Common salt, Dicalcium phosphate, Vitamins A,D&E

#### Parameter to be checked

**Energy:** - Food energy is referred to as the energy released during the combustion of carbohydrates, fats, proteins and other organic compounds. When a food contains sufficient amounts of oxygen that completely oxidize the three major calorogenic nutrients contained in it, then it has calories or energy contents in terms of kilocalories (Kcals) or kilojoules (KJs).

**Total Carbohydrate:** - Carbohydrates provide glucose to our body cells and convert them into energy used for body maintenance and daily activities. In our diets, carbohydrates are one of three macronutrients which serve as sources of fuel for our bodies. There are many forms of carbohydrate including sugars and dietary fibre; they can be found in a wide variety of foods such as wholegrains, fruits and vegetables.

**Proteins:** - Proteins play a critical role in helping us grow up properly and maintain good health throughout life because they are the main source of calories alongside lipids and carbohydrates among others. For these important roles to be satisfactorily maintained by this part of the human physiology there must be good quality protein intake through foodstuffs.

**Total fats:** - Fats help your body absorb vitamin A, vitamin D, vitamin E. These essential vitamins are fat-soluble so only fats can assimilate them into your body system. Any unutilized fat by your cellular systems or turned into ATP is converted into

adipose tissue. each function that fats perform within the human organism either when consumed or taken in as part of dieting plan.

Sugar: -Our bodies need one type of sugar, called glucose, to survive. "Glucose is the number one food for the brain, and it's an extremely important source of fuel throughout the body,"

Moisture content: -It has a lot to do with a food product's characteristics, including its physical appearance texture, taste, weight (which can impact the cost) in addition to factors that affect the product's shelf-life, freshness, quality, and resistance to bacterial contamination

Fiber: -Fiber is a class of no digestible carbohydrates and lignin which is associated with numerous health benefits. Dietary fibers are those which are native to plants while functional fibers are those which are added to foods. Both dietary and functional fibers can have positive effects on health. While the human micro-flora remains an active area of scientific research, its relationship with inflammation, immune function, and the health of the colon are promising areas for understanding how fiber may offer protective effects against variety of diseases

Calcium: -However, calcium is a mineral that is commonly associated with good bones and teeth but it also helps in blood clotting, muscle contraction, regulation of normal heartbeats and nerve conduction.

Lysine: -This amino acid appears to increase calcium intake by the body and plays an important part in the development of collagen which is essential for strong bones other than its role in connective tissues like skin, tendons and cartilage

Phosphorus: -The major function of phosphorus is to help form bones and teeth. Its also a key component of carbohydrates and fats metabolism. It also promotes protein synthesis necessary for maintaining growth, healings, replacing worn out cells in various parts of our bodies.

Methionine: -It is one among the essential Sulphur containing aliphatic amino acids from which homo-cysteine, creatine, carnitine, cysteine, succinyl-CoA are derived. Latest studies have indicated that Methionine can control metabolic processes as well as innate immune system function and digestion system in mammals.

These are the contents which are present in the collected food waste for animal feed:-

Sr.No	Parameter	Units	Initial Results of Analysis as per 100 gm	Final Results of Analysis as per 100g
1	Energy	Kcal	389.67	213.5
2	Total Carbohydrate	g	77.01	56.45
3	Protein	g	10.98	19.2
4	Total Fat	g	4.19	6.7
5	Total Sugar	g	3.16	4.15

6	Moisture content	Percent by mass	-	10.5
7	Crude fiber	g	-	7
8	Calcium	g	-	2.7
9	Lysine, percent by mass, Min	percent by mass	-	0.95
10	Available phosphorus, percent by mass, Min	g	-	0.49

Table no.1. Nutrient content in food waste

#### 4. Result

These results, obtained through our research and testing, depict the moisture content of food waste:-

Sample description	Initial Weight in gm	Final Weight in gm	Moisture content in Percentage
Plate waste of Dal Rice.	2947	2947	68.78
Plate waste of Veg Biryani	1356	457	66.29
All food waste	3050	1007	66.98

Table no.2. Moisture content in food waste

#### Shelf life of dried food waste

This is a guide for the consumer to enable them know how long food will last before it goes bad, taking into account the conditions of storage stated. It starts from the time it was made or cooked. The lasting period is influenced by various things such as kind of components used, method of preparation, packaging type and also how food is stored. This can be marked on the package with a date.

The shelf life of prepared chicken food is 3 months

#### Nutrition value checking

Nutritional value is tested for oven dry dal rice then the in the next test all hotel waste i.e (veg and non-veg ) plate rice, chicken bones, vegetable pills, chapati, fish waste are collected then dried in oven and grind it properly then nutritional value is checked again. Third test is conducted by taking 50 percentage of hotel waste 20 percentage of soyabean meal 20 percentage rice bran and 10 percentage of maize is added then whole mixture is grinded in mixer and then some amount of water is added to mix this mixture thoroughly and after sun drying nutrition value is checked again.



Sr. No	Parameter	Units	Result	Required
1	Energy	Kcal	309.67	3000kcal /kg
2	Total Carbohydrate	g	62.01	-
3	Protein	g	14.98	22
4	Total Fat	g	4.20	-
5	Total Sugar	g	2.30	-
6	Moisture content	Percent by mass	3.65	11
7	Crude fiber	g	4.31	8
8	Calcium	g	2.35	1.0
9	Lysine, percent by mass, Min	percent by mass	0.41	1
10	Available phosphorus, percent by mass, Min	g	0.65	0.5
11	Methionine, percent by mass, Min	percent by mass,	0.32	0.50

Table 3 Nutritional value of all plate waste kitchen waste (veg and non-veg waste)

Sr.No	Parameter	Units	Result	Required
1	Energy	Kcal	329.61	3000kcal /kg
2	Total Carbohydrate	g	64.34	-
3	Protein	g	23.98	22
4	Total Fat	g	7.20	-
5	Total Sugar	g	2.55	-
6	Moisture content	Percent by mass	10.30	11
7	Crude fiber	g	8.31	8
8	Calcium	g	1.35	1.0

9	Lysine, percent by mass, Min	percent by mass	0.73	1.0
10	Available phosphorus, percent by mass, Min	g	0.58	0.5
11	Methionine, percent by mass, Min	percent by mass,	0.47	0.50

Table no. 4 Nutritional value of after adding food ingredient

### Discussion

After comparing the nutrition value results with BIS 2007 of chicken feed almost all the results are matching those standards. Considering the cost benefit ratio, we can save up to 25 to 30 percent of chicken feed production cost

### Conclusion

Our research is aimed at transforming food waste management through its conversion into livestock feed. Our findings have outlined the systems' possible contributions to efficient waste management practices. By ensuring proper nutritional content for animal growth, our method emphasizes both waste reduction and resource efficiency. The development of "food waste to animal feed" resulting from our study has the capacity to entirely reshape waste management objectives in line with the ultimate goal of sustainable use of resources.

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