EFFECT OF CATTLE GRAZING ON SOIL
(A case study of Zango feedlot Tundun wada Kaduna)

By

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APPROVAL PAGE

This project has been read and approved by the under signed as having met he requirements for the award of post graduate Diploma in soil and water Engineering in the Department of Agricultural Engineering, Federal University of technology, Minna.

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DECLARATION

I here by declare that this Research project has been conducted solely by me under the guidance of Engr. (Mrs) Z.D Osunde of Department of Agricultural Engineering, Faculty of Engineering, Federal University of technology Minna.

I have neither copied some ones work nor has some one else Done it for me. Writers whose work has been referred to in this project has been acknowledged.

ABUBAKAR ABDULLAHI LIMAN

PGD/AGRIC. ENG./2002/2001/135

SIGNATURE

DATE

DEDICATION

This project is dedicated to my late parents, Alhaji Abdullahi Liman and Hajiya Hadiza Abdullahi Liman

"O my Lord, have mercy on them both".

ACKNOWLEDGEMENT

I hereby express my sincere gratitude to Almighty Allah who Bestowed on me the courage and disposition to make this Contribution to the existing literature in the field.

My sincere thanks and appreciation goes to Engr.(Mrs) Z.D Osunde(My project supervisor), who took her time and pain of guiding me through this research work by devoting much of her energy until it was completed. And Dr, D, Adgidzi, the Head of Department I am also thankful to all the entire staff of Agricultural Engineering Department especially Engr. B. Mohammed, DrE.S.A Ajisegir for their moral support. My extreme appreciation goes to my beloved wife Hauwa for her loving support and to allthe entire Abdullahi Liman Family. I pray, Almighty Allah bless each and everyone of them (Amin). Finally, iam grateful to my following friends:saidu Mohammed sani, umar Dansarki, Ismaila umar saidu, Muazu Abdullahi, Ibrahim Ndatsu, Maradu ,Babangida and Etsu for there moral support, Thank you all ,God bless.

ABSTRACT

The aim of the project is to find out weather animal grazing influence soil physical ,chemical and biological properties. A FEEDLOT had been chosen to collect soil samples like wise a careful selection of control site has been obtained, laboratory analysis was conducted on the acquired soil samples. From the samples collected at the feedlot, there has been increases in concentration of nutrient elements than the control samples. Exchange capacity of clay change by 15.8mg per100gms while that of organic matter changed by 730mg per 100mg. Hence animal waste has considerable effects on soil properties i.e. physical, chemical and biological properties of soil. Recommendation have been made to facilitate the management of the cattle waste.

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CHAPTER ONE

INTRODUCTION

INTRODUCTION:

Soil can be defined as a natural body which are formed by weathering and decomposition of rocks, it consist of three main parts; the chemical which is responsible with the nature and proportion, the physical is the part responsible for movement of water in the soil and the manner in which soil materials are built up to form the soil (body) while the biological part is responsible with activities of bacteria fungi (plant) and microbes animals) and the relationship of soil to natural vegetation. These represent the main significant features about soil in relation to business of farming (Agriculture).

Soil therefore, can be seen as a medium through which plant grow. In this aspect, the use of fertilizer is paramount in order to improve the nutrient condition of the soil, so as to obtain or boost a higher yield.

The fertilizer is divided into two main categories

a. Organic fertilizer (animal waste, manure, dead plant leaves)

b Inorganic fertilizer (processed elements from industry).

Waste can be described as a sludge result from human or animal excretion, which is beneficial as soil amendment and fertilizer. In modern agriculture fertilizer in which the cheap ingredients are nitrogen and phosphorus has been applied in increasing amount to replenish the soil nutrient. Animal waste is also used to promote such process, which (the process) reflect not only in agricultural out put but also increased run off of nitrogen and phosphorous not taken up by plant. The main difficulty associated with this waste is the entrophication of fresh water (Agricultural land nutrient concentration). But there is also the problem of nitrogen entering ground water where they may cause metabolic disorders in domestic animals and children. If used for drinking, including the human condition known as methaglobinemia,where the building action of the contaminants prevents the haemoglobin from taking up oxygen. The materials contain a high amount of soluble nutrients such as potassium. A permeable soil required in order that, thelarge volume of liquid will move into soil.

INTRODUCTION OF PROJECT TOPIC(Effect of Cattle grazing on soil):

Cattle grazing involve the rearing of cattle for meat production and these activities of animal grazing has influence on the soil physical, chemical and biological properties of cattle feedlot at Zango (Tudun wada), which is located in kaduna south local government area of kaduna state is an area of 7112, square metres. It lies between latitude 10 30' N to 11 21" W and longitude 7 26" E to 8 12" E. It is bordered by igabi local government area in the northwest and Kaduna North local government area in the southwest. The feedlot area is about 2.5 ha and it can accommodate about 700 to 1200 cows.

.3 AIMS AND OBJECTIVES

- To asses the effect of cattle grazing on the soil.
- To identify the problems associated with the cattle waste management.
- To find a suitable solution in he rent to the cattle waste application on the soil for future utilization.

1.4 SCOPE OF THE PROJECT:

The area of concentration shall only be within the feedlot taking into consideration other criteria like manpower, equipment, time factor and finances. Sequence of analysis was carried out in this project, which includes:

1. Chemical analysis
2. Collection of soil samples from different spot including the control area
3. Results compiled and compared to the standard measurement of inorganic fertilizer element ratio (all experimental work will be centered to the major plant nutrients NPK in cattle waste).
4. Conclusion and recommendations will be made at the end of the analysis

1.5 JUSTIFICATION:

This project was carried out because of the pollution effect on the people living around the feedlot area. And to know the weather to move the feedlot to a new site as a result of these effect.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION:

The traditional way of increasing organic matter in soil is to add Undecomposed raw materials in form of cattle waste. Waste application is an ancient practice in tropical Asia,related mostly to paddy cultivation. Evaluations of such practices have been carried out principally in India and Africa (Pedro, 1970). It was proved that an animal rate of 5.6 tons/ha of cattle waste increase yield as much as Nitrogen or phosphorous and the waste treatments increased soil organic carbon and organic Nitrogen slightly. On the other hand, control of soil spectrum, a similar study was conducted by Pedro, 1971 on ferralistic soil (Ox soil) in central Africa Republic in which corn and up land rice were grown in rotation for five years. The result indicates a slight superiority of animal rate of120-160kg/ha of N, P,O and k2O. The cattle waste application on soil increased soil organic carbon, organic nitrogen and exchangeable calcium thereby resulting in a significant PH increase. Apparently thru waste has considerable quantities of calcium (pedro, 1976)Samuel and Werner (1975), considered cattle waste as beneficial soil amendment and a fertilizer, which one half of the total nitrogen content is in organic form and is released slowly to crops when applied to the land. Also not all of the phosphorus is in available form. One question still not answered is the amount of heavy metals contained in the waste and whether this will cause undesirable accumulation in the soil. This may vary with the soil exchange capacity and other characteristics, yet it contains a high amount of soluble nutrients such as potassium.

Responses on crops have been similar to those obtained in chemical fertilizer. The main problem to over come is the idea that the waste may contain harmful bacteria.(or other living micro-organisms).

Margaret (1992), put forward that cattle waste is a primary source of increasing soil fertilizing or nutrients and also a garden source of fertilization. Organic gardeners have rediscovered the benefits of cattle waste as fertilizer, soil conditioner and compost ingredients. However, she recommends the best places for house gardeners to get cattle waste and feedlots and local stable. It was observed that the raw cattle waste contain highly soluble nitrogen compounds and ammonia which can burn plants root interfere with seed germination, at the same time increase the nitrogen, potassium, phosphorus and bacteria to the soil so as to enable plant growth and improve soil physical structure.

Raymond(1959), believe that the fertility of soil refer to its ability to provide essential elements including the ones that are needed in large quantities by plants (macro element) such as Nitrogen, Potassium, Phosphorus and Calcium. These essential elements under natural undisturbed condition are liberated by soil organism from the cattle waste and made available for plant use. Cooke (1982) believed that cattle waste improves the soil structure, they may do this directly through their action as bulky in compacted soils or indirectly when the waste products cements the soil particles together. These structural improvements create the amount of water useful to crops that soil can hold. They also improve aeration and drainage and encourage growth by providing enough pores of the right sizes preventing soil becoming too rigid, or completely water logged and devoid of air when wet. He further finds out that cattle waste were richer in all nutrient particularly in phosphorous, potassium and nitrogen was dropped least 7kgiha which was released in show process to soil depresses available to plant for the time. The conclusion was that, cattle waste makes only small contribution to soil fertility in the experiments in tropical countries like Ghana tested cattle waste under continuous cropping at 5 - 10 tones/heaters nearly always give better yields then inorganic fertilizers. cooke(1982) It was experimented by (Macmillan,1910),that cattle waste was applied to the soil in order to briefly supply nutrients to the soil to enable plants to make maximum growth or produce best crops, restore the fertility of an exhausted soil and enrich a naturally poor soil. It may contribute directly by supplying plant food or indirectly by:

(a) Reacting chemically or bacteriologic ally on substances already present in the soil but not a form capable of being absorbed by plant.

(b) improving the mechanical condition of the soil. This rendering it more penetrable to roots growing crops. Thus cattle waste contains all the essential elements of plantfoods. It also restores humus to the soil give cohesion to sandy and renders them more resistant to drought, it makes clay soil more porous and workable. A metric tone of average wet-rotted cattle is estimated to contain 45kg each of nitrogen and potash 2.7 – 3.2kg phosphoric acid.2 ½ metric tonesof such waste /ha/year may be considered a good dressing sufficient to maintain yield in the absence of fertilizer in case of most tropical soils waste should be applied just before the crop are planted. Buckman (1968), described cattle waste as organic fertilizer which ultimately finds its way back to the soil. Consisting of two components the slid and the liquid in about ratio 3:1 on the average a little more than 1.5 of nitrogen almost all of the phosphoric acid and about two fifth of potash and found in solid waste. It was assessed that the value of cattle waste in the soil not by organic matter it furnishesbutespecially by the quality of nitrogen that is supplied. The nitrogen released by microbial activities are used by higher plants it makes it possible for the maintenance of

higher soil or organic matter level. Thus even though the cattle waste no doubt has very considerable influence on the physical and biological properties of the soil. It must be considered particularly as a nitrogen fertilizer and to a lesser degree one of potash also. There are no doubt that majority of soils adequate dressing of cattle waste can maintain crop yields under continuous cultivation provided that a suitable rotation is followed. The rate and frequencies of application of waste required to maintain yield vary with the climate, soil crops grown and quality of the manure. It has been suggested by Webster (1958), that in East Africa, dressing of the order of one tone of cattle waste per acre per year is 2.5 - 3 tons/ha every 3 years or 5 tons for every 5 years to a rotation of 4 years cropping and years fallow. However, on some soils heavier dressings of cattle waste are likely to be needed in order to obtain
satisfactory yields or even to maintain fertility. For example, trails on poor sandy soils in Kenya's Coast province (Kenya Department of Agriculture, 1975) suggest that under conditions dressings of the order of 7.5 tons/ha of cattle waste per annum are needed to maintain yield and fertility at modest level under conditions cultivation. Similarly, in Northern Nigeria trials at Yandev showed that at least 5 tons/ha of cattle waste per annum were required to maintain yields over a period of nine years when applied to a rotation of yarns, sorghum and sesame, while experiment at Bida as much as 12.5 tons/ha/annum were

needed to maintain the fertility of land continuously cropped on a 3 year rotation. Most of the impact of cattle waste in the soil due to the nutrients it contains rather than to any special effect associated with the organic matter contents (Webster and wilson, 1980).

2.2 PHYSICAL AND CHEMICAL CHARACTERISTICS OF CATTLE WASTE

Freshly defecated faces generally contains 20 - 30% solid by weight (Faces one 70 - 80% water) urine is 3 - 4% solids. The solids of both urine and faces are classified as volatile, while 40 – 50% of total solids of urine are volatile. Fresh Manure, the combination of urine and faces typically 20 – 25% solids, with 85% of solids volatile waste solids can be classified as soluble material and suspended or desecrate particular material. Although cattle waste is not a high-grade fertilizer it contains significant quantifies of plant nutrients. Nitrogen (N), phosphorous (P205), potassium (K), calcium (ca) iron (Fe), Magnesium (mg), and Sulphur (S). Again since the rotation fed the cattle influences the waste composition, the value is only typical (Witzelet. al1966)

2.3 POLLUTIONAL CHARACTERISTICS OF CATTLE WASTE

Of equal or greater importance than the physical or chemical composition of Waste is its pollution nature. Thus their waste has sufficient nutrients and energy content. The standard measure of pollution strength of waste is the biochemical oxygen demand or BOD. An exhaustive of BOD of cattle waste was done by (Inuin 1969). Which was explained that total maximal BOD (at 38.3a) is 0.246 gm oxygen per gram of total solids and the standard fine day 20 C value is 0.11 g oxygen per farm of total of the waste solids. Basically the oxygen demand by weight is 24.6 and 11.2% of the waste solids. In practical terms one day's waste from 1,000 Ib steer will pollute and consume all the oxygen in 96,000 litre of water. It is thus important control parameter for feedlot waste management in the future. Feed lot waste unless properly managed can be seen environmental pollution and because it can breed media for flies and can cause serious odour and dust problems. Waste has been called a direct disease and public health pollutants. Admittedly, Q-fever, lepto spirosis and tuberculosis diseases have been cause from animals and perhaps from their waste but incidence in infestesimally small. Irwin (1968) worked out regulatory or control measures to correct poorly managed operations or conditions that public seem to associate with confined cattle operations. Many times such conditions are not present or at least are minimized are well- managed feedlots. Available technology should provide design and operated procedures to minimize nuisance conditions, allowing a feedlot remains competitive even though population pressure develops nearby. Regulations affecting the location of feedlot are formed at several levels of government. As concern over environmental quality increases. More regulations appears, such regulations breakdown into 3 general divisions: water quality is concern of several agencies and general standard have been established, water sources and unless within a state may be subjected to even greater restrictions by state or regional agencies than imposed at the Federal level. The basic responsibility of air pollution control region involving more than one state. Air pollutant of concern to feed lots are particular matter concerns in Manitoba are focused on the highly soluble NO3, not with standing the afore mentioned reference to immediate transport of Nutrients with run off water before their diffusion in the soil. With respect for surface waters quality, the direct and indirect effects of manure management on aquatic life forms and recreation impose specific sets of chemical and biological quality limits. Environment Canada (CCREM,1987) has established that water concentrations exceeding 1.2(mg/l or 1 b per 100,000 gals) of ammonium nitrogen NH4 40ppm of nitrogen in the form of N would hinder aquatic wildlife potential. Beck (1997) indicates that less than 0.05ppm of P should be present in surface waters to avoid entrophication, via algae proliferation.

2.4 ODOURS FROM LIVESTOCK OPERATION POTENTIAL SOURCE OF NUISANCE

Quantitative description of odours is a task yet to be accomplished, At the present time there is consensus on the fact that "odours" defined as a human response is the compounded result of 150 different gabs associated with manure decomposition and animal metabolic activities of the gabs studied to date, methane (CH4), ammonia (NH3),hydrogen sulphide (H_2S) and mercaptan (complex sulphurous compounds) one amongst those most commonly found around the various phases of manure management systems. In short odours are evolved during the decomposition. In the case of intensive live stock operations legislators have experienced great difficulties in developing regulations encompassing easily quantifiable environment state indicators and the qualitative issues of odours. Many environmental jurisdictions in North America and Canada have developed specific regulatory tools to directly or indirectly deal with the risk of chemical contamination {mainly Nitrogen (N) phosphorus (P)} and organic matter of facial origin associates with manure. For example the province of Quebec has adopted strict manure management planning regulations to prevent risks of phosphorus leaching as well as set backs from all water bodies direct run off (MFF, 1997). In the case of dours, the acuteness of the "problem is the result of the synergetic action of some 150 to 200 simple and complex gases arising from the decomposition of manna, hence complicating the measurement of an odour indicator. Many environmental jurisdictions have attempted at indirectly regulating the "Odour issue" by establishing mandatory set backs from residences neighbouring intensive live stock facilities (e.g. North Caroline a bill 1159, enacted in 1993) as well as for land application of animal manure (MFF, 1997).At the present time in Manitoba, the live stock waste regulation (L WR, 1994; revised in 1998 addresses the issue of measurable chemical and organic Contamination from animal manure. The issue of odour is treated as a mandatory form stewardship consideration. The form practices protection board (FPP A 1992) acts upon complaints filled against live stock operation using practices at the origin of nuisance odours from livestock facilities or Manure Management practices. The farm practices protection board essentially assesses a producer's practice with respect to his compliance with the form practices guidelines for Hog producers in Manitoba (Manitoba Agriculture and food, 1995; or for Y Beef, dairy, etc) which, among other manure management considerations, presents recommendations for set backs of facilities or land application from neighbours. Noteworthy to mention here, this process was recently imparted stronger legal reach by allowing the board to file compliance orders to court when issued to fail producers (FPP A, 1997). Before addressing the issue of environmental impact of livestock manure management, these impacts need to be firstly defined. These impacts will be treated in

two categories here, those affecting water quality and the specific case of odours.

2.5 WATER QUALITY IMPACTS

The main potential contaminants associated with animal manure (Beck, 1997) are the same and those, which would be attributable to general crop fertilization, principally N and P. In addition those organic matter as well as bacteria typical of any faecal matter can

be a concern to surface water bodies. Livestock manure also present sometimes notable quantities of nonessential or micro-nutrients (Sulphur, Calcium, Magnesium, etc) which are usually not treated as a direct environment threat most typically, hog manure would present three plant nutrients in the proportions shown in table 1.0

Table 1.0 Typical nutrient content of liquid manure in earthen manure storage structures from hog production facilities, as sampled in 1996 (source: Norwest Labs, 204-545 University Cr. Winnipeg, MB R3T 5S6).

	Total Nitrogen	NH4-N	Organic Nitrogen	P	K	Na	Electrical Conductivity	Dry Matter Conten
	1b/1000 gal						2.1.1.1.1.Ms/cm	%
Mean Content	27	19	7	8	13	5	15	4
Minimum	7	5	0.3	0.3	3	0.8	4	0.3
Maximum	68	52	29	51	32	15	29	13

While Norwest Lab's report present extreme values for each individual parameters, these two values were arbitrarily interchanged here to reflect the relationship better dry matter content and nutrient value of liquid manure, only the mean values should be used to approximate liquid manure nutrient value in a storage structure after thorough mixing. The water contaminants transport processes involved with water pollution risks are associated normal water hydrology on agricultural land, normally run off and infiltration, when precipitation exceeds water infiltration rate in the soil, conditions favorable to flooding or else run off develop provided that a field slope is present. A fraction of the water soluble nitrate ($N0_3$), P in various forms and organic matter from manure is likely to be carried with run off water when left exposed at the surface during heavy rainfall or snow melt situations. However, the highly soluble nature the same plant nutrients found in manure also implies that they readily diffuse into the soil as soluble as in contact with soil water or with rain infiltration in situations where little run off develops. Further, when cumulative precipitation following application of any crop fertilizer exceeds the one of plant up take and total evaporation, the excess rainfall water volume will eventually make its way to ground water, loaded with some concentration of unused and still soluble plant nutrients. This last consideration require additional interpretation for the case of P while the up to 50 % of the total P in liquid manure may be soluble (Ewanek 1997), it is rather quickly" bonded " to claim associations in the soil (Brady, 1978), hence becoming almost unavailable for leaching. This is why much of the dusts and odour standard acceptable levels for these are being defined in many geographic areas. Regulation for the often nuisance aspect are less define. Most often these pressures comes from nearby populations by way of petitions or overtures to local agencies, such as country health agencies. Sound hand use placing with proper attention to zoning, agricultural uses could be aid in separating people and animals surrounding feedlots by crop land as a buffer from people should reduce complaints and provide an area of waste utilization. It was seen that a lot of researches was done on cattle waste in relation to soil, which, indicate that so many factors will influence the degree at which water-retaining power increased its content of nutrient compounds makes an almost permanent addition to fertility of the soil, which by its continuous use is considerably increased It also provides a source of energy for beneficial microorganisms in the vicinity of the Plant roots either by reason of its own composition or by some action

2.6 IMPORTANCE OF ANIMAL WASTE

Experimental work has invariably shown that any increase in yield of farm crops can be accounted solely by the amount of waste nutrients it contains. Animal waste exerts a profound influence on the tilt of the soil. Whether it be light or heavy soil. It opens heavy soils by a mechanical loosening effect. It increased pore space and stabilizes the soil crumbs. Improve drainage and ventilation thus favoring the activity of microorganisms. Light soil cohere through the presence of colloidal humus matter. The pore space and the permeability are reduced and on the soil as yet not under stood. It makes vailable major nutrient elements to over come conditions of deficiency affecting the growing crop. The use of cattle waste is probably the best means of maintaining fertility for it migrate to great extent the effect of seasonal variation in weather and in any one year, it gives the most equable effect. Also the responses on crops have been similar to those Obtained with chemical fertilizer. However, many smaller cities or municipalities are returning to cattle waste for many years. One problem to over come is the idea that waste may contain harmful bacteria. This after it (cattle waste) has gone through sewage digestion system this has not been a problem.

CHAPTER THREE

3.0 MATERIALS AND METHOD

3.1 MATERIALS

(A) For soil sampling

(i) Core cutter

(ii) Hammer

(iii) Tape (iv) Tag

(iv) Polythene bags

(B) For chemical analysis

(i) Platinum crucible

(ii) Bunsen burner

(iii) Blast furnace

(iv) Desiccators

(v) Filter

(vi) Cathode lamp

(vi) Tolodo P_H meter

3.2 METHOD

Series of soil sample were taken using disturbed bag method in order to obtain the required soil sample. Subsequently, chemical analysis was conducted on the soil sample in the laboratory using different methods of test to analyze nutrient elements according to their respective order of determination.

3.3 SOIL SAMPLING

Soil horizons are the bodies from which samples are normally taken. The size of the sample depends upon its purpose. It must be large enough to include the features to be examined and longer enough to adequately represent item.

Three samples are taken from individual soil horizons for Laboratory studies, disturbed samples for particle size, chemical and other analysis, undisturbed core samples for micro morphological studies.

As for this research, which is basically on chemical analysis on macro and micro nutrients present in the soil, particularly the plant major nutrients (NPK), the choice of disturbed bag sampling is appropriate. The equipment used in sampling the soil is core-cutter, which is 12cm0 and 20cm0 eight in size.

1. Suitable areas were located and labeled as A, B, C, to represent the real sample with a measure distance of 100 meters apart in order to acquire the soil characteristics of the area that is being considered. The fourth area, which is labeled as D to represent the control sample and about 250 meters away from the field of sampling.

2. Hammer is used to force the core-cutter, which is rounded, hollow, and deep inside the soil to reach a desired depth and obtain the required amount of soil.

3. Samples were collected from the depth of 0-15, 16-30cm from the pits and labeled as follows AI, A2, BI, B2, Ct, C2 and control sample DI, ~ respectively.

4. Each sample was collected in a black-tagged polythene bag and was tightened loosely to allow microbial activities.

5. The samples were later taken to the laboratory for chemical analysis.

3.4 STEPWISE DECOMPOSITION OF SOIL SAMPLE FOR METALS DETERMINATION BY ABSORPTION SPECTROMETRE.

(i) 1 gram of soil sample was collected

(ii) 4 grams of $NaCo_3$ (analydrom) (flux) was collected.

(iii) The substances were mixed properly in platinum crucible.

(iv) It was covered with about 1 gram of flux.

(v) The crucible was covered and placed on Bunsen burner.

(vi) Increasing of flame and occasional checking of the sample and flux were effected in order to see whether the mixture has melted.

(vii) The mixture was transferred to blast furnace at 1200° for complete fusion.

(ix) Sample was removed and cooled in desiccators.

(x) 5ml of concentrated Hcl was added into crucible with cover only slightly raised to avoid loss by effervescence.

(xi) After completion of effervescence, the sample was steam bathed.

(xii) Water was occasionally added until full dissolution of flux is observed.

(xiii) Keep overnight.

(xiii) Filtration of insoluble residue was conducted.

(xiv) The mixture was made to final volume of 100ml for sample intended for sodium analysis, alternative flux is used (potassium carbonate).

3.5 METALS ELEMENT ANALYSIS

(Sodium, Potassium, Calcium).

(i) 19 of sample digested was used and made final volume of 100ml.

(ii) Standard for individual metal was prepared from 1000ppm stock solution of each for Na, K, Ca.

Working standards of 100ppm, 50ppm, 25ppm and 12.5ppm were prepared by serially diluting stock solution.

3.5.1 INSTRUMENTATION

The Phillips Pu 9110X atomic absorption spectrometer was used for analysis mode: flame emission. The highest concentration standard was used to set the reading at 100. Subsequent readings for the other standards were noted. The prepared samples then get into the system and the corresponding reading for each sample noted. A plot of concentration stands against the readings (absorbance) gives a straight-line curve. Each sample reading was extrapolated in the graph to obtain the corresponding concentration. Alternatively, the slope of the curve could be worked out and multiplied by the readings to get the corresponding concentration.

A graph of the absorbance against the concentration of 1 in the samples determined by extrapolation from the curve obtained. Similarly, the other metals were determined by using their corresponding lamps and wavelength.

3.5.2 DETERMINATION OF NITRATE

(i) Using Phillips Pu 9600 nitrates can be determined i.e. Pu 9600 UV /visible spectro photrates by the PYE Unice methods, booklet method of 1979.

(ii) 19 sample of extracted with distilled water. The filtrate is again filtered by suction with 0.45um membrine filter to obtain clear sample. Nitrate standards and samples were noted at 210nm and 275nm; the concentration of nitrate was extracted as in atomic absorption method above.

3.5.3 PH DETERMINATION

(i) 10% solution of the sample was used for PH measurement into the beaker.

(ii) Distilled water was added to calcium chloride and then kept it for a period of 35 minutes.

(iii) Then the stirred soil sample was allowed to settle for 30 minutes.

(iv) The soil sample was placed on the table and lower the pH meter (Tolodo) electrode into the soil sample. Signal will be clearly seen and read on the PH meter scale.

3.6 DETERMINATION OF IRON MAGNESIUM AND COPPER AND ZINC

The atomic absorption mode was used and hollow cathode lamps were selected. Standard were prepared for stock solution of 100 ppr of each metal in the following order:

TABLE 3.1 DETERMINATION OF METAL (ELEMENT) USING WAVE LENGTH

1 ELEMENT	WORKING STANDARD	WAVE LENGTH
1.1 Fe	2.5ppm 5.00ppm 10ppm	248.3
1.2 Mg	0.1ppm 0.2ppm 0.4ppm	285.2
1.3 Cu	2ppm 4ppm 8.0ppm	324.7
Za	0.4ppm 0.8ppm 1.6ppm	213.9
Mn	1ppm 2ppm 4ppm	279.5

3.7 ANALYSIS

To determine Fe, the hollow cathode lamp is selected and a wavelength of248.3 programmed. When the equipment is optimized, a set of readings is obtained for the standard prepared above, then the samples are individually fed and their reading noted.

3.8 DETERMINATION OF CHLORINE,AMMONIA AND ORGANIC MATTER

1. **CHLORINE**

10g of air-dried soil are extracted from 100rnl of water. Allow the mixture for fifteen to twenty hours for leaching to be completed. An eliquet portion is taken for analysis. Later chloride is quantified by titration with filter nitrate, which is (Sample Blank) ml $AgNo_{3Ml}$ of sample

2. **AMMONIA**

The weight sample is placed in the distillation flask with splash bulb and the material decomposed with ammonia free caustic solution. The ammonia is distilled into an excess of standard acid or saturated solution of toxic acid and ammonia determined by titration of excess acid.

3. **ORGANIC MATTER**

A weighed sample is subjected to 550°C heat for 3 hours. The difference in weight is calculated as organic matter containing that sample which is = weight of sample - weight of ignited sample x 100

3.9 DETERMINATION OF PHOSPHORUS

(i) Use the digested sample for analysis

(ii) Method: Molybdovanado phosphate spectro photometric method.

A. **PREPARATION OF STANDARDS**

1. From stock solution of 1000ppm phosphorus

2. Prepare series of standard equivalent to 2ppm – (10ppm) in 100ml flasks.

3. Thus pipette 0.2, 0.4, 0.5,0.6, 0.8, 1.0ml/g and above stock into various 100ml flasks.

4. Add 20ml of vanadomolybdute reagent into each flask and make up to 100ml with water.

5. Stand for ten minutes

6. Read absorbance at 400mm 7. Plot calibration curve

A sample was prepared in similar manner as above, taking 1 ml of digested sample. In 100ml flask plus 20ml molydovanadute reagent, it was made up to 100ml, it was allowed ten minutes. The absorbance was read at 400mm and extrapolated on curve to estimate P205 concentration

TABLE 4.2 RESULT OF THE CHEMICAL ANALYSIS OF THE SOIL FOR MICRO ELEMENTS (NUTRIENTS)

6.0 SAMPLE	A_1	A_2	B_1	B_2	C_1	C_2	D_1	D_2
IRON PP	125	125	125	125	25	32	125	125
COPPER PPM	0.1	0.31	0.15	0.15	0.08	0.07	0.185	0.168
ZINC PPM.	0.33	0.27	0.33	0.28	0.13	0.09	0.43	0.40
CHLORIDE PPM	33	37	34	38	45	50	10.2	13
MANGANESE PPM	1.4	1.02	0.57	0.51	0.57	0.53	1.14	1.06

TABLE 4.3 RESULT OF DETERMINATION OF LIQUID LIMIT AND PLASTIC LIMIT ON SOIL SAMPLES OF THE FEEDLOT AREA

7.0 SAMPLE	A	A1	A2	B1	B2		C1	C2
TYPE OF TEST	LL	LL	LL	LL	LL		PL	PL
CONTAINER NO	22	32	29	7	31		81	89
NO OF BLOW	48	35	27	18	11		-	-
Wt of wet soil +container wt+wc(g)	20.7	27.6	62.39	21.5	24.9		11	10.9
Wt of dry soil +container wd+wc(g)	17.1	18.3	19.2	17.0	18.8		10.6	10.3
Wt of Container wc (g)	8.6	8.8	9.4	8.6	8.8		9.6	8.7
Wt of dry soil Wd(g)	8.5	9.5	9.8	8.4	10.0		1.0	0.6
Wt of moisture Wm(g)	3.6	4.3	4.7	4.5	6.1		0.4	0.6

Moisture Content 100(wm\wd) (%)	42.4	45.3	48.0	53.6	61.0		40.0	37.5

Liquid Limit = LL = 48.8%

Plastic Limit = PL = 38.8%

Plasticity Index = PI = 10%

TABLE 4.4 RESULT OF DETERMMINATION OF LIQUID LIMIT AND PLASTIC LIMIT OF THE SOIL OF CONTROL AREA

7.1SAMPLE	A	A1	A2	B1	B2		C1	C2
TYPE OF TEST	LL	LL	LL	LL	LL		PL	PL
CONTAINER NO	10	11	12	13	14		16	18
NO OF BLOW	11	18	28	39	42		45	48
Wt. of wet soil + Container Wt + Wc (g)	83.7	78.3	73.2	91.2	84.7		84.4	84.1
Wt of dry soil + container wd + wc (g)	79.1	74.4	69.3	87.5	83.0		82.7	86.6
Wt of container Wc (g)	69.4	65.9	60.2	78.4	77.5		77.0	77.5
Wt of dry soil Wd (g)	9.7	8.6	9.1	9.1	5.5		5.7	5.1
Wt of Moisture wm (g)	4.6	3.9	3.9	3.7	1.7		1.7	1.5
Moisture Content 100(wm\wd) (%)	47.4	45.3	42.9	40.7	30.9		29.8	29.4

Liquid Limit = LL = 43.6 %

Plastic Limit = PL = 30%

Plasticity Index = 13.6%

TABLE 4.5 RESULT OF THE DETERMINATION OF MOISTURE CONTENT OF SOIL AT THE FEEDLOT AREA

7.2 SAMPLE	A	A1	A2	A3
CONTAINER NO	32	20	10	77
Wt of wet soil + container(g)	65.00	50.5	52.25	56.01
Wt. of dry soil + container(g)	60.0	48.0	49.25	52.00
Wt. of container (g)	9.4	8.6	8.7	8.7
Wt. of dry soil Wd (g)	50.6	39.4	40.55	43.3
Wt. of moisture Wm (g)	5.0	2.5	3.0	4.01
Moisture Content 100(wm\wd)%	9.9	6.3	7.3	9.2

TABLE 4.6 RESULT OF THE DETERMINATION OF MOISTURE CONTENT OF SOIL AT THE CONTROL AREA

7.3Sample	B	B1	B2	B3
Container No	32	20	10	77
Wt. of wet soil + container(g)	58.5	50.25	46.0	49.0
Wt. of dry soil + container(g)	54.8	48.6	42.5	46.0
Wt. of container (g)	9.4	8.6	8.7	8.7
Wt. of dry soil Wd (g)	45.4	40.0	34.0	37.3
Wt. of moisture Wm(g)	3.7	1.65	3.5	3.0
Moisture Content 100(wm\wd)%	8.2	4.0	10.0	8.0

properties of the soil and at the same time in the process of plant crop growth while the control area which is not influenced by cattle waste has more or less small content of the nutrient elements which practically could not withstand continuous cultivation of agricultural plant crops.

4.4 MICRO NUTRIENTS

The results of chemical analysis indicates that the iron content (Fe) in the soil has almost the same capacity or concentration both from topsoil down profile and from real to control area except one sample among the real area which shows deviation from the trend, which is attributed to technical error. The concentration of the rest nutrient elements indicates that some have higher concentration in the innermost soil horizon.

In general, micronutrients, which are needed by the plant crop in small quantity, have minor importance and only rarely affect the success of agriculture. Most of them are absorbed by plant crops as cat ions but boron, chlorine and iodine are taken up as anion. In the chemical analysis, it indicates that most of the micronutrients were not influenced by the presence of cattle waste. It shows in our control samples (results) to the real sample (results), which indicates either the nutrients concentration of the control area is greater than the real area or have the same concentration except in the case of chloride which is richer in the areas that are influenced by cattle waste. This may be attributed to the presence of salt in the animal ration ($NaCl_2$).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

Animal waste is important in crop production in plant crop growth it has a considerable high content of major plant nutrients (NPK) with the availability of such plant major nutrients and others, it can affect the soil physical, chemical and biological properties.

It has pollutional characteristics which constitute a great nuisance to the urban cites. Having considerable supply of different nutrients elements but not in a fixed ratio, as such some might be over supplied to crops plant thereby causing harmful effect on them. In short here is no doubt as to a potential for negative environmental impact from intensive livestock operations: the manure produced holds considerable plant and its decomposition starting at the 109 housing level, produces odorous gases. As far as water pollution is concern the compliance 0 the current construction requirements for storage structure and application of the liquid manure at rate meeting plant nitrogen requirements will provide assurance against water contamination risk in most situations in Manitoba. Chemical analysis was carried out during research, and from the result, phosphorus was found to have increased from 3ppm to26ppm from the control sample to the feedlot area. Soil PH indicate that it is not acidic, but alkaline soil.

Feedlot tend to be higher or richer in concentration of macro element than the control area. From the result of chemical analysis, micro nutrients were not influence by the presence of cattle waste At both the feedlot and control area

5.2 RECOMMENDATIONS

1. We should promote livestock production and educate farmers on how to manage a feedlot successfully.
2. We should encourage research work on how to supplement animal waste as another substitute to inorganic fertilizer so as to alleviate the cost of obtaining it.
3. Environmental officials should try to ensure periodical inspection of feedlots areas in order to lessen pollutional effects of the waste.

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