Chapter (1)

Introduction

(1-1) Introduction:

Fertilizer is any organic or inorganic material of natural or synthetic that is added to soil to supply one or more plant nutrients that are essential to the growth of plants and their optimum yield. Organic fertilizers are natural materials of either plant or animal origin, including livestock manure, green manure, crop residues, house hold waste, and woodland litter. Inorganic fertilizers are fertilizers mined from mineral deposits with little processing (e.g., lime, potash, or phosphate rock), or industrially manufactured through chemical processes (e.g., urea). Inorganic fertilizers vary in appearance depending on the process of manufacture .The particles can be of many different sizes and shapes (crystals, pellets, granules, or dust).

And the fertilizer grades can include straight fertilizers (containing one nutrients element only), compound fertilizers (containing two or more nutrients usually combined in a homogeneous mixture by Chemical interaction) and fertilizer blends (formed by physically blending mineral fertilizers to obtain desired nutrient ratios). (Mtambanegwe &.kosina, 2007)

Chicken manure is the feces of chickens used as an organic fertilizer, especially for soil low in nitrogen . All animal manures have high amount of nitrogen, phosphorus, and potassium. Chicken manure is sometimes pelletized for use as a fertilizer, and this product may have additional phosphorus, potassium or nitrogen added. Optimal storage conditions for chicken manure includes it being kept in a covered area and retaining its liquid, because a significant amount of nitrogen exists in the urine. Fresh chicken manure contains approximately 1.5% nitrogen. One chicken produces approximately 8-11 pounds of manure monthly. Chicken manure can be used to create homemade plant fertilizer. Animal manures have been used as natural crop fertilizers for centuries. Because of poultry manure's high nitrogen content, it has long been recognized as one of the most desirable manures. Besides fertilizing crops, manures also supply other essential plant nutrients and serve as a soil amendment by adding organic matter, which helps improve the soil's moisture and nutrient retention. Organic matter persistence will vary with temperature, drainage, rainfall, and other environmental factors.

Poultry manure is high in phosphorus. In areas with high levels of phosphorus as determined by a soil test or in areas where phosphorus movement offsite is a concern (e.g., areas with poor drainage, a high slope, or an adjacent water body), phosphorus rather than nitrogen should determine the manure's application rate.

Fertilizer grades for manure can be calculated by comparing the total amounts of nitrogen, phosphorus, and potassium as a simple ratio, broiler house litter has a fertilizer grade of 3-3-2. Note that not all nitrogen in the manure will be in the same form. Some nitrogen in poultry manure will be in the form of ammonium (NH_4-N). The ammonium state is volatile, so there will be some loss of this nitrogen form to the atmosphere. Environmental conditions, such as rainfall, wind, and sunlight, will also affect the availability of organic nitrogen, phosphorus, and potassium.

Arising poultry on pasture is a time-established method of farming quality chickens turkeys, waterfowl, and other poultry. Historically, before that ration of poultry nutritional science and the widespread availability of balanced rations, forages were an important component of poultry diets. Access to vegetation was a way of providing a multitude of critical vitamins and minerals, many unknown "At all times of the year, an abundance of green feed is necessary. A lack of it is

often a cause of ill health and low production. It acts as a tonic in functioning properly, securing for the bird
a larger utilization of the feed consumed. The principal value, therefore, is in maintenance of health. The importance of abundance, as well as a variety, of green feed is seldom fully realized.” (Rice and Bots ford, 1930)

(1-2) The objective of the Research:

Study the effect of ration on the quality of chicken manure, by analyzing the components of each of the ration, and manure from different samples and farms.

This method is chosen for its accuracy, speed and cross code .In addition to the ease of comparing the results table and graph.

(1-3)The hypotheses raised are:

- The possibility of a clear impact of chicken ration on the quality of chicken manure. .

- The possibility of a lack of a clear impact of ration on the quality of chicken manure. .

- Probability a difference of chicken manures as a result of the different components the ration.

(1-٣) Feed ingredients

Feed ingredient for poultry diets are selected for the nutrients they can provide, the absence of anti-nutritional or toxic factors, their palatability or effect on voluntary feed intake, and their cost. The key nutrients that need to be supplied by the dietary ingredients are amino acids contained in proteins, vitamins and minerals. All life functions also require energy, obtained from starches, lipids and proteins.

Feed ingredients are broadly classified into cereal grains, protein meals, fats and oils, minerals, feed additives, and miscellaneous raw materials, such as roots and tubers.

(١-٣-١) Cereal grains

The term “cereal gains” here includes cereal grains, cereal by-products and distillers dry grains with soluble . Cereal grains are used mainly to satisfy the energy requirement of poultry. The dominant feed grain is corn, although different grains are used in various countries and regions of the world. For instance, in the US, Brazil and most Asian countries corn is by far the most important energy source for all poultry feed, whereas wheat is the -predominant supplier of dietary energy for poultry diets in Europe, Canada, Australia, New Zealand and the Russian Federation. Of course, in reality, a feed manufacturer will use any grain in a poultry diet if it is available at a reasonable price. For instance, in some parts of the US and China wheat is often used in place of corn if its price is below that of corn. In Australia, sorghum is a key grain during the summer season instead of wheat, while in the Scandinavian- countries barley and rye are used when these grains are at the right price. Although the amounts and types of cereal grains included in poultry diets will depend largely on their current costs relative to their nutritive values, care must be taken to avoid making large changes to the cereal component of diets as sudden changes can cause digestive upsets that may reduce productivity and predispose the birds to disease.

Corn (maize) Wheat Sorghum

The quality of cereal grains will also depend on seasonal and storage conditions. Poor growing or storage conditions can lead to grains with a lower than expected energy content or contamination with mycotoxins or toxin-producing organisms such as fungi and ergots. Genetic and environmental factors also affect not only the content of nutrients in grains but also the nutritive value, which takes into account the digestibility of nutrients contained in an ingredient in the target animal.

(١-٣-٢) Protein meals

Protein is provided from both vegetable and animal sources, such as oilseed meals, legumes and abattoir and fish processing by-products.

(١-٣-٢)Vegetable protein sources

Vegetable protein sources usually come as meal or cake, the by-product of oilseed crops. The main oilseed crops include soybean, rapeseed/canola, sunflower, palm kernel, copra, linseed peanut and sesame seed. After the oil is extracted, the remaining residue is used as feed ingredient. Oilseed meals make up 20-25% of a poultry diet. Inclusion levels do vary among formulations for different species and for the same species in different regions.

The main vegetable protein sources used in Australian poultry diets are soybean and canola. Other sources like cottonseed, sunflower, peas and lupines may be included in poultry feed formulations if these are available at a reasonable price.

Many oilseeds and legumes contain anti-nutritive factors. Some of these anti-nutritive factors can be destroyed by heat and are used in heat-treated meals. New cultivars of some oilseeds and legumes have been developed that are naturally low in anti-nutritive factors, permitting higher levels of the unprocessed grains to be included in poultry diets without ill-effect.

(١-٣-٤)Animal protein sources

The main animal protein sources used in poultry diets are meat meal, meat and bone meal, fish meal, poultry by-product meal, blood meal and feather meal. Although the production of animal protein for human consumption has been under continual pressure and marred by much controversy, the world-wide and domestic consumption of animal protein continues to grow and much of the future supply of meat protein will come from poultry. With increased animal protein production there will be increased demand for feed and, in particular, a demand for ingredients high in protein and energy.

The animal industry evolved as means of adding value (i.e. higher nutrient level and availability, flavor, variety, etc.) to ingredients that were of marginal food value for humans. These ingredients include grains that are of poor quality or damaged by harvest or storage conditions; as well as a means of recycling by-products of brewing, vegetable oil, meat, milk and egg production. Approximately 50% of the live market weight of ruminants and 30% of poultry is by-product. These by-products are rendered, ground and available as a feed source. Animal protein meals are usually defined by inputs. Those specifically used in poultry diets include meat (no bone) or meat and bone meal from ruminants and/or swine blood meal poultry by-product meal; feather meal; and fish meal. There are specific limitations now assigned to these products with regards to inputs used and guarantees with respect to minimum nutrient levels. For example meat and bone meal may be specifically from ruminants and must be free of hair, wool and hide trimmings, except where it is naturally adhering to heads and hoofs. The products are rendered, which is a bios cure process that evaporates water, extracts fat and yields a finished ground product high in protein (which has no resemblance to the raw product) and minerals. The products are marketed with guarantees as to minimum protein, phosphorus and calcium levels.

There are some challenges associated with the use of animal protein sources. First, food safety is the most important concern people have about the recycling of animal protein meals back through animals as feed ingredients. This is based on the links between the prison disease bovine spongiform encephalopathy (BSE_Mad cow disease) and a variant Creutzfeldt-Jakob disease in humans. Importantly for poultry production though, researchers have been unable to demonstrate the transfer of prisons to poultry and no symptoms of disease have been observed in birds up to five years after direct challenges. The proteins (prisons) associated with BSE are not destroyed by traditional methods of rendering and are capable of 9causing disease when BSE contaminated meat and bone meals are injected cerebrally into ruminants.

As a consequence of the public's concerns about BSE, Australia does not allow the use of ruminant by-products in feed for ruminants; however, ruminant by-products are available for use in poultry feed.

In addition to BSE contamination, there are concerns that animal protein meals are responsible for food borne pathogen contamination, such as Salmonella. Typically these bacteria are destroyed by rendering and possible recontamination which is often negated by polluting of manufactured feeds. In most cases, if poultry acquire Salmonella it is likely to be from an environmental- source other than feed. It is possible for animal protein meals to be contaminated with high levels of heavy metals, dioxins and pesticides, however, meals are monitored and regulated to minimize this contamination. Secondly, with respect to feeding the animal protein meals, the important practical issue is the variability in available nutrients (those that can be absorbed and retained by the bird) and limits to incorporation to maintain a diet balanced for all nutrients, particularly calcium and phosphorus.

Animal protein meals provide a good source of essential amino acids (e.g. lysine and methionine) and are also good sources of energy and minerals (particularly calcium and available phosphorus). However, there can be significant variation in availability (absorption and retention) of amino acids due to the day to day variation in inputs as well as processing conditions (temperature, moisture, pressure and time). The variation within processing plants can often be greater than variation between plants. It is important for users to establish strict criteria as to the quality of product and work with their suppliers to ensure these criteria are met. Quality should include measurements that indicate moisture; nutrient availability (particularly essential amino acids); levels of minerals (for example, calcium can vary from 8–12%; phosphorus from 4–6%); and stability of fat (all meals should be stabilized with an antioxidant).

The most accurate way of measuring the 'feed value' of an ingredient is to use an animal assay or bioassay. However, these assays are extremely time consuming and expensive. One of the most promising predictors of nutrient level and availability is near-infrared reflectance spectroscopy. This technology is rapidly being adopted by feed manufacturers and enables rapid screening of incoming products for a wide variety of measurements (moisture, protein, amino acid availability, fat, etc.). In most cases the samples can be prepared, scanned and results assessed in a few minutes. However, calibrations are still being established for meals and further research is required to classify the cause of variation in feed value. Animal protein meals have a long history in poultry nutrition. Utilization of this valuable feed ingredient is important in minimizing loss (nutrient and economic value) in the production of safe, high quality poultry meat, eggs and byproducts.

(1-3-5)Fats and oils

Fats and oils, collectiedly termed lipids, are regularly used in poultry feed- to satisfy the energy need of the animal as lipids have more than twice the amount of meal energy compared with carbohydrates or proteins per kg weight. Lipids are also an important carrier for fat soluble vitamins (A, D, E, and K) as wells for the provision of an essential fatty acid, linoleic acid, in the diet. A variety of fats and oils are used in feed, including lipids of animal origins (usually fats, i.e., tallow, lard, except fish oil) and lipids of vegetable origin (usually oils, i.e., soy oil, canola/rapeseed oil, sunflower oil, linseed oil, palm oil, cottonseed oil).

In practical feed formulation, the level of lipids rarely exceeds 4% in compound feed. However, even a small decrease in digestibility can cost dearly in terms of dietary energy. Like any other nutrient, a varying proportion of lipids are undigested depending on their sources and the species and age of the animal to which they are fed.

(1-3-6)Minerals and vitamins

Minerals are vital for normal growth and development in poultry, such as bone formation and body processes such as enzyme activation. Some minerals such calcium and phosphorus are required in large quantities. For example, laying hens require between 3.5-4% calcium, 0.3-0.4% available phosphorus and 0.2% sodium in their diets for egg production. Other minerals, such as copper, iron, manganese, zinc, selenium, cobalt, iodine and molybdenum, are required in milligram quantities but deficiency of these minerals will lead to serious health problems in mild cases and death in severe cases.

Similarly, vitamins are essential for the body systems of poultry. Both fat soluble (A, D, E, K) and water soluble (biotin, choline, folic acid, niacin, riboflavin, thiamine, pyridoxine, pantothenic acid and B12) are needed in the diet to maintain proper health and well being of poultry.

Some vitamins and minerals are provided by most ingredients but the requirements for vitamins and minerals are generally met through premixes added to the diet. Diets may also contain additives for specific purposes.

(1-3-7) Feeding animal protein meals

With respect to feeding the animal protein meals, the most crucial dilemma facing a nutritionist is the variability in available nutrients (those that can be absorbed and retained by the bird) and limits to incorporation to maintain a diet balanced for all nutrients, particularly calcium and phosphorus. published by the National Research Council for meat and bone, blood, feather and poultry meals.

Knowledge of the amount of manure and plant nutr ients produced on a poultry farm is the first step in the proper operation of a manure handling and utilization system. The nutrient content of poultry manure will vary with the digestibility of the ration, animal age, amount of feed wasted.

The amount of water wasted, and the number of times the poultry house is cleaned in a year. The data provided in this chapter is to be used for general planning purposes. South Carolina regulations (Standards for the Permitting of Agricultural Animal Facilities (Jan van der Heide 1999).

(1-4)Organic fertilizers:

Soil fertility on smallholder farms is almost entirely dependent on locally available resources. Cattle manure, cereal and legume Stover, and woodland litter are the commonly used organic fertilizers, but these are really applied in sufficient quantities to impact on crop yield .

The use of high quality organic fertilizers is really practiced, although through research and extension. Activities in Africa, some farmers now include legume green manures or legume –based fallows in crop sequences. The main advantage of using organic fertilizers is that, compared to mineral fertilizers, they are usually available on or near the farm at very little or no cost other than labor costs of handling, transportation or opportunity costs of land for their production.

(1-5) Chicken Manure:

Chicken manure is basically a waste material which is organic in nature and comprises of urine and feces of animals which are related to poultry e.g. chicken . Poultry manure is a mixture of certain types of bedding material such as sawdust or wood shavings .The manure is acquired by cleaning of the poultry houses on regular basis where thin bedding layers are removed along with such manure . So the manure which is basically the waste from chicken dropping and other mixtures ,when used as fertilizer is called Chicken fertilizer. Now the components or constituents found in the manure are dependent on the types of birds , their feed ration and proportions of droppings to litter , the handling systems of the manure and the types of litter . However, the most common components are Potassium, Nitrogen and phosphorus.

(1-5-1) Timing of using Manure and Precautions Involved:

It is preferred to use manure after within 120 days of the harvesting of crops . Similarly it is preferable not to use fresh manure because it may contain certain bacteria which are harmful for human health and may cause diseases . It is therefore suggested that the manure should be used- after it is composted because composting not only enhances the nutrients but also avoids the risks of your exposure to different diseases . The composting procedure may involve 3 to 4 weeks after which such manure can be used as fertilizer in gardens and for crops . Always wash your hands thoroughly after they come in contact with the manure or the compost and especially before eating so that no bacteria can enter your body .

(1-5-2) Advantages of chicken manure fertilizer in comparison with other fertilizers:

Chicken manure fertilizer has some of its distinct benefits in contrast to the synthetic or the inorganic fertilizers available in the market. The first benefit of their use is that they are more economical for the cause as compared to inorganic fertilizers they have the tendency to condition the soil better than the inorganic ones . This better conditioning of the soil will result in an extra yield. Research has shown that the yields of crops like Cotton was significantly higher when a Chicken manure organic- fertilizer was used . The use of chicken manure for fertilizer not only- brings ecomical benefits to farmers but is also less harmful to the environment in comparison to inorganic fertilizers . Not only can it be used for the fields but it can also be used as garden fertilizer . Chicken manure or a chicken fertilizer or litter as fertilizer is basically a mix of- droppings of chicken or birds like pigeon , ducks and turkey . They are generally hotter as compared to other organic fertilizers like those of cow and horse . They need to be composted first or else they have the tendency to burn plants. They are high in nutrients like nitrogen and- potassium . Horse manure is on the other hand not as rich in Nitrogen as chicken manure but is richer when compared with cow manure So a Chicken litter fertilizer you can say is rich in some components in contrast to others but the usage of fertilizers can vary according to the crops.

Deep litter is a housing system of animals which is based on repeated or continuous spreading of sawdust or straw material . The initial layer is made as bedding for animals and the other layers are added when the litter gets soiled . They are also known as backyard litter or domestic litter when used in domestic poultry .Chicken manure pellets which are used as fertilizers are obtained from the manure of the chicken in the . ages or coop (Deborah L .Martin1992).

Chicken manure

(1-5-3) Nutrient content of poultry manure:

Poultry manure contains all therteen of the essential plant nutrients that are used by plants. These include nitrogen (N), phosphorous (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S), manganese (Mn), copper (Cu), zinc (Zn), chlorine (Cl), boron (B), iron (Fe), and molybdenum (Mo). Plant nutrients originate from the feed, supplements, medications, and water consumed by the animals. Using poultry manure as a fertilizer for crops or trees may provide aportion, or all, of the plant requirements. The amount of nutrients provided depends on the nutrient content of the manure (lb of nutrient / ton of manure) and the amount of manure applied (ton of manure / acre). The amount of manure applied per acre (called the application rate) is typically based on the nitrogen needs of the plants. However, phosphorous requirement can also be used to determine the application rate Waste Utilization. South Carolina regulations can also limit the land application rate of poultry manure based on the copper, zinc, or arsenic content of the manure.

(1-5-4) Copper ,Zinc , and Arsenic limits of Poultry Manure:

In most cases, the agronomic rate, or the amount of nitrogen or phosphorous needed to grow a particular crop, is used to determine how much poultry manure can be applied per acre. However, South Carolina law also requires poultry producers to consider the concentrations of arsenic, copper and zinc in the manure as part of the land application requirements.

In most cases, the regulatory requirements for the application of arsenic, zinc and copper can be satisfied by demonstrating that the concentrations of these elements are below the threshold values. The concentration of zinc in poultry manure must be less than milligrams per kilogram of dry solids (mg/kg) to be excluded from further consideration. (John P. Chastain, James J. Camberato, and Peter Skewes .1999)

(1-5-5) Organic Nitrogen and Mineralization:

Organic nitrogen (organic-N) is the most abundant form of nitrogen in animal manure with a high solid content (10% total solids or more). Organic-N is not available to plants until it has been decomposed by microbes to ammonium-N. The process of converting organic nitrogen to ammonium-N is called covertsion .

(1-5-6) Mineralization:

Conversion of organic-N to ammonium-N does not occur immediately, and not all of the organic-N is mineralized. Sometimes animal manure with high solids content is referred to as a slow-release, N source because the organic-N is made available over time and not all at once. How fast and how completely this occurs depends on a number of factors including: soil temperature, soil moisture, soil pH, type of manure, and the extent of incorporation.

The amount of organic-N that is available during the first growing season can range from 30 to 80%. This value used to estimate the plant available nitrogen by the Clemson University Service Laboratory. However, since many factors influence mineralization, the conversion of organic-N to NH4 -N may be more or less than 60%. Organic-N does not leach from soil. Erosion is the only way that organic-N can be lost from the soil.

(John P. Chastain, James J. Camberato, and Peter Skewes .1999)

(1-5-7) Nitrate Nitrogen:

If poultry manure is stored in a predominantly anaerobic condition then very little nitrate nitrogen will be present and is generally not measured anaerobic means oxygen is excluded. Aerobic treatment systems, like composting, maintain elevated levels of oxygen in the manure through natural or mechanical aeration. The elevated oxygen levels will result in a significant amount of nitrate nitrogen in the manure. Therefore, poultry manure that receives a significant amount of aeration must also be analyzed to determine the nitrate-N content. The composting activity that can occur in a stacking shed can introduce a significant amount of air and as a result nitrate can be present in a significant amount (5 to 10% of total-N). Dry litter (less than 15%moisture content) from production houses can also contain significant amounts of nitrate-N. All of the nitrate-N is available to the crop and is an important component of some commercial fertilizers (ammonium nitrate for example).

Even though nitrate is not always present in a significant amount in poultry manure, it is still an important form of nitrogen. Nearly all of the ammonium-N and organic-N will eventually be

Converted to nitrate in the soil. Although nitrate is readily taken up by crops, it can be easily lost from the soil. Rainfall or irrigation that results in the movement of water through the root zone of the crop will result in the loss of nitrate by leaching. When soil is saturated, and leaching does not occur, nitrate can be converted to nitrogen gas and be lost to the air. Both of these processes can occur rapidly. Therefore, it is best to apply manure or fertilizer nitrogen very close to the time when the crop's requirement for N is the greatest.

(John P. Chastain, James J. Camberato, and Peter Skewes .1999)

(1-6)Quantlity of manure produced from poultry houses

The quantity of litter or manure can vary greatly from farm-to-farm. Estimates of the amount of layer manure produced per animal unit per year The moisture content and the litter depth at the time the house .

(1-7) Other type of organic fertilizer

(1-7-1) Green manure

Trees ,shrubs ,cover crops, grain legumes, grasses, weeds, ferns and algae provide green manure, an inexpensive source of organic fertilizer to build up or maintain soil organic matter and .Green manure crops can contribute 30-60 Kg N per huktar alwahid annually to the subsequent crop . The cumulative effects of continued- use of green manure are important, not only in terms of nitrogen supply but also with regard to soil organic matter and other elements such as phosphate and micro – elements which are mobilized, concentrated in the topsoil and made available for plant growth.

Deep –rooted green manure crops in a rotation can help recover nutrients leached to the subsoil. Under high rainfall conditions, especially at the start of the wet season, permanent deep-rooted systems, as in some trees, are needed for recycling .Most food crops have shallow roots, which develop too slowly to intercept the mineralization flush when the soil is first wetted .Some leguminous cover crops, such as Centrosema, Pueraria Crotalaria, also appear to be able to develop deep root systems on acid soil in the humid tropics.

Particularly where land becomes scarce and fallow periods must be shortened , persistent weeds such as Impetrate species proliferate ,creating grassland that are difficult to recover for cropping .

Shifting cultivators who have been obliged to shorten or abandon the fallow period often try to suppress weeds by using cover crops,e.g. yam beans (Pachyrrhizus erosus) in Southeast Asia or Mucuna utilize in West Africa .Rapid establishment of a cover crop is being introduced into a crop rotation ,good potential to suppress weed control can be observed immediately ,while effects of improved nutrient supply may occur only in the longer run (Green land,D.J.1986).

(1-7-2) Biological control:

In the biological control, pests are controlled by their natural enemies, such as - birds, spiders, mites, fungi, bacteria, viruses, or paints (e.g. cover crops to control weeds). In traditional farming systems, structures and practices have evolved that enhance biological pest control, although famers my not be- conscious of the effects. On the basis of the recent in pest ecoiogy, was of using natural enemies for pest control are being developed.

Biological control can be cheap, efficient, selective and ecologically sound. But there are also disadvantages. Biological control, like chemical control, is sensitive to external factors. It does not always work fast enough to- avoid damage. Many different factors may be important for biological control to be successful (e.g. climate, type of crop, size of the point, intensity of breeding measures). Therefore, heavy demands are made on research and extension services when biological control programmers are introduced .

However, some biological control measures can be applied by small- holder without outside support , e.g the conservation approach of promoting natural enemies, as it offers alternative food sources and hiding possibilities . This variation may be created by intercropping, allowing certain weeds to grow, planting or retaining hedges and patches with wild vegetation, cover-cropping, mulching and composting (for natural enemies that live in the soil). However, creating variation can also favour some pest, the pest way of stimulating the occurrence of natural enemies must be sought.

A specific form of biological pest control involves the use of bacteria,- fungi, protozoa and viruses. Mixed with water or another fluid, these micro-organisms are applied like chemical pesticides. Microbial pesticides have many advantages over chemicals: their effect is generally selective, they do not damage over useful organisms and man, and resistance to them is not likely to- develop. However, they must be applied more often, because they disintegrate more rapidly.

The best known and most widely used micro-organism is the bacterium Bacillus thuringiensis (B.I). During sporulation it produces a protein which is toxic to most caterpillars. Symptoms of poisoning show only minutes after a caterpillar starts eating a sprayed plant. The pesticide is sold to control caterpillar pests in various crops. B.t. is not known to be harmful to aquatic -organisms. Wildlife. Livestock, beneficial insects (including bees) or man. Until now, no susceptible species have become resistant to B.t. (Amb Hoffman, G.J- 2002).

The microbial pesticides produced by Western companies with the aid of high-technology equipment are usually too expensive for small holders. However, there are also examples of pesticide production in developing countries which are cheap raw materials and simple, locally available equipment. To control the sap-sucking bug Mahanarva posticata in Brazil, thousands of hectares are treated with Metarnizium anisopilae, a fungus produced locally in simple Iaboratories, using bottles of sterilised rice as a substrate. To control the stemboring caterpillar Ostrinia nubilalis in China.0.4 million hectares of maize are treated with locally prepared Bauveria, a fungus produced on steamed but not sterilized rice, bran or corn stalks (Amb Hoffman, G.J 2002).

(1-8)Inorganic Fertilizers:

Inorganic fertilizer is man-made and typically comes as a powder, pellets, granules or a liquid. Examples of inorganic fertilizers are chemical additives that are designed for plants to directly absorb, such as nitrogen (N), phosphorus (P) and potassium (K), these three essential elemental nutrients should naturally occur in healthy soil, but some plants require more of them. Other chemicals that might be included in inorganic fertilizers include calcium, sulfur, iron, zinc and magnesium.

(1-9)Nitrogen Fertilizers:

Nitrogen is necessary ingredient in soil for agriculturalists to produce high-yielding crop. Some plants produce their own nitrogen, and some nitrogen is contributed to the soil by rainfall, but these natural sources of nitrogen do not occur in high enough level for prolific. Many agriculturalists add nitrogen to the soil by way of fertilizer. They are four main of nitrogen fertilizers, each with its own advantage.

(1-9-1) Urea:

Urea contains 45% to 46% nitrogen. It is formed when anhydrous- ammonia is combined with carbon dioxide. Urea is a solid that is granulated before applying. Urea-ammonium nitrate (UAN) is a liquid form of urea made by dissolving urea and ammonium nitrate in water. UAN has become popular because it is more versatile as a liquid and is widely available .The urea form of nitrogen must be converted to ammonia first by a chemical process, then to-ammonium by a microbiological process, the ammonia can vaporize into the air, which can be a problem as some of the nitrogen is lost. Leaching can also occur- if the soil is coarse, and if the soil is wet or compacted, gentrification can occur.

It is rich in nitrogen content. On application, the nitrogen present in it gets converted into ammonia. It readily dissolves in water and is capable of showing quick results. It is found in the form of granules or pellets and is white in color. Due to its tendency to absorb moisture from the air, it is white a thin layer of non-hygroscopic material. Normally, it is applied during sowing time. However, care should be taken that it does not make physical contact with the seeds.

(1-9-2) Anhydrous Ammonia:

Anhydrous ammonia, which contains 82% nitrogen, is a commercially manufactured fertilizer and is the slowest of any nitrogen to convert to nitrate. Anhydrous ammonia is one of most commonly used nitrogen fertilizers because - it has higher concentration of nitrate and is lower cost. At normal temperatures, anhydrous ammonia is in gas state but converts to liquid when pressurized. Although anhydrous ammonia is dangerous, all other commercial nitrogen fertilizers are derived from it. Anhydrous ammonia must be injected into the soil. It is harmful to germinating corn seed and can erode on steep slopes.

(1-9-3) Ammonium Nitrate:

Ammonium nitrate contains 34% nitrogen. It is 50- 50 mix of ammonium and nitrate nitrogen. Ammonium nitrate quickly converts to the nitrate from that plants can use. It can be applied as a dry product as granules. So it is also popularly used in agriculture. Volatilization loss in ammonium nitrate is minimal, but Ohio State University Extension *recommends* that it not be used on soil that is prone to leaching and denitrification.

(1-9-4) Ammonium Sulfate:

Ammonium sulfate contains only 21% nitrogen. It is applied as a dry form with no nitrogen loss through volatilization. Sulfate is an essential nutrient to plants, so ammonium sulfate is a good source of sulfate. On the other hand, it is very acidifying and requires large quantities of lime to counteract the acidic effects.

(1-9-5)Ammonium Sulphate , Ammonium nitrate mixture :

This fertilizer type is available as a mixture of ammonium nitrate and ammonium sulphate and is recognizable as a white crystal or as dirty-white granules. This fertilizer contains 26% nitrogen, three-fourths of it in the ammoniac form and the remainder (i.e. 6.5%) as nitrate nitrogen. Ammonium- sulphate nitrate is non-explosive, readily soluble in water and is very quick-acting. Because this type of fertilizer keeps well, it is very useful for all crops. Though it can also render garden soil acidic, the acidifying effects is only one-half of that of ammonium sulphate on garden soil. Application of this fertilizer type can be done before sowing, at sowing time or as a top-dressing, but it should not be applied along the seed.

(1-9-6)Ammonium Chloride

This fertilizer type comes in a white crystalline compound, which contains a- good physical condition and 26% ammoniac nitrogen. In general, ammonium- chloride is similar to ammonium sulphate in action. (Do not use this type of fertilizer on crops such as tomatoes because the chlorine may harm your crop.)

(1-9-7)Sodium Nitrates

Sodium nitrates are also known as Chiclets or Chilean nitrate. The nitrogen-contained in sodium nitrate is refined and amounts to 16%. This means that the nitrogen is immediately available to plants and as such is a valuable source of nitrogen in a type of fertilizer. When one makes a soil amendment using sodium nitrates as a type of fertilizer in the garden, it is usually as a top- and side-dressing. Particularly when nursing young plants and garden vegetables. In soil that is acidic sodium nitrate is quite useful as a type of fertilizer. However, the excess use of Sodium nitrate may cause deflocculating(Stevenson 1982)**.**

(1-10)Fertilizers with Phosphorus Content

The main ingredient of phosphorus fertilizers is either naturally occurring phosphorus or artificially synthesized phosphates. There are two examples:

(1-10-1) Bone Meal:

There are two kinds of this phosphate fertilizer – raw and steamed. Raw bone meal contains phosphorus and little nitrogen, and is insoluble in water. On the other hand, nitrogen is absent in steamed bone meal due to high pressure steaming. It is quite brittle and can be grounded to powder. It is good for those soils which are acidic nature. It is applied to the soil either during sowing or after.

(1-10-2) Superphosphate:

In this fertilizer, phosphorus is in the form of phosphoric acid. Based on the manufacturing process. Superphosphate has three different grades – single, triple and declaim.

When added to the soil. Its phosphoric acid changes to water soluble phosphate. It is suitable for all types of soils and is used during time of sowing or transplantation

(1-10-3)Rock Phosphate:

As a type of fertilizer, rock phosphate occurs as natural deposits in some countries. This fertilizer type has its advantages and disadvantages. The advantage is that with adequate rain fall this fertilizer results in a long growing period which can enhance crops. Powdered phosphate fertilizer is an excellent remedy for soils that are acidic and has a phosphorous deficiency and requires soil amendments. However, the disadvantage is that although phosphate-fertilizer such as rock phosphate contains 25 to 35% phosphoric acid, the phosphorous is insoluble in water. It has to be pulverized to be used as a type of fertilizer before rendering satisfactory results in garden soil. Thus it is not surprising that Rock Phosphate is used to manufacture superphosphate which makes the Phosphoric acid water soluble.

(1-10-4)Slag :

Basic slag is a by-product of steel mills and is used as a fertilizer to a -lesser extent than superphosphate. Slag is an excellent- fertilizer that can be used to amend soils that are acidic because of its alkaline reaction. For slag application to be an effective fertilizer it has to be pulverized first .(Syeres,- Mackay,1986).

(1-11)different types of potassium fertilizers:

- Marinate of potash (Potassium chloride) .
- Sulphate of potash (Potassium sulphate).

Both marinate of potash and sulphate of potash are salts that make up part of the waters of the oceans and inland seas as well as inland saline deposits.

(1-11-1)Marinate of Potash

Marinate of potash is a gray crystal type of fertilizer that consists of 50 to 60% potash. All the potash in this fertilizer type is readily available to plants because it is highly soluble in water. Even so, it does not leach away deep into the soil since the potash is absorbed on the colloidal surfaces.

(1-11-2)Sulphate of Potash

Sulphate of potash is a fertilizer type manufactured when potassium chloride is treated with magnesium sulphate. It dissolves readily in water and can be applied to the garden soil at any time up to sowing. Some gardeners prefer- using sulphate of potash over marinate of potash(Kapusta 1968).

(1-12) Fertilizers and Environmental Pollution

Agricultural practices by farmers are being increasingly viewed as- contributors to environmental degradation. In recent years many reports have indentified agricultural nonpoint source pollution as the leading source of water quality impacts to rivers and lakes. The impact of agricultural practices on groundwater quality is of particular concern. This concern is heightened by the fact that a majority of the population in many areas receives their drinking water supply from private wells. Most of these wells are shallow and are vulnerable to water pollution, especially from nitrate that supplied by fertilizers (Caraco.1999).Nitrate leaching from fertilizer use depends upon the fertilizer types (ammoniacal, nitrate or), method of application, and climatic conditions. Nitrate leaching may be greater when a fertilizer contains the nitrate component , compared to the situations where ammoniacal nitrogen is the major component of of a fertilizer. Nitrate losses are likely to be more when nitrogen is applied in one application compared to when it is applied in split- application s. Fall-application of fertilizers or manures will cause high nitrate losses during early spring. Nitrate losses from fertilizer use can be reduced matching fertilizer application with nitrogen needs of a crop. (Caraco.1999).

(1-13) Pollution of chicken manure

One of the most basic principles of incineration is that what goes in, must come out. There is no alchemy going on, so if there are toxic - heavy metals like lead, mercury or arsenic going in one end, they must come out in the form of toxic ash and toxic air emissions. When another class of contaminants known as halogens enters an incinerator, you have another situation on your hands. These halogens (chlorine being the most prominent) are often released in the form of acid gases (contributing to acid rain and respiratory problems) and also are released in small volumes of extremely toxic- chemicals called dioxins and furans (among the most toxic chemicals ever studied).Naturally, when evaluating incineration, one of the first questions becomes "what is going in to the incinerator?" Incineration of poultry waste bring much needed attention to what is in poultry waste and in the chicken and turkey feed itself.

(1-13-1) Arsenic Use in Chicken and Turkey Feed

According to the Environmental Protection Agency, "Organic arsenic compounds are extensively added to the feed of animals (particularly poultry and swine) in the United States to improve growth rates by controlling parasitic diseases. Several other articles and government reports confirm this, including studies by the U.S. Geological Survey looking into the land and water impacts of arsenic-containing poultry litter being land applied in the Chesapeake Bay watershed, where they have found trace elements of arsenic in Maryland's Pocomoke River.Roxarsone, or 3-nitro-4-hydroxyphenylarsonic acid, is currently the most commonly used arsenical compound in poultry feed in the United States, with a usage of 23 to 45 grams of chemical per ton of feed for broiler chickens for increased weight gain, feed efficiency, improved pigmentation, and prevention of parasites. Roxarsone is used in turkeys as well as chickens. By design, most of the chemical is excreted in the manure. .(Mike Ewall, November 2007)

Studies have shown arsenic concentrations in poultry litter to be between 15 and 35 ppm (parts per million). At these concentrations, one can expect that the 300,000 tons per year of chicken litter than Fibrowatt plans to burn at their proposed Hurlock, Maryland and Magee, Mississippi plants would contain 9,000 to 21,000 pounds (4.5 to 10.5 tons) of arsenic. Fibrowatt's first and largest proposal in the U.S. - one for 500,000 tons per year of turkey waste in Benson, Minnesota - would burn waste containing 15,000 to 35,000 pounds (7.5 to 17.5 tons) of arsenic each year.

Even if pollution control equipment were able to remove 99% of this arsenic, that would leave 90-210 pounds (150-350 for Minnesota) of arsenic air pollutants, making these incinerators a major source of arsenic air pollution. The Fibrominn air permit projects that the Benson plant would emit 64 pounds a year of arsenic into the air, meaning that the plant's pollution controls would have to capture between 99.6 and 99.8% of the arsenic. Any arsenic captured in pollution controls would not simply disappear, but would become part of the fly ash, which Fibrowatt plans to sell as fertilizer. This is a lose-lose proposition. The lower the air emissions (due to better pollution controls), the more toxic the ash "fertilizer" will be.

Minnesota state law sets an ambient air limit standard of 0.002 micrograms per cubic meter for arsenic. There is reason to believe that the "Fibrominn" incinerator may violate Minnesota's Chronic Health Risk Value for arsenic and arsenic compounds, which ought to be measured at Fibrominn's property line.

State regulators in Minnesota, where the first poultry waste incinerator in the U.S. is planned, are relying on self-reported data from one of Fibrowatt's 3 existing facilities (all of which are in the UK), concluding that arsenic won't be a major concern at the proposed Fibrominn plant. However, one of the other two Fibrowatt plants in the UK (Fibrogen in North Lincolnshire) is listed as the 27th largest arsenic air emitter out of the 93 listed in the 1998 Pollution Inventory of Industrial Units in England and Wales.

It is being assumed that emissions from a poultry waste burner in the U.S. would be comparable to the British facilities, even though no effort has been made to evaluate whether arsenical and other feed amendments are used as widely in the British poultry industry as in the U.S. Until this is known, extrapolations of emissions from Fibrowatt's UK facilities to those in the U.S. are inappropriate.

Arsenic is more toxic than lead and has been the subject of much political debate after much scientific research led policymakers to seek to lower the allowable amount of arsenic in drinking water. Arsenic's use in wood-treatment chemicals has been phased out. Arsenic is classified as a known human carcinogen and, when inhaled, can cause cancer in humans, particularly lung cancer. A new study suggests that arsenic interferes with hormones, making it a potent endocrine disrupter.

The air pollution permit for the proposed Fibrominn project allows that incinerator to emit nearly 5 million pounds of regulated air pollutants each- year, including 388,000 pounds of sulfuric acid, 236,000 pounds of hydrochloric acid and 4,600 pounds of hydrofluoric acid. That's about 1,722 pounds a day of acid gases released into the sky above Benson, Minnesota. The permit states that "the proposed source will be a major source for hazardous air pollutants." This is a gross understatement. It would not only be "a major source" - if nearing their permit limits, the incinerator would be the largest source of sulfuric acid in Minnesota (exceeding the COMBINED emissions of all of the coal-fired power plants and other sources in the state which reported their toxic releases to the U.S. EPA's Toxic Release Inventory database in 2000). It would also be the second largest source of hydrochloric acid air pollution in the state, beating out the state's paper mills, an oil refinery and all but one of the state's coal-fired power plants.

Fibro watt would argue that their actual emissions would be nowhere near their permit limits and that it would be improper to compare their permit limits with actual (self-reported) emissions from other industries. Were this true, it begs the question: why would Fibro watt need permit limits far, far higher than what they expect to release?

To make a fair comparison, it would be best to compare actual emissions to actual emissions, or permit limits to permit limits.

The Blue Ridge Environmental Defense League (BREDL) -- a regional grassroots environmental network based in North Carolina -- is fighting Fibro watt's plans to build three poultry waste incinerators in North Carolina. They compared the permitted emissions from Fibro watt's Minnesota plant to the permitted emissions of a new coal power plant planned in North Carolina. The comparison shows that Fibro watt's permit limits are higher for four of the five major regulated air pollutants regulated in these permits. Emissions of nitrogen oxides (NOx) and acid gases (hydrochloric and sulfuric acids) would be 2-3 times higher from Fibro watt (129% and 162% increases, respectively). Emissions of particulate matter would be 33% and carbon monoxide would be 60% higher. The sulfur dioxide emissions would be 53% lower.

In November 2007, Fibro watt countered this comparison, arguing that they wouldn't be as polluting as a coal plant. They did their own comparison -- comparing actual emissions from the just-opened Fibro minn plant to existing coal power plants in North Carolina. While a comparison of actual emissions would naturally be best, Fibro watt's comparison is a false one. They compared their incinerator to coal power plants that were built decades ago, which would be illegal to build today, without being subjected to much more stringent air pollution laws. As it turns out, BREDL's comparison is more accurate, as it compares "apples to apples" by looking at recent permits under modern-day air pollution laws.

When Fibro watt was asked whether they could meet the current limit for nitrogen oxide emissions that the Cliffside coal power plant proposed in North Carolina would have to meet, they responded that they could not. An environmental engineer in the North Carolina Division of Air Quality affirmed, in a 2006 article in the *Charlotte Observer*, that Fibro watt's "emissions would be similar to those of regular coal-fired power plants."

(1-13-2) Chlorine Contamination and Dioxin

Dioxin was declared a Class 1 carcinogen, or "known human carcinogen," by the International Agency for Research on Cancer (IARC), an arm of the World Health Organization, in February, 1997. This was confirmed by the U.S. National Toxicology Program in their Ninth Report on Carcinogens. In 2001, Bush's EPA signed an international agreement seeking to eliminate sources of dioxin. Dioxin is formed accidentally in the course of most incineration processes and in certain other industries where chlorine is used. Incinerators are the largest known source of dioxin.

Dioxin wouldn't be much of an issue if the ingredients for forming dioxin weren't being placed in the incinerator. Dioxin production requires hydrocarbons and chlorine. Poultry litter is full of hydrocarbons, both in the manure and the bedding. There should be no shortage of chlorine in the poultry litter, either. This is apparent from the huge amount of hydrochloric acid that the Fibro minn incinerator would be permitted to release.

One of the sources of chlorine is from the various drugs and pesticides used in the poultry industry. Chlortetracycline is a chlorinated growth-promoting antibiotic widely-used in the broiler industry. Also, at least seven other drugs, most of them anticoccidials are chlorinated. One of the more commonly used anti coccidials is Amprolium. The residues in poultry litter of Chlortetracycline and Amprolium alone rivals that of Roxarsone, the most common arsenical. With this many tons of chlorinated drug residue in poultry litter, there is undoubtedly an ample supply of chlorine for dioxin formation. After all, dioxins are typically measured in nanograms and picograms, since they are toxic in such tiny amounts.

(1-13-3) Permit Choice

The permit has a "fill in the blanks" style emissions limit for fine particulate matter, where no limit is set by the agency and Fibrowatt gets to build and operate the incinerator for a while, then do some testing and propose what they think the limit should be, based on what they can manage to meet, rather than setting limits based on what would be considered an "acceptable" amount of pollution that wouldn't harm the health of humans and other living systems. .(Mike Ewall, November 2007)

(1-13-4)Lack of Monitoring

The Fibrominn incinerator is only required to use continuous emissions monitoring systems for nitrogen oxides (NOx), carbon monoxide, sulfur dioxide (SO_2), oxygen and opacity. Not a single toxic pollutant will be monitored on a regular basis. Dioxins and furans will be tested only once. Hydrochloric acid, mercury and fine particulate matter (that under ten microns in size -- called PM10) will be tested only 5 times, over the course of the first 15 months of operation and none thereafter. Other pollutants that never have to be monitored include ammonia, sulfuric acid, hydrofluoric acid, polycyclic aromatic hydrocarbons, volatile organic compounds and toxic metals (including arsenic).

Any claims of emissions being "clean" or "safe" need to be understood in the context that no one really knows what's being emitted since testing isn't being done for most of the toxic and hazardous pollutants. Continuous emissions monitoring technology exists for all of the above-mentioned pollutants, but state agencies aren't in the habit of requiring their use, and companies have no interest in obtaining data on their emissions if they're not forced (Mark Pattison 2008).

(1-14) Chicken Waste and Water Pollution

Describes the problem of water pollution from chicken waste. On the Chesapeake Bay's Eastern Shore, large-scale chicken farms dominate the landscape. These factory farms produce a bountiful supply of cheap chicken, but also an excess of chicken manure. Runoff from these farms, which is largely unregulated, flows into rivers that pollute the bay. While chicken farmers and chicken companies debate who should be responsible for the waste, the industry has successfully resisted pollution control regulations, arguing that voluntary practices are better.

Chapter (2)

Materials and Methods

(2-1) Sampling of ration and manure

Field visits were done to two different farms in Kuku (Eastern Nile) and Shambat area specialized in poultry production.

Farms owners were questioned about some information regarding the types of ration they use. The samples were collected from the Faculty of Animal Production ,Sudan University(Shambat) strain municipal poultry chicken species Wadai , at the age of ten months the other sample was collected from the National Center for Veterinary Research(Kuku) ,chicken platoon Hai telex imported by Alghar from the Netherlands company at the age of six months. .

(2-2) Preparation of samples:

Ration and manure samples were air dried, ground to pass 1um sieve and stored at room temperature for further analysis.

(2-3)Reagents:

-Sulphuric acid- H_2SO_4 (93-98%)

-Copper sulphate-$CuSO_4 .H_2O$ catalyst.

-Potassium sulphate.

-45% sodium hydroxide solution. Dissolve 450g solid NaOH in water and dilute to one liter.

-0.1N NaOH. Prepare 0.1N NaOH by dissolving 4.0g NaOH in water and made volume to one liter.

-0.1N hydrochloric acid HCl. Prepare standard 0.1N HCl and standardize against 0.1N sodium carbonate.

-Zinc granule.

-Methyl red indicator solution.

-20% hydrochloric acid HCl.

-Dissolve 1g sample in 5ml HCl (20%) and dilute to 50ml with distills water.
-Reagent solution. Prepare reagent solution by dissolving 22.5g ammonium molybdate and 1.25g ammonium vandate in 250ml concentrated nitric acid and dilute to one liter.
-Concentrated nitric acid HNO_3.
-Potassium,1000mg/L. Dissolve1.907g of potassium chloride.KCl, in deionized water and dilute to one liter with deionized water.

-Iron ,1000mg/L.Dissolve 1g of iron wire in 50ml (1-1)HNO_3.Dilute to one liter with deionized water.

-Sodium,1000mg/L.Dissolve 2.542g of sodium chloride in deionized water and dilute to one liter deionized water.

-Manganese,1000mg/L.Dissolve 1g of manganese metal in few HNO_3.Dilute to one liter with deionized water.

-Cobalt,1000mg/L.Dissolve 1g of cobalt metal in 5ml (1-1)HCl.Dilute to one liter with deionized water.

-Zinc,1000mg/L.Dissolve 1g of zinc metal in 5ml (1-1)HCl.Dilute to one liter with deionized water.

-Copper,1000mg/l.Dissolve 1g of copper metal in 5ml (1-1)HCl.Dilute to one liter with deionized water.

(2-4)Instruments and tools:
-pH meter Hanna model 211.
-EC meter Hanna modle214.
-Flame atomic emission spectrometry model (Jiebo technology made in USA) .
-Atomic Absorption Spectrometry model ((AAS) device model 210 VGP Buck, scientific, made in USA).
-Electric oven with thermostat and desiccators.
-Kjeldahl digestion flasks.

-Digestion stand, suitable for digestion of samples with sulfuric acid at temperature near to 400 °C and fit to evaporate the fume.

-Vacuum jacket of micro-kjeldahl distillation apparatus.

-Conical flask,funnel.

(2-5) pH determination

Ten grams of sample was mixed with 50 cm^3 distilled water. The mixture was shaken for 30 minutes, filtered and pH of the extract was measured directly by using pH-meter(Mclean .E.O.1982) .

(2-6) EC measurement

Ten grams of sample was mixed with 50 cm^3 distilled water. The mixture was shaken for 30 minutes, filtered and the extract EC was measured by using EC-meter in dS/m (Mckeague 1978).

(2-7) Moisture content, %

Ten grams of samples were dried in oven at 105̊C for 24 hours. The moisture content was estimated gravimetrically by the following equation:

$$\text{Moisture content \%} = \frac{\text{Wet sample} - \text{Dry sample}}{\text{Dry sample}} * 100$$

(2-8) Ash ,%

Ten grams of dried samples were ashed for 4 hours at 550˚C. The ash % was estimated by the following equation:

$$\text{Ash content \%} = \frac{\text{Sample weight after burning}}{\text{Sample weight before burning}} * 100$$

(2-9) Determination of Phosphorus (P)

-The sample was burned inside furnace at 600C for 8 hours then 1g of the sample's ash was weighted, added to 5ml of HCl with concentration 20% and filtered, then the volume was completed to 50ml by distilled water.

-The reagent was prepared by the following procedure, first 22.9g of Ammonia molybdate and 1.25g of Ammonia vandate were weighted and added to 250ml of concentrated HNO3, then the volume was completed to 1000ml.

-5ml of the sample solution was taken and added to 20ml of the reagent solution in volumetric flask, the volume was completed to 100ml. The spectrophotometric was adapted to the wavelength 420nm, then the concentration of the phosphorus P was determined as it described in the result(Syeres JK, Mackay AP, Brown MW,1986).

-The calculations was done by using the following equation:

$$\% \text{ phosphorus} = \frac{M\ P*\text{volume}*Mwt*100}{1000*\ Ws}$$

Where :

Mwt: Macular weight of phosphours.

M P: concentration of phosphours.

Ws: weight of sample

(2-10) Method of Nitrogen Estimation

-One gram of the sample was weighted and placed in kjeldahl flask, 0.7g of Copper sulphate, 15g K_2SO_4 were added. Then the flask was placed inclined position and it was heated gently until frothing ceases.

-The briskly was boiled until the solution became clear, and then the digestion was continued for 90 minutes.

-Then it was removed from the burner and cooled ,after that 150 ml of water was added and it transferred to 500ml volumetric flask, then it was cooled and diluted to the mark.

-25ml aliquot was transferred to distillation flask and 300ml of water was added 25ml of stander acid (0.1N HCL) was taken accurately in the receiving conical flask 2 drops of methyl red indicator was added ,enough water was added to cover the end of the condenser out let tubes.

- Few Zn granules were added to distillation flask to prevent bumping, the flask was tilted and 30ml of 45% NaOH because of those contents did not mix.

-The distillation flask was connected immediately to the distillation unit, and it was swirled to mix the content distillate, then it was distillated at moderately high heat till 150mlof distillate has been.

-The receiving flask was removed risen outlet tube into receiving flask with a small amount of distilled water.

-The excess standard acid in the distillate was titrated with 0.1 N NaOH ,then blank on reagent was determined by using same quantity of standard acid in the receiving flask (Mclean .E.O.1982.).

-The calculations was done by using the following equation:

$$\text{Percent of Nitrogen (N)\%} = \frac{(A-B) * N * Mwt * 100}{1000 * \text{Weight of sample}}$$

Percent of protein% = Percent of Nitrogen (N)* Dilution factor (df)

Where:

A : ml standard NaOH used in titrating blank

B: ml standard NaOH used in titrating sample

N: normality of standard NaOH

Mwt; Macular weight of Nitrogen(N)

df; Dilution factor =6.25

(2-11) Determination of Potassium (K) and Sodium (Na) Concentrations

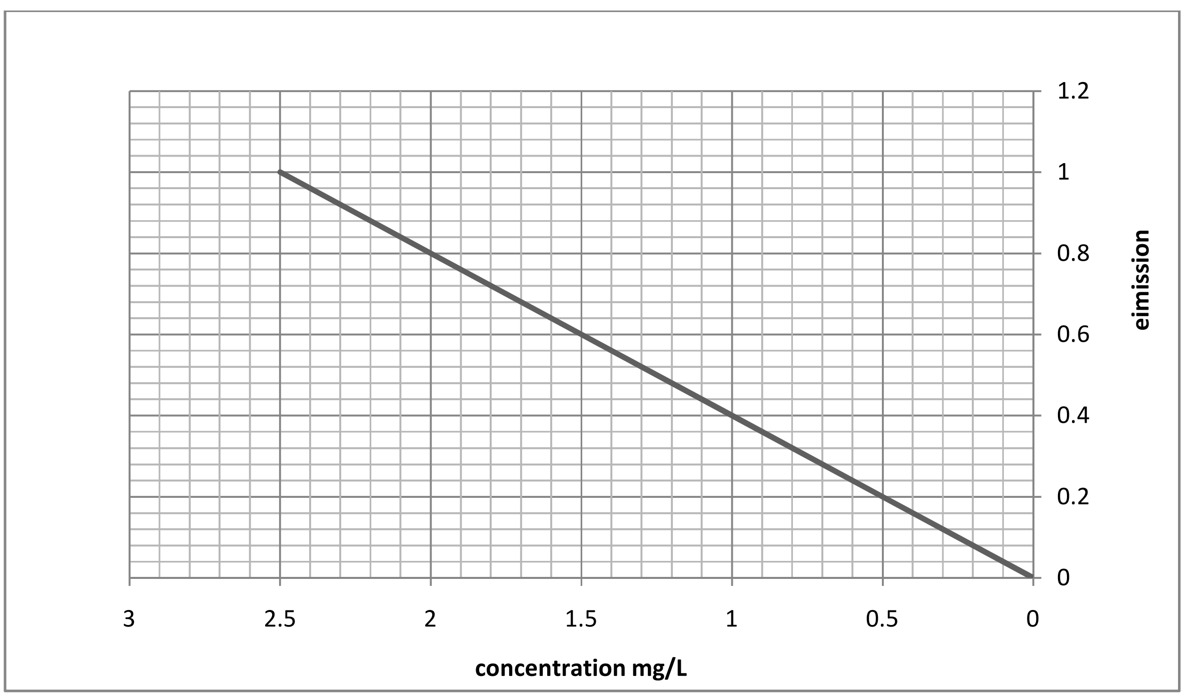
-The concentration of K and Na were estimated from the samples extract by using flame emission spectrometry .

-One gram of the sample was placed in 150 ml beaker, it was charred in on hot plate which had been ignited for one hour with muffle door propped open to allow free access of air.

-Then the cake was broke up with stirring rode, and then it was dissolved in 10ml of concentrated HCl.

-The residue was re dissolved in20ml of(2N) HCL, the it was boiled gently, and it was filtered through fast filter paper into 100ml volumetric flask, at last the paper and residue were washed thoroughly with deionized water.

-The concentration of elements was determined as it described in the result by using flame atomic emission spectrometry (Calibration curve using standard solution for elements).



Calibration curve: Emission of metal versus Concentration of metal(mg/L)

(2-12) Determination of trace metals concentration

The concentrations of copper (Cu), Cobalt (Co), Iron (Fe), Manganese (Mn) and Zinc (Zn) were estimated from samples extract using Atomic Absorption Spectrometry.

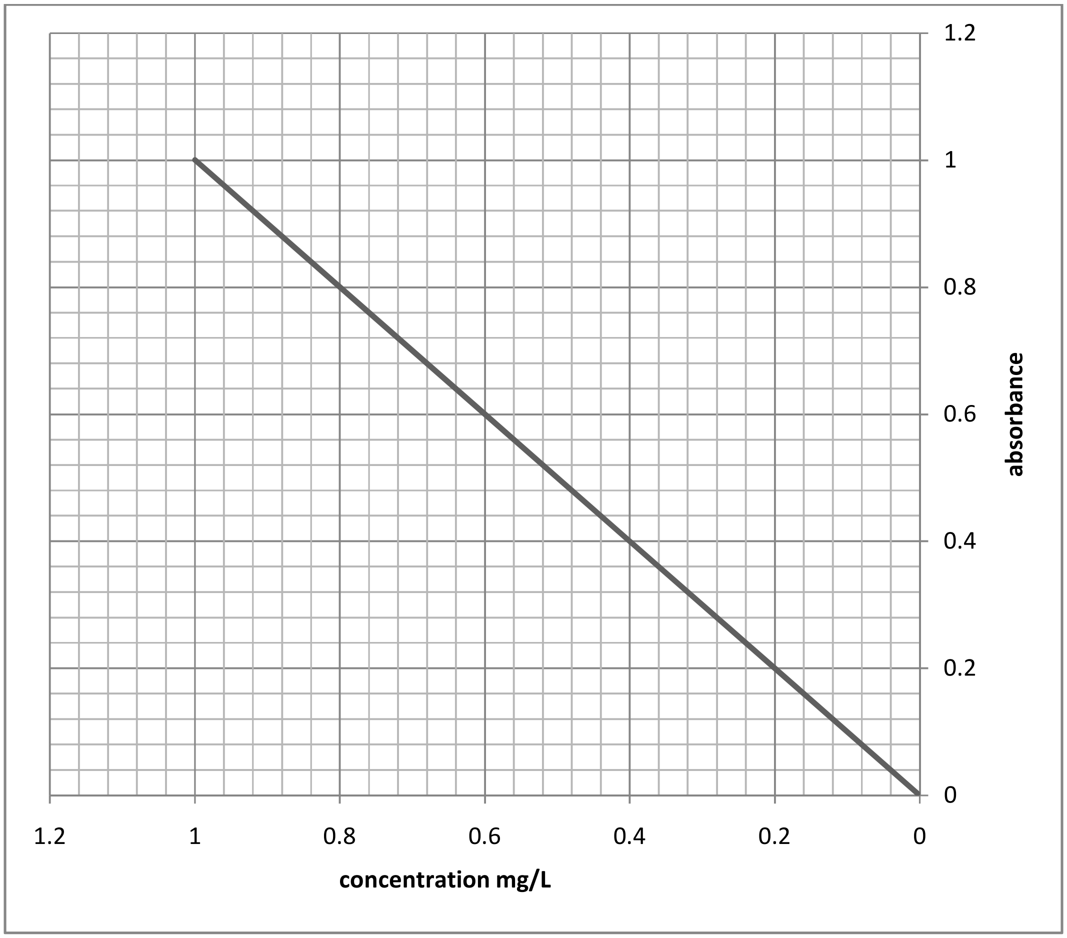
-One gram of the sample was placed in 150 ml beaker, it was charred in on hot plate which had been ignited for one hour with muffle door propped open to allow free access of air.

-Then the cake was broke up with stirring rode, and then it was dissolved in 10ml of concentrated HCl.

- After that it was boiled and evaporated nearly to dryness hot plate without baking.

-The residue was re dissolved in20ml of(2N) HCL, the it was boiled gently, and it was filtered through fast filter paper into 100ml volumetric flask, at last the paper and residue were washed thoroughly with deionized water.

-The concentration of element was determined as it described in the result by using atomic absorptions spectrometer(Calibration curve using standard solution for elements) (Perkin Elmer,1994).



Calibration curve : absorbance of metal versus Concentration of metal(mg/L)

Chapter (3)

Results and Discussion

The comparison of the concentration of metals in chicken manure and ration with that reported in the literature (Paar, Colacicco 1987) using flame emission and atomic absorbsion is shown in Tables 3-1and Table (3-2), respectively.

Table (3-1) flame emission spectrometry result of chicken manure and ration from kuku and shambat

Elements	Kuku ration	Kuku manure	Shambat ration	Shambat manure	Standard manure
Potassium (K)mg/L	0.018	.060	0.158	.044	0.023-0.051
Sodium (Na)mg/L	0.0026	0.0031	0.0032	٠.٠٠٣٤	-

The concentration of metals in chicken manure and ration is shown in Tables 3-2

Table (3-2) Atomic Absorption spectrometer result of chicken manure and ration from kuku and shambat

Elements	Kuku ration	Kuku manure	Shambat ration	Shambat manure	Standard manure
Iron (Fe)mg/L	0.0003	0.0013	0.0006	0.0001	-
Copper(Cu)mg/L	0.0002	0.0002	0.0009	0.0003	-
Cobalt(Co)mg/L	0.0001	0.0003	0.0002	0.0004	-
Manganese(Mn)mg/L	0.0003	0.0005	0.0002	0.0006	-
Zinc(Zn)mg/L	0.0002	٠.٠٠٠٤	٠.٠٠٠٢	٠.٠٠٠7	-

The comparison of The concentration of nitrogen, phosphorus, pH, EC, moisture content, and ash content results of chicken ration with that reported in the literature (Paar, Colacicco 1987) and manure from kuku and shambat farms is shown table 3-3.

Table 3-3 The concentration of nitrogen, phosphorus, pH, EC, moisture content, and ash content results of chicken ration and manure from kuku and shambat farms

compound	Kuku ration	Kuku manure	Shambat ration	Shambat manure	standard manure
Nitrogen content%	2.94	3.22	6.30	٣.٠٠	3-3.5
pH	5.96	7.15	4.99	6.00	6.2-7
EC dS/m	2.90	٢.٠١	5.01	2.80	6.2-6.8
Moisture content %	6.061	10.904	8.664	7.833	6-15%
Ash content%	7.726	٢١.١١٧	7.689	16.790	7.6-20%
Phosphorus content mg/L	0.0007	0.001	0.0008	0.002	0.0005-0.0051
Phosphorus content %	0.49	1.1	0.59	1.34	0.49-4.73

3-1 pH value

p of the ration and manure from the investigated farms was presented in figure (1).Forage from Kuku farm showed acidic pH (5.96) while the manure had alkaline pH (7.16). Samples from Shambat farm revealed acidic pH values in forage and manure. This could be attributed to the type of ration the farmers feed their poultry.

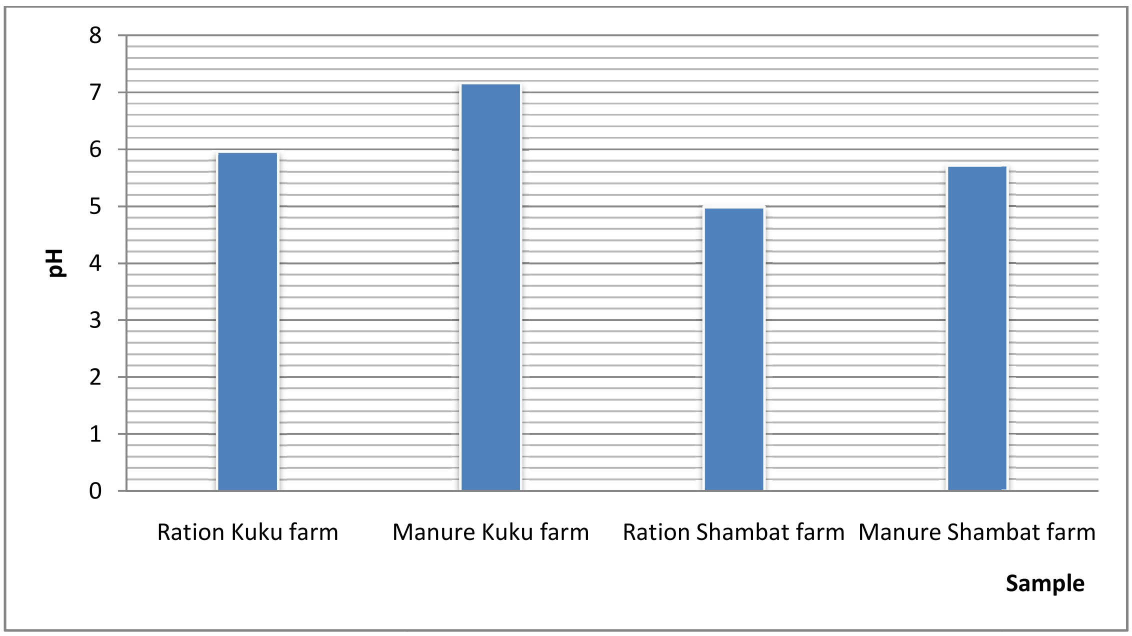


Figure (1): pH of ration and manure samples from different farms.

3-2 Electric conductivity (EC)

Samples from Kuku ration and manure showed EC values 2.9 and 2.01 dS/m, respectively, while Shambat samples had higher EC values, 5.01 dS/m for ration and 2.8 dS/m for manure (Figure 2), which were defined as saline and careful measure should be implemented in further application to soils as improvers.

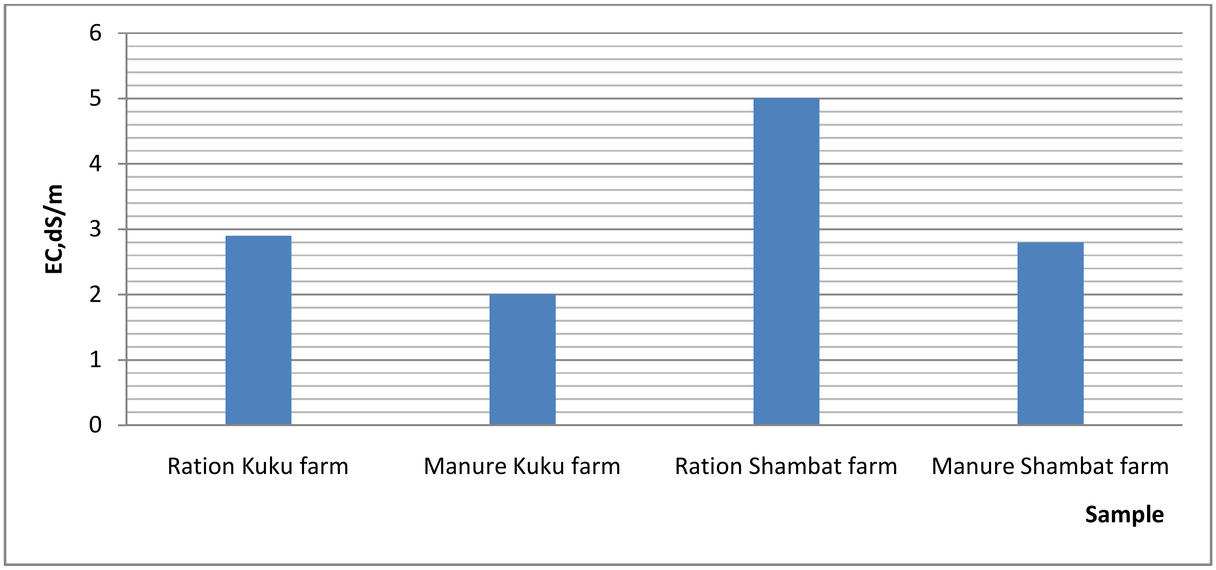


Figure (2): Electric conductivity (EC) of ration and manure samples from different farms, dS/m.

3-3 Moisture content

Figure 3 presents the moisture content of the samples analyzed. The highest value (10.9 %) was obtained in manure sample from Kuku farm-compared to 7.83 % in Shambat manure.

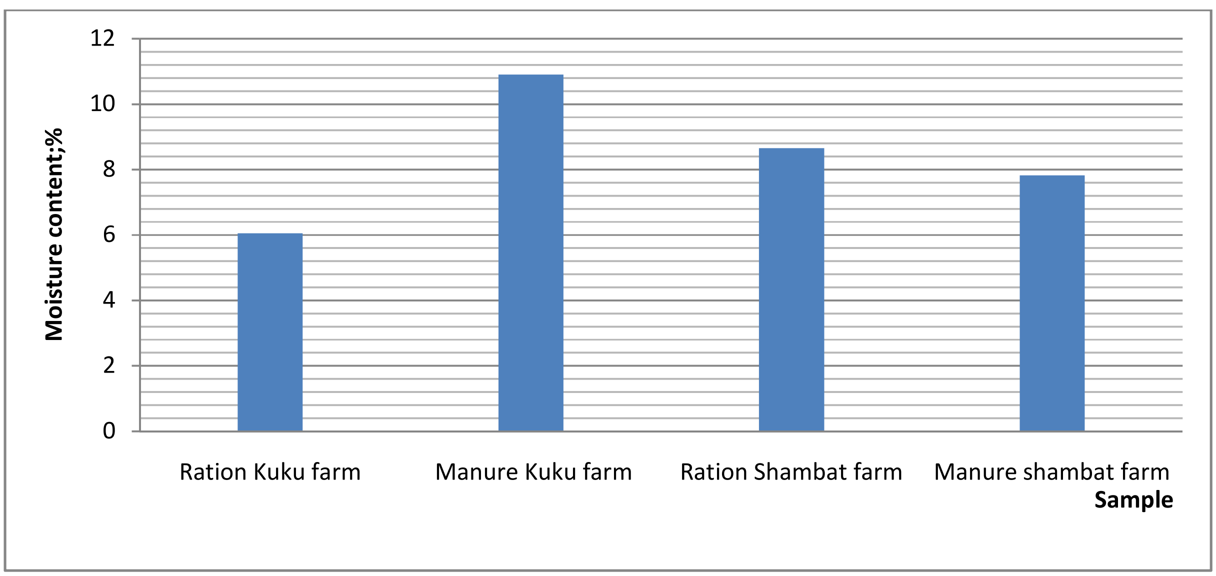


Figure (3): Moisture content of ration and manure samples from different farms, %.

3-4 Ash content

The ash content analysis results are shown in Figure (4). An increase in ash percentage was observed in manure samples compared to the ration ash percentage. The ash percentage in Kuku manure sample was 21.12 % and 7.73 % in Kuku ration sample. In Shambat manure sample the ash content was 16.79 % and 7.69 % in the Shambat ration. Ash content was found to be very low and also further amendment procedures should be followed for further use of manure as fertilizers.

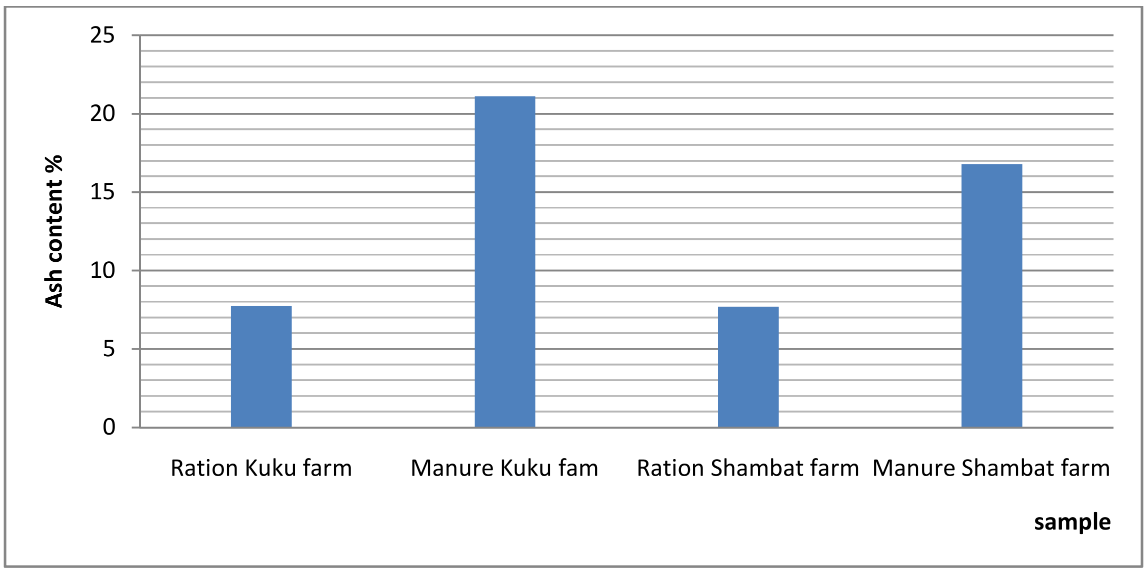


Figure (4): Ash content ration of ration and manure samples from different farms, %.

3-5 Phosphorus concentration

Figure 5 shows the concentration percentage of phosphorus in ration and manure- samples. An increase was obtained in manure samples concentration above the ration samples. In Kuku samples the ration sample had $0.7*10^{-3}$ mg/L phosphorus and $0.1*10^{-2}$ mg/L in manure sample. Shambat ration sample had $0.8*10^{-3}$ mg/L phosphorus and $0.2*10^{-2}$ mg/L in manure sample. The additives could be attributed to the poultry feed with higher phosphorus concentration for better quality of poultry products, increase the concentration of phosphorus in manure from the ration ratio for mixing the manure with feathers and chicken litter and ration that fall out of the eating utensils.

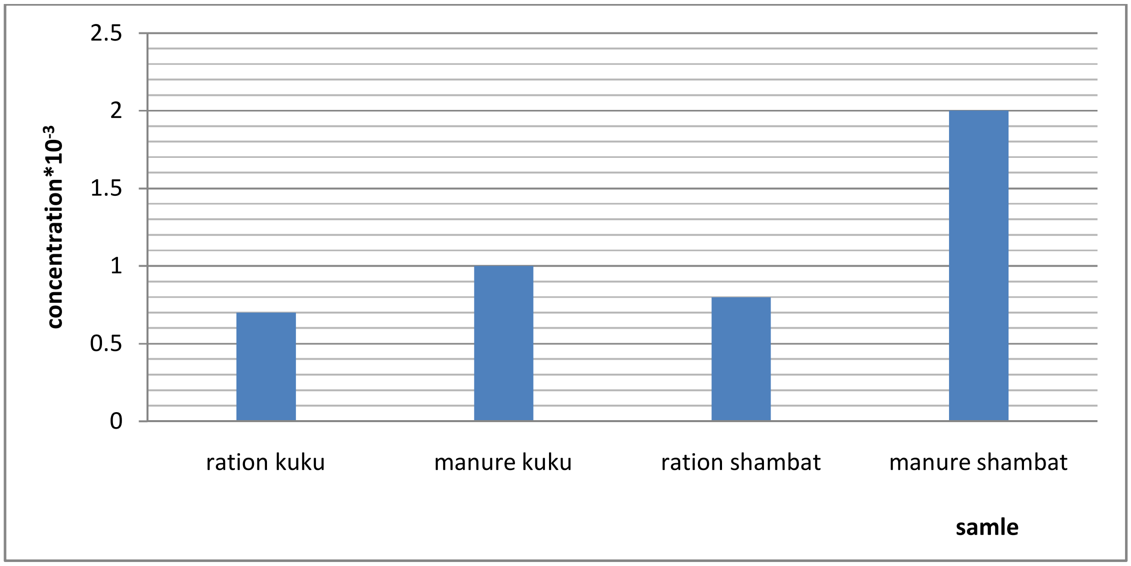


Figure (5): Phosphorus (P) mg/L concentration of ration and manure samples from different farms.

3-6 Nitrogen concentration

The concentration of Nitrogen from kuku farm is 2.94% in ration, while the manure is 3.22% (Figure 6) ,that within range of Nitrogen concentration standard manure samples, while manure from shambat is 3.0% and 6.3 in ration the different of ration is refer to chicken weight and age , within range of Nitrogen standard concentration samples.

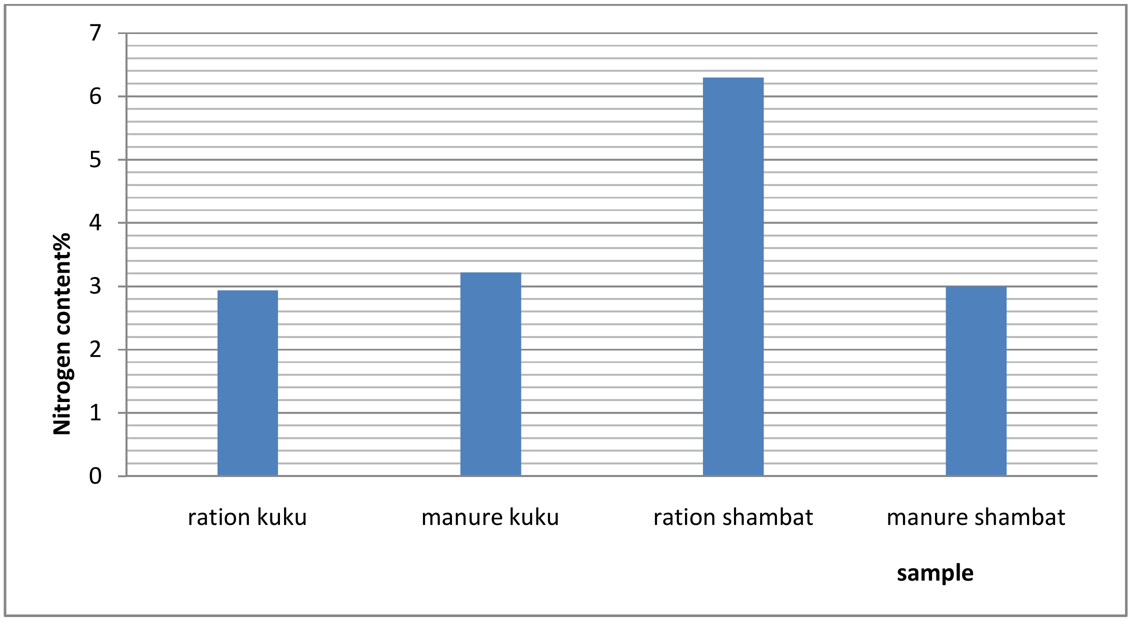


Figure (6): Nitrogen content of ration and manure samples from different farms , % .

3-7 Potassium concentration

Concentration of K in ration and manure samples are shown in Figure- (7). Also an increase in concentration was observed in K in manure samples above the ration K concentration. This could be explained by the application of K supplements to the ration to improve the quality of poultry products, increased rates of components in the manure from ration, due to the large amount of feed it eat chicken, compared with a small quantity of manure product so components ratios are higher in the manure from the ration proportion to the concentration of the components in ration.

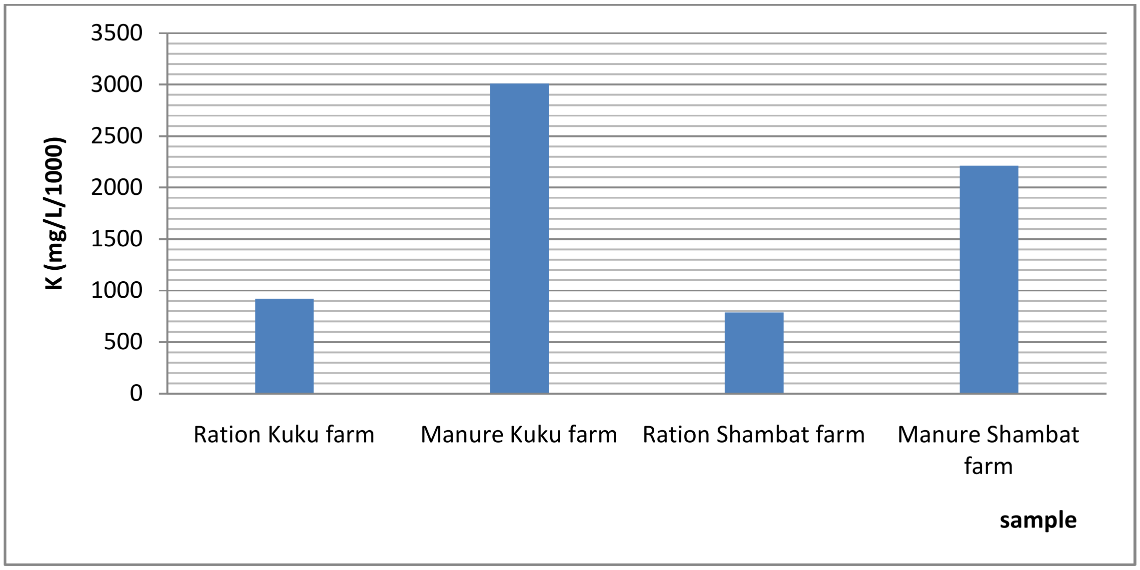


Figure (7): Potassium (K) concentration of ration and manure samples from different farms, mg/L.

3-8 Sodium concentration

Figure (7) presents the concentration of Na in ration and manure samples analyzed. No significant change was observed between Na-concentrations in forages and manure samples.

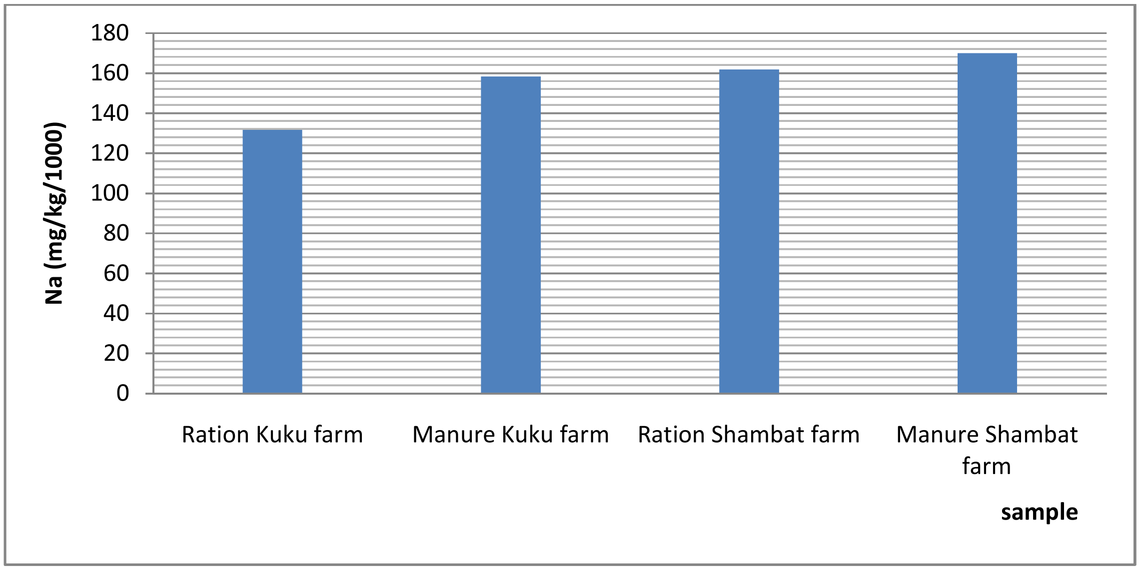


Figure (8): Sodium (Na) concentration of ration and manure samples from different farms, mg/L.

3-9 Concentration of trace metals

Figure (9), (10), (11), (12) and (13) show the concentrations of Cu, Co,- Fe , Mn and Zn in ration and ,manure samples from Kuku and Shambat farms. An increase in Cu concentration was observed in manure samples above the ration Cu concentration (Figure 9). Unlike concentration of Co in manure sample of Shambat that of Kuku did not show an increase (Figure 10).

Fe concentrations in manure samples showed an increase above the ration samples concentration (Figure 11). Similar results were obtained with Mn and Zn concentrations (Figure 12 & 13), we find an increase in manure components for ration for mixing the manure with feathers and chicken litter and ration that fall out of the eating utensils, the difference between the farms in the proportions of components due to differences in the type and age of chicken.

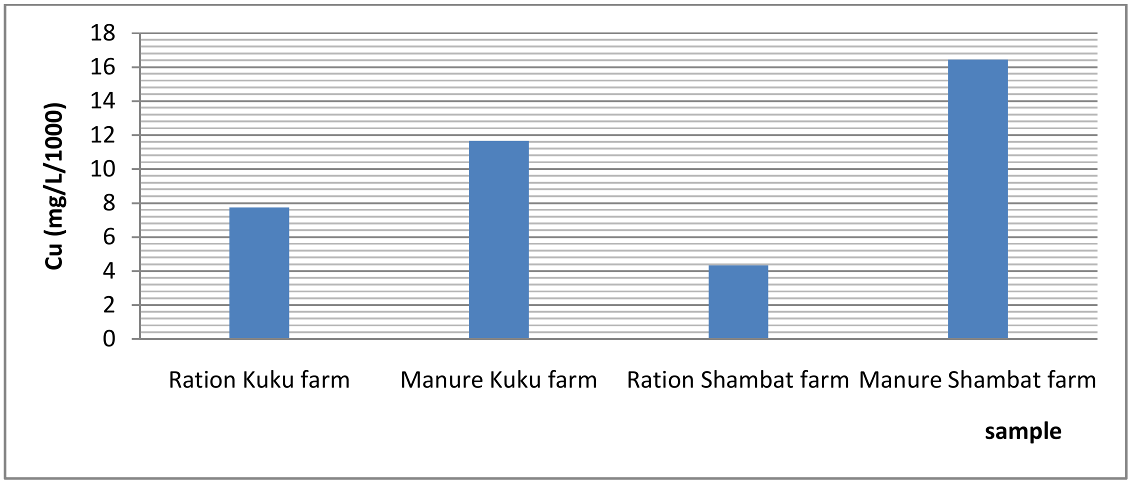


Figure (9): Copper (Cu) concentration of ration and manure samples from different farms, mg/L.

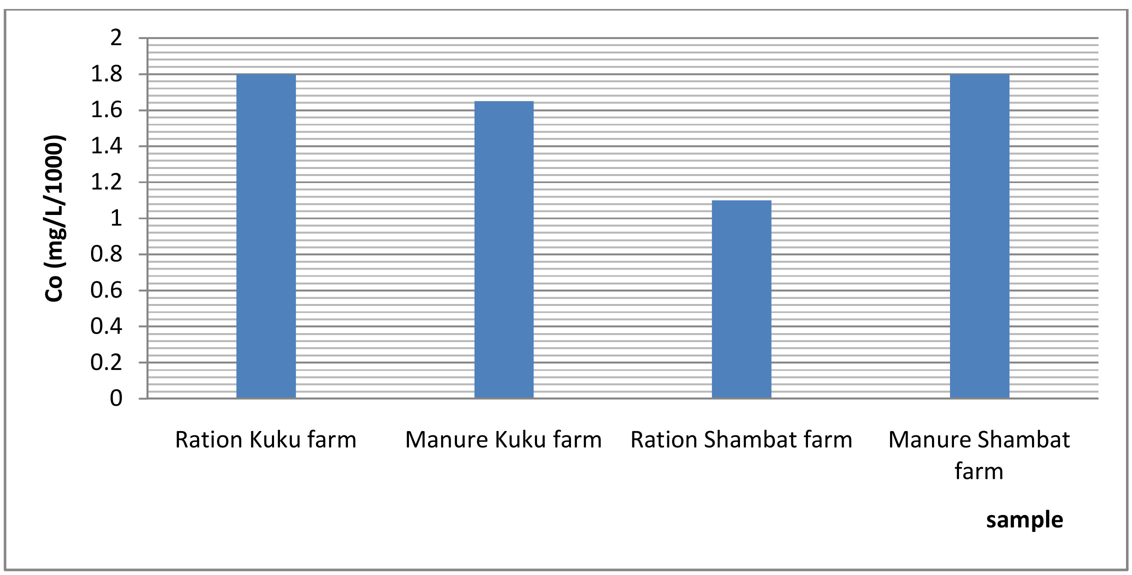


Figure (10): Cobalt (Co) concentration of ration and manure samples from different farms, mg/L.

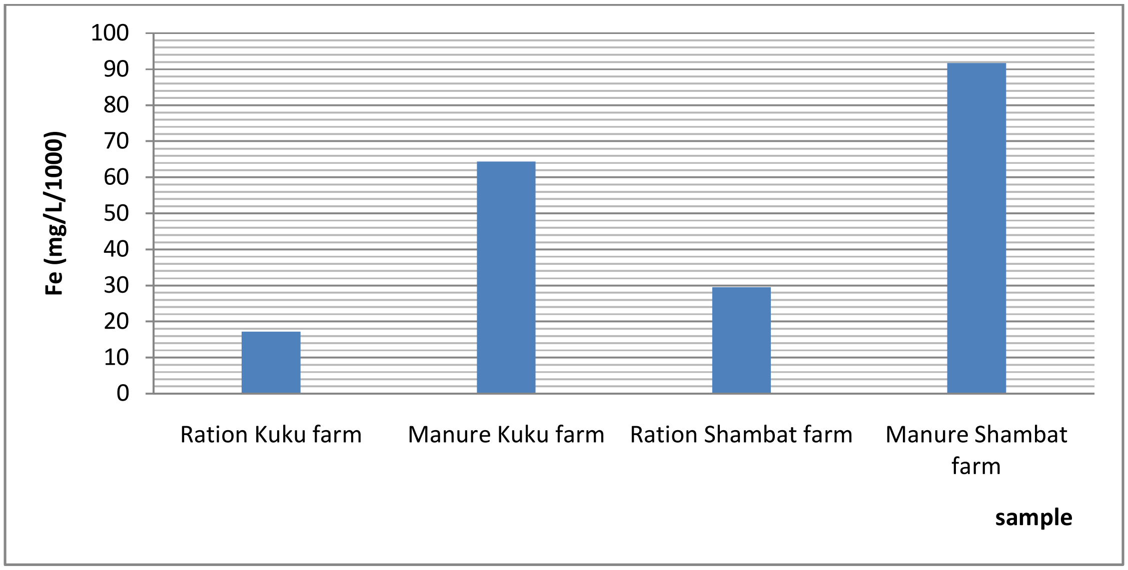


Figure (11): Iron (Fe) concentration of ration and manure samples from different farms, mg/L.

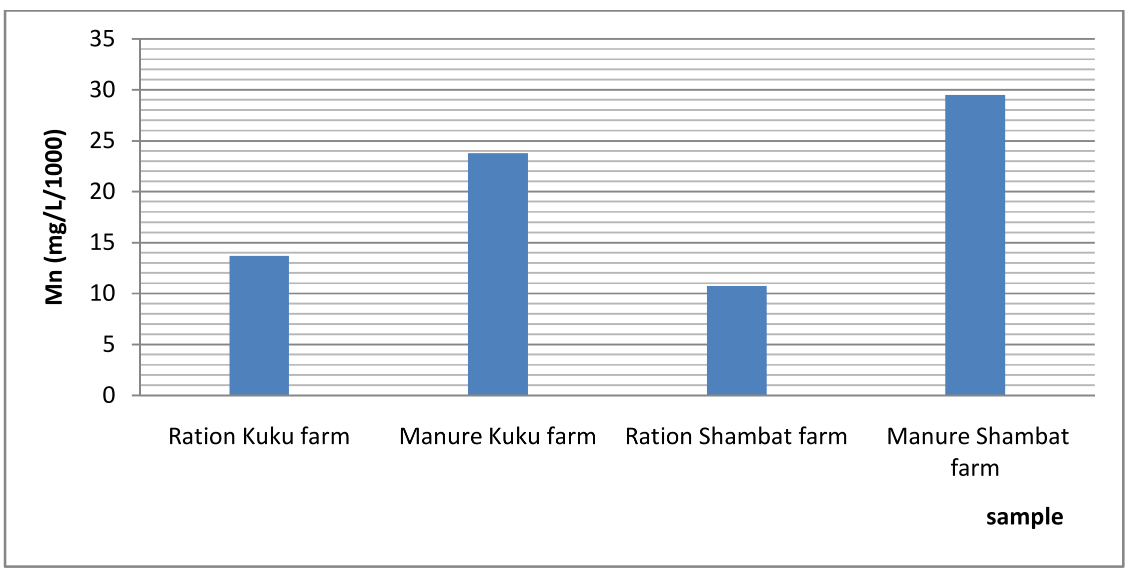


Figure (12): Manganese (Mn) concentration of ration and manure samples from different farms , mg/L .

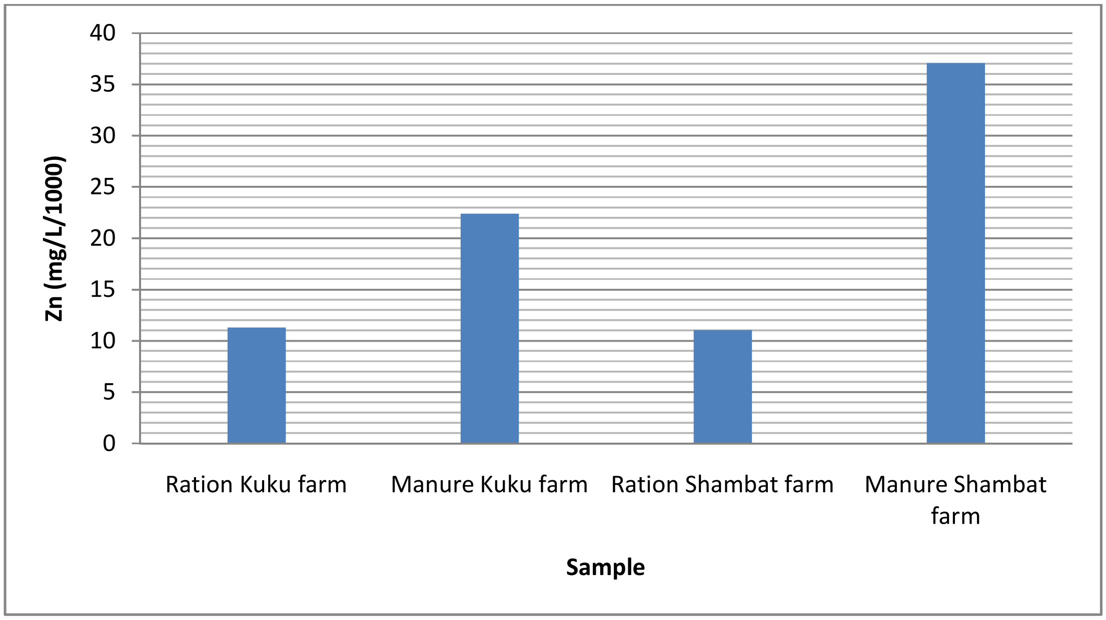


Figure (13): Zinc (Zn) concentration of ration and manure samples from different farms, mg/L.

3-10 Conclusion

The importance of poultry manure on the ground that it extends the necessary elements as it prevents the output of the use of chemical fertilizers, most of the world are unable to use organic fertilizers to prevent environmental pollution and, plus get new crops and the appropriate concentration of nutrients in fruits without having adverse effects on human health in the long run, so we recommend using chicken manure to fertilize farmland to produce vegetables and cereals.

In this study chicken rations and chicken manure from two poultry farms were sampled and analyzed to study the effect of the quality of rations feed to poultry on manure quality. Results of analysis revealed that the ration used in poultry farms affected manure quality and mainly for fertilization programs.

The importance of the use poultry manure for fertilization that it provides extends the necessary elements for agriculture and it prevents the use of chemical fertilizers, most of the world are unable to use organic fertilizers to prevent environmental pollution and, plus get new crops and the appropriate concentration of nutrients in fruits without having adverse effects on human health in the long run, so we recommend using chicken manure to fertilize farmland to produce vegetables and cereals.

In the case of the use manure from the farms must be configured in ration with standardized, it advised not to use chicken manure directly improves its use in the form of fertilizer ratio processor to fit sometime on some types of bacteria ,fungi and microorganisms. This is because chicken manure before its degradation leads to a lack of oxygen in soil and achentaq seated, as microorganisms multiply dramatically to attack the humus soil and the formation of toxic compounds affect plant growth and the spread of allenbmatoda and fungal infections and bacterial in soil that has been fertilized, fertilizer is degradable, and so the chicken manure hazard if used directly.

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