



## WASTES GENERATED, WASTES MANAGEMENT IN KANO ABATTOIR, DALA LOCAL GOVERNMENT AREA, KANO STATE, NIGERIA

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### ABSTRACT

High production of meat for human use has resulted to extreme waste generation from abattoirs. Nigeria as a developing nation has been characterized by incompetent waste disposal, treatment, and management technologies leading to pollution. This study was conducted to assess wastes generation and management in Kano Abattoir. An investigative survey approach was used to assess the Wastes generated and management in Kano Abattoir, Kano State. This was investigated using personal communication and interview with the staff, workers and meat sellers of the Abattoir. Waste generated was estimated based on Aniebo calculation. The assessment was carried out for six months during dry and wet season (February – April for dry season and June – August for wet season). The sum total of 131,737 cows and goats were slaughtered for both seasons (dry and wet season) in Kano Abattoir. For female and male cows about 766.6 ton of blood, 486.8 ton of intestinal contents, 389.5 ton of waste tissue and 718.1 ton of waste bone, total of 2,361.3 tons of wastes were discharged for dry and wet seasons in Kano Abattoir while for female and male goats, 51 ton of blood, 88.5 ton of intestinal contents, 56.6 ton of waste tissue and 145.9 ton of waste bone, total of 342.1 tons of wastes were discharged for the dry and wet seasons in Kano Abattoir. The Abattoir visited used nearby stream as means of discharging these effluent there by giving offensive odour to the environment, contributing to the organic and nutrients of the streams. Transporting wastes out of the abattoir was done in unhygienic conditions, exposing the meat to all sorts of contaminants. This action was found to be unhygienic and dangerous to human health. It was recommended that the excrement must be discharged into soil at rates not exceeding the recommended rates given by the Federal Environmental Protection Agency (FEPA).

**Keywords:** Abattoir, Wastes generated, Wastes management, Pollution, Environment

### INTRODUCTION

Slaughtering of animals for community consumption is ineluctable in utmost nations of the world and dates back to age. An abattoir is a demesne approved and registered by the controlling authority for aseptic slaughtering, examination of creatures, processing and effective preservation, and storehouse of meat products for mortal consumption (Anjaneyulu, 2006). Animals are being slaughtered on daily basis in abattoirs across Nigeria. Wastes from Abattoirs is a threats to its natural environment because it contributes to uncontrolled organic and nutrient loads in environment where it is discharged. In light of the negative effects of wastes from Abattoirs, there is a need for us to properly understand the types of wastes being generated and how they are managed across the different abattoirs. These abattoirs vary in size from one location to another and the wastes generated at these abattoirs also vary (Abdulmalik, 2009). Similar researches have been done by several scholars across Nigeria but what is most striking is they put more emphasis on solids and liquid wastes produced from these abattoirs. The reason for these adverse environmental impacts to occur is that in Nigeria and some other developing countries, it is common to site Abattoirs without carrying out an Environmental Impact Assessment; consequently, no appropriate mitigation measures are available (Nwanta, 2011).

The nonstop drive to increase meat product for the protein needs for the world population has some pollution problems attached. Pollution arises from conditioning in meat product as a result of failure in clinging to Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHP) (Akinro *et al.*, 2009). Consideration is hardly given to safety practices during beast transport to the abattoir, during bloodbath and during dressing (Singh and Neelam, 2011). In the Nigerian

animal assiduity, slaughter houses are littered with non-meat products and wastes that need to be reclaimed into useful by-products for farther agrarian and other artificial uses (Osibanjo and Adie, 2007). Abattoir waste just like any other waste can be mischievous to humans and the terrain if definite preventives are not taken. Adeyemo *et al.*, (2009) observed that facilities for waste recovery, treatment, and reuse are either inadequate or nonexistent in most Nigerian abattoirs. Thus, wastes are indiscriminately and improperly discharged and constitute environmental hazards. Leachates from their serial decomposition processes have the potential to pollute nearby surface water, with enteric pathogens and excess nutrients which may percolate into the underlying aquifers and contaminate hand-dug wells. It is important to note that for one to understand the methods of handling and disposing waste there is need for a vivid knowledge of the basic characteristics of the waste in question and its quantity. Therefore, this study focuses on the assessment of Waste generated and Waste management in Kano Abattoir in Dala Local Government Area, Kano State, Nigeria. The objectives of this study are therefore to assess the various types of wastes generated, the numbers of animals slaughtered in both dry and wet season in the abattoir, the quantity of waste generated from Kano abattoir, Nigeria and to evaluate various methods of handling and disposing of the abattoir wastes and their environmental implications.

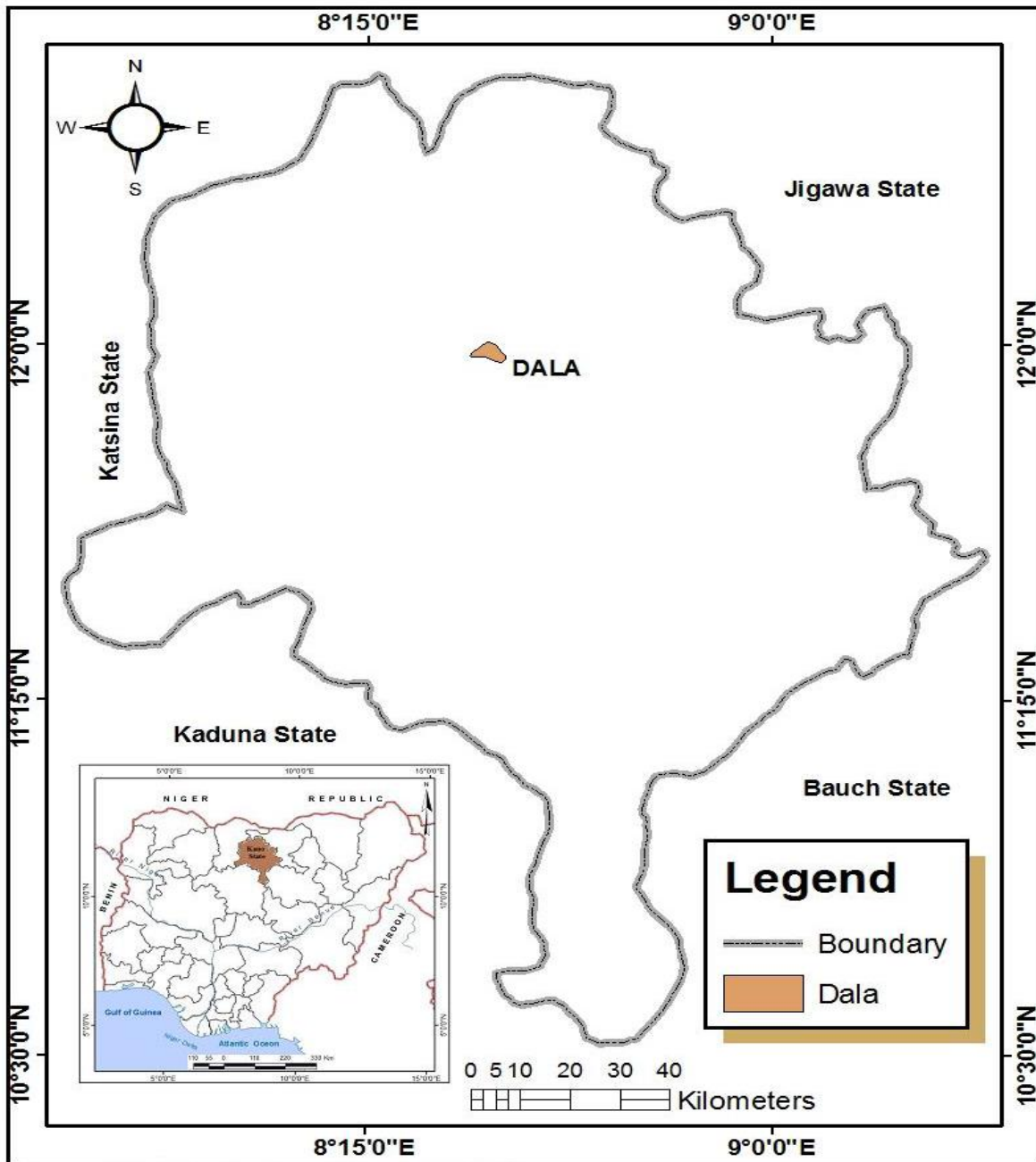
### MATERIALS AND METHODS

#### Study Area

Kano being one of the populous state in Nigeria is located at latitude 11°20' to 12°4' North and Longitude 8°22' East to 8°39' (Olofin, 2008). Kano is among the 12 states created in May 1967 out of the former Northern Region. The state remained

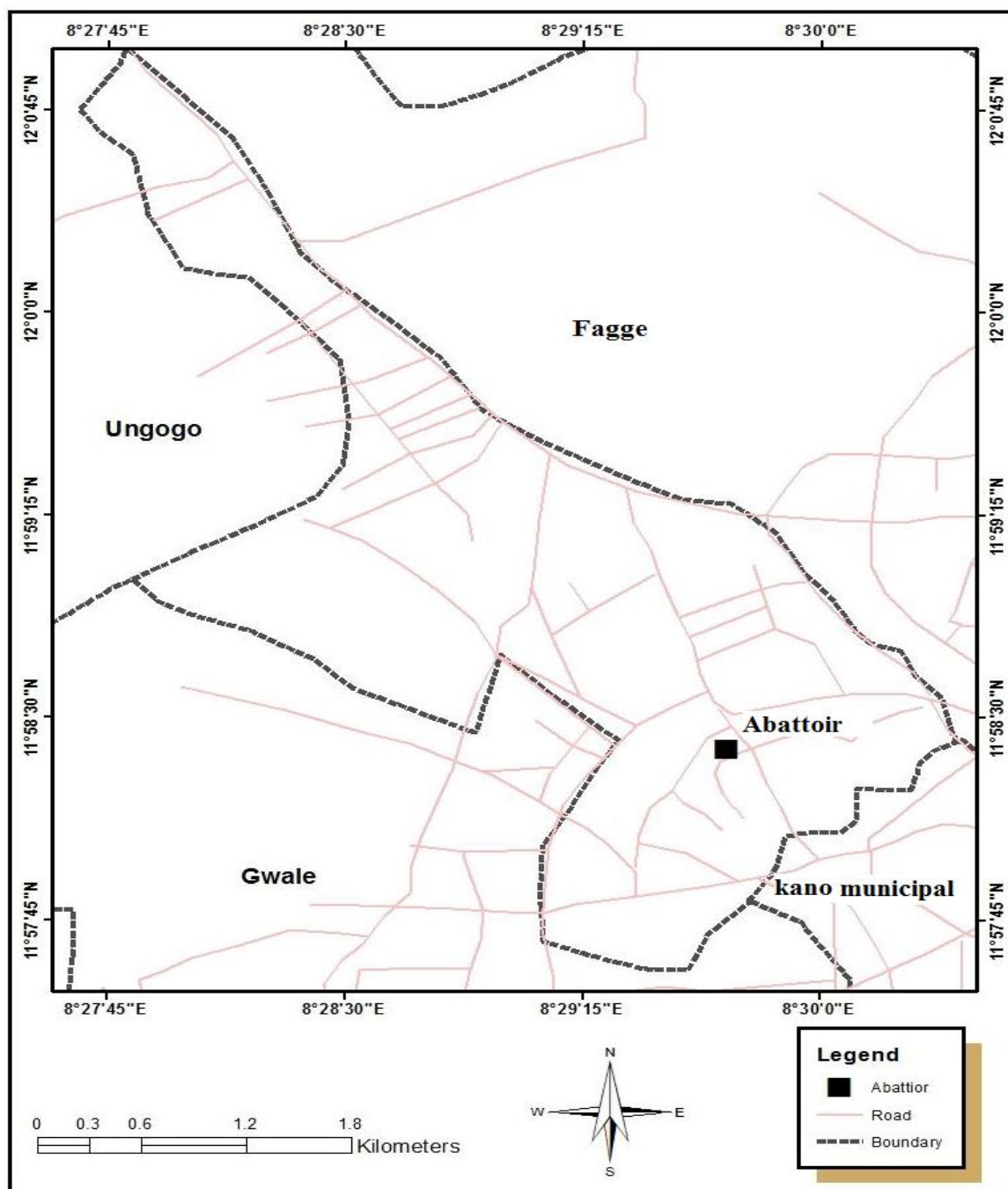
intact until August 27, 1991 when Jigawa State was carved out of it. The study was conducted in Kano Abattoir located at Dala Local Government Area of Kano State with enclosed between latitudes 11°57'45" N to 12°0'45" N and longitudes

8°27'45" E to 8°30'0" E (Olofin, 2008). Figure 1 and Figure 2 shows the map of Nigeria showing Dala Local Government Area and the location of the Abattoir.



Source: Administrative Map of Nigeria NPC 2006

Figure 1: Administrative Map of Nigeria NPC 2006



Source: Google Earth 2016

Figure 2: Map of Dala L.G.A Indicating the Location of the Abattoir, Google Earth 2016

**Sample collection**

The methodology adopted in this study is the investigative approach, these includes abattoir visitation, Particular interviews with workers of the Kano Abattoir and assessing their slaughter records. Data was collected for a period of both dry and wet season in this investigation, the average number of cows and goats that were slaughtered monthly were

assessed from the records kept by the records department of Kano Abattoir, Dala Local Government Area Kano State and the wastes generated was calculated based On Aniebo *et al.*, (2009) shown in table 1.

Data collected were statistically analyzed using ANOVA with Statistical Package for Social Science (SPSS).

**Table 1: Aniebo *et al.*, (2009) table**

	Cow	Goat
Blood/head(kg)	12.6	0.72
Intestinal content/head (kg)	8.0	1.25
Waste tissues/head (kg)	6.4	0.8
Bone/head (kg)	11.8	2.06

**RESULTS AND DISCUSSION**

Table 1 gives the quantity of blood, intestinal content, waste tissue and bone that one cow and goat slaughtered can generate based on Aniebo, *et al.*, (2009). This table was used to calculate the quantity of waste generated in Kano Abattoir which was presented in table 3. Records of slaughtered animals in the abattoir visited for both dry and wet season which means seasonal records of slaughtered animals in the abattoir visited for the year is as presented in Table 2. From table 2, a total of 18,940 female cows, 13,359 male cows, 20,371 female goats and 22,281 male goats were slaughtered and a sum total of 131,737 cows and goats were slaughtered for both seasons (dry and wet season) in Kano Abattoir. When this is related to table 3, for female and male cows about 766.6 ton of blood, 486.8 ton of intestinal contents, 389.5 ton of waste tissue and 718.1 ton of waste bone, total of 2,361.3 tons of wastes were discharged for dry and wet seasons in Kano Abattoir while for female and male goats, 51 ton of blood, 88.5 ton of intestinal contents, 56.6 ton of waste tissue and 145.9 ton of waste bone, total of 342.1 tons of wastes were discharged for the dry and wet seasons in Kano Abattoir.

These wastes were biological materials that can be composted, recycled and reused were used for farming activities. Figures of animals slaughtered went up during the festive period in the town because people tend to consume more animal protein during festive seasons. The quantities of wastes generated from the four main categories was assessed in which female cows had the highest summation of amount of wastes generated followed by male cows and female goats have the least, it was noted that the quantity of wastes generated is attributed to the number of animals slaughtered. This result is in conformity with the result of Mittal *et al.*, (2004) on Abattoirs in Quebec, Canada that there is possibility of additional pollutants from humans operating within and around the Abattoir thus the drainage outside the Abattoir is more polluted than that within the Abattoir. This result also corroborates Coker *et al.*, (2001) that Abattoir wastewater is heavily polluted regardless of the point from which it is taken from. Excess nutrients cause the water body to become choked with organic substances and organisms. Also improper disposal systems of wastes from abattoir could lead to transmission of pathogens to human and cause diseases.

**Table 2: Numbers of Animals Slaughtered in Kano Abattoir in Dry and Wet Season**

	Sum	
	Dry Season (Feb- April)	Wet Season (June- August)
	Female Cow	
Number of Animals	18,940	13,797
	Male Cow (bull)	
Number of Animals	13,359	14,794
	Female Goat (does)	
Number of Animals	20,371	10,709
	Male Goat (buck)	
Number of Animals	22,281	17,486
<b>Total</b>	<b>74,951</b>	<b>6,786</b>

**Table 3: Assessment of the Quantity of Waste Products Generated in Kano Abattoir in Dry and Wet Season**

	Sum	
	Dry Season (Feb- April)	Wet Season (June- August)
	Female Cow	
<b>Number of Animals</b>	<b>18,940</b>	<b>13,797</b>
Blood (kg)	238,643.7	173,842.2
Intestinal content (kg)	151,520	110,376
Waste tissue (kg)	121,216	88,300.8
Bone (kg)	223,492	162,804.6
Total waste produced (kg)	734,871.7	535,323.6
	Male Cow (bull)	
<b>Number of Animals</b>	<b>13,359</b>	<b>14,794</b>
Blood (kg)	168,150.4	186,026.4
Intestinal content (kg)	106,872	118,112
Waste tissue (kg)	85,497.6	94,489.6
Bone (kg)	157,636.2	174,215.2
Total waste produced (kg)	518,329.2	572,843.2
	Female Goat (does)	
<b>Number of Animals</b>	<b>20,371</b>	<b>10,709</b>
Blood (kg)	14,667.12	7,710.48
Intestinal content (kg)	25,463.75	13,386.25
Waste tissue (kg)	16,296.8	8,567.2
Bone (kg)	41,964.26	22,060.54
Total waste produced (kg)	98,391.92	51,724.47
	Male Goat (buck)	
<b>Number of Animals</b>	<b>22,281</b>	<b>17,486</b>

Blood (kg)	16,042.32	12,589.92
Intestinal content (kg)	27,851.25	21,857.5
Waste tissue (kg)	17,824.8	13,988.8
Bone (kg)	45,899.82	36,021.16
Total waste produced (kg)	107,617.2	84,457.38

Table 4 results statistically shows no significant difference ( $p>0.05$ ) in the quantity of wastes produced for female cows, male cows and male goats in both season (dry and wet season) except that of female goats ( $p<0.05$ ) which reveals that there is significant difference in quantity of waste produced in both season (dry and wet season).

**Table 4: Statistical Analysis on the Assessment of the Quantity of Waste Products Generated in Kano Abattoir**

	Sum		
	Dry Season	Wet Season	P value
<b>Female Cow</b>			
Number of Animals	18940	13797	0.386
Blood (kg)	238643.7	173842.2	0.386
Intestinal content (kg)	151520	110376	0.386
Waste tissue (kg)	121216	88300.8	0.386
Bone (kg)	223492	162804.6	0.386
Total waste produced (kg)	734871.7	535323.6	0.386
<b>Male Cow</b>			
Number of Animals	13359	14794	0.681
Blood (kg)	168150.4	186026.4	0.681
Intestinal content (kg)	106872	118112	0.681
Waste tissue (kg)	85497.6	94489.6	0.681
Bone (kg)	157636.2	174215.2	0.681
Total waste produced (kg)	518329.2	572843.2	0.681
<b>Female Goat</b>			
Number of Animals	20371	10709	0.029
Blood (kg)	14667.12	7710.48	0.029
Intestinal content (kg)	25463.75	13386.25	0.029
Waste tissue (kg)	16296.8	8567.2	0.029
Bone (kg)	41964.26	22060.54	0.029
Total waste produced (kg)	98391.92	51724.47	0.029
<b>Male Goat</b>			
Number of Animals	22281	17486	0.482
Blood (kg)	16042.32	12589.92	0.482
Intestinal content (kg)	27851.25	21857.5	0.482
Waste tissue (kg)	17824.8	13988.8	0.482
Bone (kg)	45899.82	36021.16	0.482
Total waste produced (kg)	107617.2	84457.38	0.482

Significant at the 0.05 level.

#### Waste management in Kano Abattoir

There is no environmental friendly operation system in Kano Abattoir. Intestinal contents and blood as shown in fig. 3 are washed into an open drain and are allowed to be washed into nearby stream called the Jakara conduit or drainage as shown in fig 4. Where the intestinal contents are not washed into open drain they are just allowed to degrade openly and have formed heaps as shown in fig 5. These heaps have come safe place for flies, worms and other scavenging creatures. They create a nuisance to the abattoir workers, people living nearby and others that visit the abattoir to buy meat. Bone management in Kano abattoir is relatively better because these bones are being bought by buyers, the bones are stacked up as raw materials for people that use them for production as shown in fig 6. This people come every day to buy them and pack them from the abattoir environment. The abattoir workers and meat sellers also stand the risk of zoonosis because no form of covering is used either for their body, nose or mouth during spreading operation. Another observed poor

processing method being used in the abattoir visited is the using of tyre, petrochemical products to burn the hairs of the animals and using detergent to wash the hide and skin afterwards. This process generates a lot of smoke and may contribute to global warming. This can be replaced with hot bath management system which is cleaner, neater and pose no threat to the environment (Aniebo, *et al.*, 2009).

From personal interview and observation, the workers in all the abattoirs use the nearby stream called Jakara canal/ drainage as toilets. The abattoirs indicated that they discharge their wastes segregated and there was general acceptance that the nature of waste produced are in liquid, solid and slurry forms. From further investigation it was observed that the receiving streams are used for domestic and irrigation purpose by local farmers within the abattoir vicinity. The abattoir lacked the basic facilities needed in a standard abattoir because the facilities provided many years ago have been destroyed by poor maintenance system.



Figure 3: Intestinal content washed into open drains



Figure 4: Popular nearby stream called Jakara drainage



Figure 5: Heap of intestinal contents.



Figure 6: Bones dumped in open place.

### CONCLUSION

The study has handed data base for which waste from Kano Abattoir can be estimated which would help engineers and environmentalist in taking the necessary procedure or precaution while trying to proffer solutions to the problems associated with abattoir. It should be noted that due to urbanization there would always be increase in population which would in turn increase consumption of meat, therefore, more information on the abattoir waste will go a long way to estimate possible problems and proffer suggestion on how to curb the menace created by abattoir wastes. The problems of waste generated in an abattoir can be better managed and corrected if proper assessment of the amount of waste

generated are properly documented. This would help in accurate prediction of the best method to manage the waste generated. In order to reduce the rate of pollution, it is recommended that the excrement must be discharged into soil at rates not exceeding the recommended rates given by the Federal Environmental Protection Agency (FEPA). This is to avoid salt and nitrate accumulation in the soil. There should be extensive use of compost and biogas produced from waste decomposition in the generation of electricity for the abattoir and the environment at large. This will help in the generation of revenue for the local government. Anti-odour chemicals should be used to suppress odour from animal waste and flies nuisance in the environment. Also wedge wire screen should

be used to remove the suspended solid material from the effluents prior to discharge into streams. The use of aerobic digestion system should be rehearsed since it takes lower retention time in reducing the BOD. Another system is the trickling sludge aerobic system which can take lower land size. Another method is the trickling filter aerobic method which can take smaller land size.

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