

**ENVIRONMENTAL POLLUTIONS CAUSED BY ANIMAL WASTE AND  
POTENTIAL SOLUTIONS**

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**Abstract**

Modernization in the rapidly developing animal husbandry and intensive management business, has brought a number of issues. At the same time a significant number of animals with the economic potential of the waste are major problems for the environment. Although there is poor water, water constraint is considered among the countries of our country's existing water resources, such as manure is contaminated by materials of high economic value. Obtained from an animal shelter is not stored in a proper manner fertilizer nutrients and microorganisms in the surface and ground water may cause pollution. The wastes in livestock operations would not create adverse environmental conditions necessary legal and technical measures are required. In this review, environmental pollutions caused by animal waste and potential solutions was investigated.

**Key words:** *Animal manure, environmental pollution, cattle, small ruminant, poultry*

**Introduction**

With the increasing population, to meet the proteins of animal origin required has made an intensive animal production necessary excluding of traditional methods. However, this situation brought about a number of environmental pollution (Mutlu, 1999). Indeed, Improperly stored or used of animal waste in animal enterprises pollute underground drinking water supplies primarily (Özek, 1994). Animal production waste to cause environmental problems but also is an important source of economic income as well. Many of these wastes is possible to use as fertilizer and fodder production therefore, as a result of animal waste management, environmental pollution may be reduced or even can be regarded as an economic gain for the enterprises (Karaman, 2006). However, disposal of animal waste unconsciously to the fields, pastures, open fields and streams reduces productivity and quality of water and soil biological structure is disrupted (Yetilmezsoy, 2010).

Solid and by diluting stored animal wastes generally cause the air and water pollution, environmental odor and flies resources due to absence of animal waste recycling methods and techniques and high cost. Due to the ease of use and more economical of the increasingly widespread use of artificial fertilizers instead of animal manure in vineyards, gardens and fields has led to further growth of the problem (Sahin and Altunal, 2008).

If the proper precautions are not taken for the animal manures may result unintended consequences. The fact that a material which can provide benefits of animal waste will be caused to become harmful (Waskom, 1999). Putrefaction will began when the manure and other wastes released into the external environment after a while and start to smell bad for the environment and will emit harmful gases and dusts to atmosphere. As a result of distortion as well as chemical pollution, visual pollution and bad odors occur. Therefore, uncontrolled use and relasing of manure to the external enviroiment should be avoided. The

use of animal-based fertilizers in agricultural land or other storage steps should be performed under conditions that prevent contamination consciously (Jacobson et al., 1999).

### Animal Wastes

#### Wet and Solid Animal Manures

Manure and urine is the way of throwing the metabolic wastes or some indigestible nutrients. Excreted amount of manure and urine vary in terms of an animal's age, physiological condition and physical properties of feed. Body weight and manure excretion amount of some Livestock was given in Table 1. (Ergül, 1989).

Table 1. Body weight and manure excretion amount of some Livestock

Livestock	Live Weight (kg)	Manure and Urine Rate (%)	Amount of Daily Manure (kg)
Cattle	600	9	54.0
Buffalo	500	8	40.0
Small Ruminants	50	5	2.5

Environmental pollution occurring as a result of livestock farming consists of two wastes basically. These fluids (urine) and solid (manure) wastes. These wastes varies according to effect of various factors such as the animal's age, physiological condition and physical properties of feed consumed.

The manure are not cleaned and stored properly create environmental pollution considerably in both inside and outside environment. For this purpose, in shelters emerged fertilizer shelter air emitted into the scent the air with harmful effects of substances very well known and their animals and do not harm people to be tolerated is necessary (Alagöz et al., 1996).

Using of manure and urine in certain extent is not a waste, but is a commercial substance for increasing crop production contrary. Proper using of animal waste materials prevent soil decomposition in terms of organic materials and leads to increase soil fertility.

When certain levels of used manure and urine exceed in an effort to increase crop production quantity and soil amelioration, the quantity of crop production, product quality, soil structure, underground and surface waters were affected adversely. In addition, it spread to the soil, plants, water, animals and people by the disease-causing agent, a heavy odor emitted to the environment. The odor spreading to the environment will be easier due to contamination of animals to manure in shelter (Ergül, 1989; Alagöz et al., 1996).

It is important to reach of all kinds of waste (food waste, barn wash water, etc..) and dirty water caused by manure and urine seeping into groundwater through the permeable soil layer in Livestock enterprises. This spreading can be possible for surface water in sloping terrain and in wet weather. The contaminated groundwaters enriched by nitrate especially. The surface waters in terms of phosphorus and nitrogen content begins to enreach the highest value. Phosphorus contamination occurred on surface waters depending on animal manure causes less dangerous in terms of nitrogene. The effect of nitrogen is heavier, indicating the presence in the conversion of urea to ammonia.

#### The Gases, Odors and Dust Emitted by Animal

Gas can be spread from animals with respiratory and intestinal tract, such as manure and urine excreted can arise as well. Gases in the manure, in bedding, in silos and as a results of the aerobic or anaerobic microorganisms activity on rooting feed may occur. While the water steam, carbon dioxide and ammonia are always seen, the hydrogen sulfide, carbon monoxide, hydrogen gas is detected occasionally in animal barns.

Dissemination and distribution of gas may be different according to the power density and diffusion (Ergül, 1989). There is also a heavy odor in the form of gases emission impact on the environment occurred in animal shelters. The smell of manure spreading rate are closely related to manure operating and mismanagement applications. Odor can be spread from animals especially, manure and urine gases and may also be caused by decayeinge feed.

The odor from these sources can be transported by the effect of wind to remote locations. The bad odor can be released more intense during the removal and storage of manure in open-air manure storage and spreading of compost to the field. Odors realeased in barns is important for the health of the workers and animals. It is also uncomfortable situation for people living close residential areas. Especially hydrogen sulphide and ammonia gas has a greater influence in this respect. (Yağanoğlu, 1987; Ergül, 1989; Alagöz et al., 1996).

When the animal waste and animal manure stored without taking measure in near settlements, by spreading bad odor to the environment causes air pollution as well, primarily flies to various pest proliferation of facilitating environmental health deterioration and spread of infectious diseases (Gur, 1993).

Stored manure without taking measures spread a weak smell once, then with the effect of high heat and humidity causes microorganizimical fragmentation. As a result, uric acid was quickly converted to the ammonium salt and increased ammonia output causes irritating odor emission to the atmosphere.

The animal wastes' 50-75% include organic materials that can be decomposed by bacteria. These organic substances for an energy source for microorganisms are proteins, fats and carbohydrates. The odors occur as a result of separation organic substances depending on ambient oxygen. In shelters where the oxygen is abundant and sufficient, animal waste decomposes quickly and carbon dioxide, water and some odorless compounds spread to environment. The nitrogen and inorganic compounds of sulfur occurs in the rapid decomposition of animal waste under aerobic conditions while decomposition is slow insufficient oxygen and anaerobic conditions. As a result of animal waste decomposition, 60 different compound spreading various odorous was determined (Yağcıoğlu, 1981; Yağanoğlu, 1987). Some chemical substances emerged from decomposition of manure was given in Table 2 (Anonymous, 2003).

Table 2. Compounds Emerged from Anaerobic Decomposition of Animal Manure

Volatile fatty acids	Sulfites
Acetic acids	Hydrogen sulfide
Propionic acids	Dimethylsulfide
Butyric acid	Diethylsulfide
Isobutyric acid	Disulfides
Alcohols	Ammonia and amines
Aldehydes	Ammonia
Esters	Methylamine
Phenols and Cresols	Ethylamine
Mercaptans	Dimethylamine
Methylmercaptan	Diethylamine
Ethyl mercaptan	Nitrogenous heterocycles
Propyl mercaptan	Indole
	Skatole
	Odorless gases
	Carbon dioxide
	Methane

### **Result and Discussion**

As a result of the review, the measurement to be taken are as follows;

- Manure storage must be designed according to the planning principles that can be stored in a storage tanks in a certain period of time and spreading of animal manure to the environment, (Karaman, 2006).
- Liquid waste to be removed from the environment must be prevented seeping into underground sources of drinking water , It should be drained and collected in underground tank. (Harner et al., 1997).
- The capacity of manure storage must be constructed to prevent contamination of water. (Öztürk, 2003).
- In order to reduction of air pollution, animal waste must be stored in a controlled environment . The storage and disposal channels to be prevent surface runoff should be made in open-air manure storage (Mature and Parker, 2005).
- Animal shelters should be constructed separately from the buildings, it should not be built the bottom and side walls of the houses in a common way.
- Recommended values taken into consideration in calculating the distance between manure storage and settlement, lakes and other water resources,
- In order to prevent groundwater contamination, the ground of manure storage should be checked frequently by eliminating cracks and leaks.
- Manure storage should be designed in accordance with construction techniques. It must construct storage capacity sufficient to store all manure produced by the operation over a period of at least 3 months.
- Biogas is one of the renewable energy source. Using of biogas in reducing methane and ammonia, increasing carbon dioxide emissions in atmosphere, reducing of the greenhouse gas emission that cause global warming can be achieved and hygienic living spaces are created.

### **Conclusion**

Animal waste causing environmental problems in Livestock enterprises has also an important economic potential. Most of the animal origin waste for use in areas such as fertilizer and feed production is possible. Therefore, management of animal waste will tend to reduce on environmental pressures and idle economic resources will be assessed.

Unless properly stored manures may cause environmental pollution. Storing of manure outside will reduce quality of animal based fertilizer to be used in crop production, odours and visual pollution create. Animal manures produced in shelters must be stored an environmentally responsible manner. The manure storage should be constructed with livestock buildings together. Energy supply is quite expensive nowadays, Processing of the animal wastes by the way of anaerobic fermentation and obtaining fermented manure as well as providing production and use of renewable energy, reduction of environmentally harmful waster and will also be reduced waste management costs.

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