WRM 506: WILDLIFE NUTRITION

- **Introduction**

Nutrition is the study of disease by which organic and inorganic substances injected by living organisms are converted to various means for life processes such as promoting growth, replacing worm and injured tissue and the perpetuate life.

Wildlife nutrition in addition to this is concerned with the supply and gilt of food in an animal contract

The basic requirement of all wildlife are food water and cover WN deals many with the first two of these requirement good and adequate cover, however is implement not only for escape and rest but also to secure unperturbed feeding and to conscience energy during them extremes.

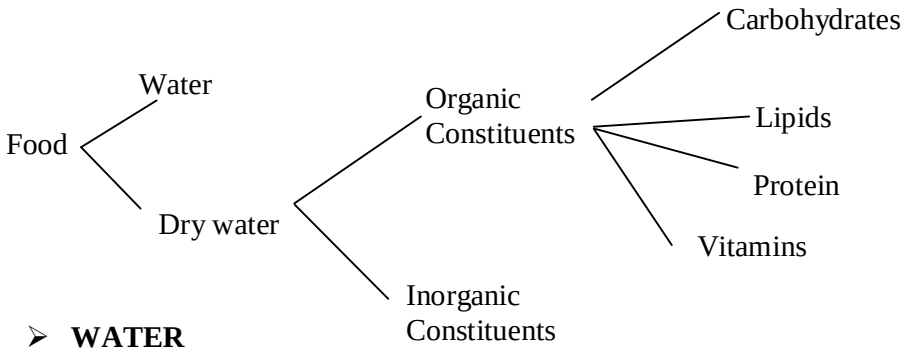
These are many e.g. in literature which distract the importance of introduction for wildlife. In general animals with adequate food supply give large produce young and are more resistant to many forms of mortality than those affected by malnutrition. During failure of mass crop in 1940, reproduction success of Michigan mitigal fox squirrels declined. Also the reproductive success of white failed beans on range providery good nutrition was higher then on poor nutrition ranges. Weight of dears were also higher on ranges providing good nutrition than an on angers providing poor nutrition.

During the last decade with managers and biologists have become increasingly aware of the fact that a know high of physiology and nutrition are basic areas to the understanding of wildlife ecology.

- **NUTRIENT CONTENT OF FOOD**

A nutrient is any food or feed constituent or a group of construct that is normally consumed by the around and is a source of energy or scented for the normal functioning ofr

the chemical substance and these can be grouped into classes according to them nutrient function on contribution the means component of food are.



- **WATER**

Water is essential to all live of living organic. It is necessary for digestion, metabolism, cooling, lubrication and other life processes. Wild vertebrates may obtain water from 3 sources

1) Free water e.g. Lakes, streams, dear or vegetation
2) Water from food consumed
3) Metabolism water which is produced during the break down of protein, carbohydrate and fats.

The dry matter of an animal ore plant tissue includes everything except water.

The term carbohydrate is applied to certain nutrient compound containing only hydrogen, carbon and oxygen. Carbohydrates are the source of energy used in all cellular form. They form about ¾ of dry matter in crop and are the chuff sources of energy in the food of herbivores and omnivores.

Because of the variety and abundance in nature their requirement in animal body for any surface carbohydrate in then diet. Carbohydrate are divided into sugar (glucose, lactose, Galactose, fructose) and non sugar (cellulose, hemicelluloses etc) sugars are eating digested by animal whole, digestion of non sugar is a larger process. Cellulose, one of most abundant

cost can't be digested by higher animal. only bacterial and fungi and possibility some protozoa the CELLULASE necessary to breakdown of cellulose compound into simple digestible sugar. Many animal have developed symbiotic relationship with bacteria to enable than to utilize cellulose as a nutrients. Lignin, a pimply propyl derivation is not a CHO but is usually discussed with CHO because of its influence on the digestibility cellulose and hemicelluloses reducing of digestibility of those compounds.

- **LIPIDS**

Are found in both pH and animals tissues and includes fats and an no of cloudy related/associated compounds such as phospholipids and glycolipids which play important role in the physiological processes of an animal they are insoluble such as ethery, bergen and chloroform. Because fats calories a high population of carbon and hydrogen, they supply are times as much health and energy per e.g. as do carbohydrate. fats are not specifically required in the diet except as a source of essential fatty acids that free ranging animals receive a sufficient amount under normal circumstances.

Dietry fats are however important during the absorption process of fat soluble vitamins (A, B, E, K) and important energy reserve during certain stressful period of their lifecycle.

- **PROTEINS**

Are high molecular weigh, large colloidal moles comprises of amino. They are the building blocks of every cells. Their important in the due is to supply amino acids. Numerous amino acids are required by simple stomach animals and are termed essential amino acids. Ruminant animals don't require specific amino acids in their diet.

- **VITAMINS**

They are organic compounds required animals in minute quantities. They are divided int fat soluble vitamins A, D, E, K and water soluble vitamins (B complex and Ascorbic acids).

Although most animals have similar vitamin requirement. The required level in their diet can vary considerably.

NB: In wildlife literature, food is usually referred to as substance eaten by animals under natural conditions. Feeds is however reserved exactly to processed substances e.g. he peleted diet consisting of a mixture of feed.

- **INORGANIC CONSTITUENTS**

Various minerals are required by animal for growth or other physiological needs. These mineral are divided into 2.

1. Macro elements which are Ca, P, K, N, Sulphur, Mg
2. Trace elements are Fe, Mn, Cu, I, Molybdebum, Zn, Boron, Chlorine

Wild animal obtain thus required through food, water and ingestion of soils or grots (small stress)

In addition to a required minimum level the ratio of intake of various elements is also important e.g. Ca and P generally occur in the diet in a ratio of 2:1 and 1:2.

15 trace elements have been identified, which are required in small amount by animals.

They are termed ETES. If about from the diet metabolic disturbance will occur. Some ETE and other NETE has toxic effect if ingested in large amount/quantity. Some example of importance of minimal to all animals are,

Calcium for egg production in pleasant and water fall and Ca and P for another growth in their several researches have shown that their pleasant select grits containing high level of calcium and distribution of pleasant pop has been found to related to soil level and soil calcium

Reduced egg hatchability has been linked to calcium deficiencies in pink tail hen. Nutrient requirement for another growth in white tailed deer have also been investigated; they formed that calcium and phosphorus deficiency ratios limited anthers growth, but felt that phosphorus was the most heavy to be limiting another growth under natural conditions.

- **BODY COMPOSITION**

In knowledge of process because of wildlife species can be important for several reasons.

i. Fat content can be used as a general indicator of animal conditions.
ii. Body composition of prey species are important to investigate wildlife food chains in order to determine amount of energy
iii. Protein available in higher trophic level
iv. Game species are often used for human consumption, this, a knowledge of their body composition is important in evaluating of contribution of limiting to human nutrition.

Animal tissues are of water, protein, fat, mineral and CHO. Water content is higher in new born animal, approximately 80% but decreased to 45 – 60% in mature animals depending upon the fat content, CHO content of animals is very low less than 1%.

Mineral content of animal varies between 2 – 5% depending upon skeletal size and protein content is usually between 15 – 20%. The fat content of variability influences the relative percentage of other chemical constituents because the higher the fat content the lower the

relative percentage of the other substances. For this reason, body compositions are sometimes presented on a fat-free basis. Fat serves several important function.

It is primarily the mechanism of energy storage. This is important for most compounds species allowing them to survive/avoid successful period such as winter when food available nutritive quality are low. Bird depends on fat deposit for migration to avoid harsh condition. Hibernations depends on fat supplies to allow dormancy, during the unfavourable seasons. Considerable weight loss has been observed hibernating animals.

Brown fat a specialized fat deposit is important to both hibernators and other species requiring known-showing thermogeensis. Other species such as deer utilizes fat as an insulator and to supply energy during winter.

Deer ca loss 30% to their body weight during winter, the role of fat levels to individual species and community relationships remain one of the most fascinating research area in wildlife nutrition and energetic.

- **COMPARATIVE ANATOMY**

Base upon fod habits wildlife species can be categorized into 3 groups carnivore, omnivore and herbivorous. In addition, the categories of insectivorous and grasshopper are occasionally used in responses to the types of fod consumed by each groups characteristics digestive system are involved while a basic digestive system is common in both birds and mammals, various specialization or modification of digestive organic have developed especially in herbivores. Carnivorous have involved the most simple digestive system because their food is early digested. In mammals, the system digestive tract consist of oesophagus, stomach, small intestine and large intestine. In birds the basic that consist oesophagus, crop, proventiculus, gizzards, small and large intestine. In birds 3 types of crops have involved to different dietary selection. Carnivorous birds including insectivorous typically have only a temporary

explanation of the oesophagus as a crop. A few carnivore are most leaves eating, birds have a false crop which is small and poorly developed.

Carnivorous birds have a true crop or permanent diversification. These allowed for storage of rapidly gathered food. During which some softening of the seeds by saliva occurs.

An apparent abnormalities in the evaluation of the vertebrates have been the feature to develop enzymes capable of breaking down cellulose.

Cellulose is one of the major channel constituents plants and one of large potential sources of energy for animals. As a result some species of animals have involved specialized digestive organs which allow for symbiotic between the animal and the micro organism.

Many species of herbivorous birds including some granuovores have developed a pair of caeca located at the function of small and large intestine. Each containing micro-organisms which continue the breakdown of CHO and proteins reaming after digestion in the proventiculus, gizzard and amll intestine. Micro organism digest cellulose and other CHO production VFA which are absorbed trough the wall of the caecum and aid in the bird energy supply.

These birds has the high rate of passage of food through the digest tract and although the food particle many stay in the caecum for several hours. It is doubtful that cellulose digestion can apparently add to energy budget of the bird. As in bird, some mammals has also developed a large caecum and somewhat enlarge, large intestine allowing microbial digestion among those some rodents lagormpiles and equinozes, the caecum allows synthesis of bacteria protein and vitamins. The caecum content are high VFA and amino acid. The caecum absorbs water, non protein nitrogen and vitamins. Some smaller animals such as lagormorphs used comprophagy as a means of increasing digestive efficiency. The content of the caecum covered by a mucous internal are defecated and immediately re-ingested in the stomach. This involves the amount of amino acids and vitamins available to the host.

Other rodents such as flamster rat and golden hamstar have developed a preventive type of fore-stomach. Thus cardiac portion of the stomach harbor micro-organism that allows some microbial digestion to occur to chemical and enzymatic digestion.

- **FEEDING STRATEGIES**

There are many

Which influence habit…….. this because wild animal differ considerably in size and rumen anatomy. In term these differences influence animal metabolites rate and nutritional requirement, differences in the nutritive quality of grouse diet during wet and dry, winter and summer as well as inventive quality of the diet of the male and female during this wet season have been observed, the identification of such differences and their corresponding influence on diet selection has led to the investigation of wildlife feeding strategy.

The investigation of the feeding strategies involve the identification of the selected diet of a species or groups of animals. In nutritional basis as symptoms of these selection and the effect of the select on intra-specific and inter-specific relationship. FS has been investigated for various groups of wildlife including large herbivores and several groups of birds for example the feeding strategy of the Zebra in non-ruminant and 2 ruminant the Wildebeest and Thompsons Gazelle. Although the zebra have no rumen but they do have an enlarge caecum.

Microbial action in the organ improved the nutritive quality of the ingested food. Through the caecum because of its location is not as efficient in supplying nutrients from fibrous foods as the rumen. In ruminants the opening between the reticulum and omasum (recticulo-omasa orifices) restrict passage of larger fibrous food parasites.

Before these material can travel in the omasum micro-organisms and the chewing action of the rumen must reduce ingested material to small fragments. Therefore the rate of passage of digested in the digestion in the ruminant is infactorial digested is by fibre content of food.

No such restrictions are imposed on digestive tract of the monogatstric such as zebra.

The zebra therefore is able to take large amount of poor quality fibrous food obtain easily digestive nutrient from this food, upgrade some of it in its large caecum and excrete the fibrous portion. Large amount of food passing through the digestive tract compensate for the low nutritive quality.

The Wildebeest is a large ruminant and has a large rumen in relation to body size then thus the smaller. Thompson Gazelle, bars of its large body size, the wildebeest has a low metabolic rate than the gazelle resulting in lower energy requirement per unit body weight. Thus, the wildebeest can utilize a power quality forage than the Thompson gazelle. Consequently, TG is more selective in its feeding habits. These differences have resulted in difference complimentary forage selection by the 3 species the zebra is the first spies to leave the short grass prairie because of food shortages. They move into less quantity of the coarse parts of the grasses and also move to other areas as the quantity of forage available is reduced.

The wildebeest utilized the lowland areas vacated by zebras eating the more nutritious lower plant parts exposed by the foraging of the area selecting the most nutritious forage exposed through the foraging of other 2 species. In this way, computation for food is not only minimized between the 3 species.

It is actually complimentary. The importance of the study of speeding strategy is exemplified in these relationship. If the property of some of these species is seriously impacted by some factor or disturbance. It should have a severe impact on other to species as well.

PLANT CHEMICAL COMPOSITION AND SAMPLING CONSIDERATION

- **PLANT CHEMICAL COMPOSITION**

Plant and animals contains similar types of chemical substances. The only difference been the relative amount of these substances in their composition. Water is a major constituents of

plants although its proportion varies considerable from 5 – 90% seeds and tubers been of these variability the other plant constituents are usefully expressed as a percentage of plant dry weight. CHO comprises of the majority of the plant dry matter.

The amount and type of CHO in a plant are major determinant of plant changeably plant matter is often divided into 2 groups.

This cell content and the cell wall CHO contain in the cell content consist probably of sugars, starch and soluble CHO these are almost completely digestible by animals and are major sources of energy. Cell walls are large composed of CHO, cellulose and hemacellulose, ECHLC along with varying amount of lignin and cutin. The relative amount of cellulose and hemicelulose and lignin inflammable the digestibility of a plant. Lignin forms a complex compounds with cellulose and hemicelluloses reducing the digestibility of these constituents by wildlife includinjg ruminant. The higher the lignin level the less digestible and the cellulose and hemicelluloses constituents. Many factors affect the relative amount of these CHO such as plant age, season and plant part. Plant lipids occur in the cell content and consist almost exclusive of fat. Plant fat content is generally low because energy is form of sugar and starches certain plant however do contain higher levels of fat e.g. seeds and some fruits plant protein also occur probably in the cell content, amino-acids and non protein nitrogen (NPN) are often considered along with protein in plant chemical analysis. Protein levels of plants are generally low less than 10% although considerable variation can occur. Plant are able to synthesis al their required vitamin which are present in the cell contents. The mineral or Ash content of plants as in animal is a small percentage of dry weight plant region various micro & trace elements and can also accumulate some in very high conc. High levels of some elements in plant such as selenium can pose a hazard to herbaceous animal.

➢ FACTORS AFFECTING PLANT COMPOSITION

Various factors can influence the composition of a plant which in term affect its nutritive quality some of these factors are

1. Plant species
2. Seasonal and phonological effects
3. Site effects
    - Temperature
    - Moisture
    - Precipitation
    - Insolation
    - Soil

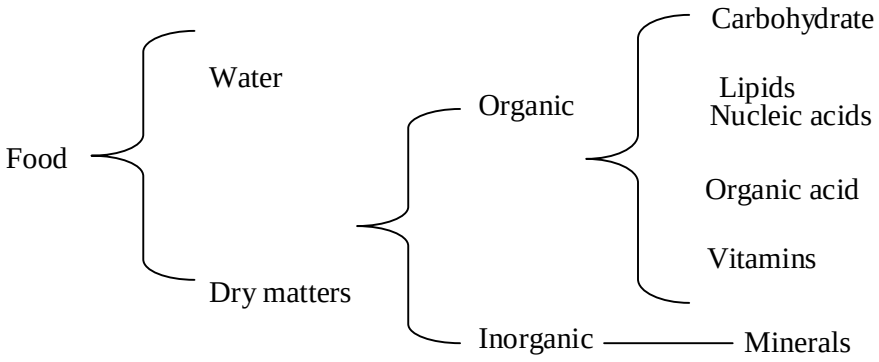
1. PLANT SPECIES

The factors having the gastric influences on plant composition has been formal to be plant spp, numerous studies have migrated the manual composition of various plant spp. Different plant spp have different manual composition.

➢ NUTRITION

Food is material which after infection by animals is capable of been digested, absorbed and utilized. The diet of animal consists of plants and plant products animals depend upon plants for then existence and consequently a study of wildlife nutrition must begin with plant itself. Plant at able to synthesis composition material from sample substances such as CO_2 from air and water ad inorganic elements 4m the soil by mean of photosynthesis, e^0 from the sun light is trapped and used for this synthesis. This e^0 is should

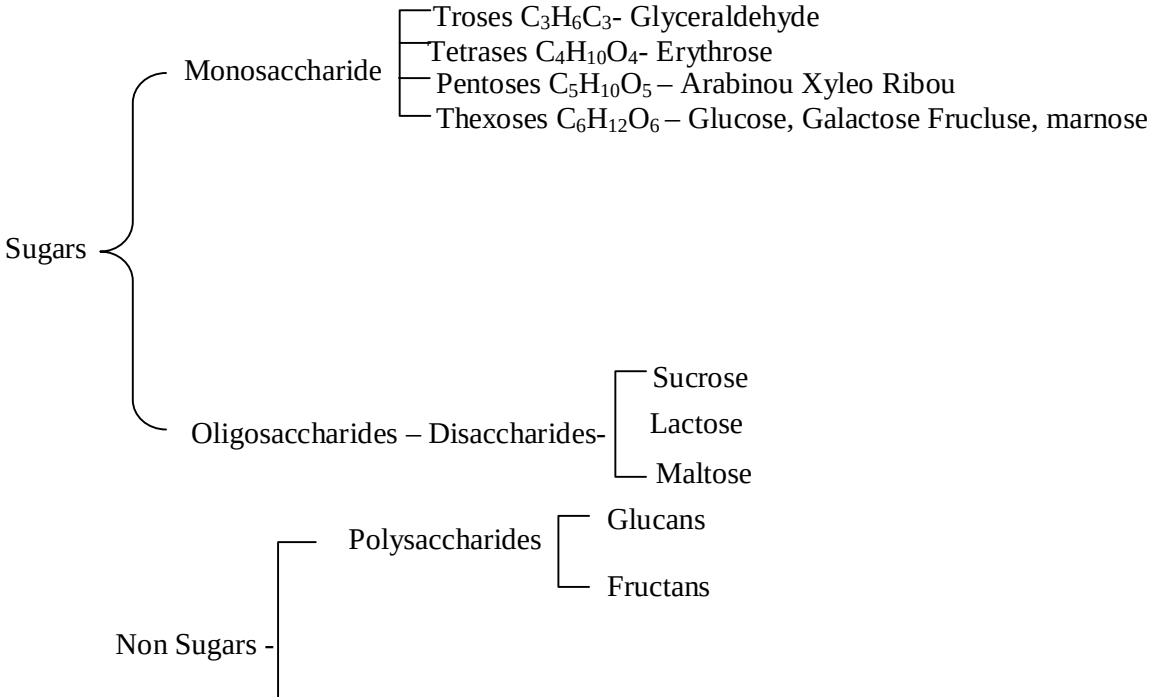
as meal e^0 in the plant and it is used by a^0s for the maintenances of life and synthesis for it's own body tissues



- **CARBOHYDRATE**

It comes from the French Word "hydrate carbone" they have the compared formula of (CH_2O) in where n can be 3 or more CHO contain the element carbones, hydrogen (H)S oxygen adehydes, ketonus and any compounds that may be hydrolyzed.

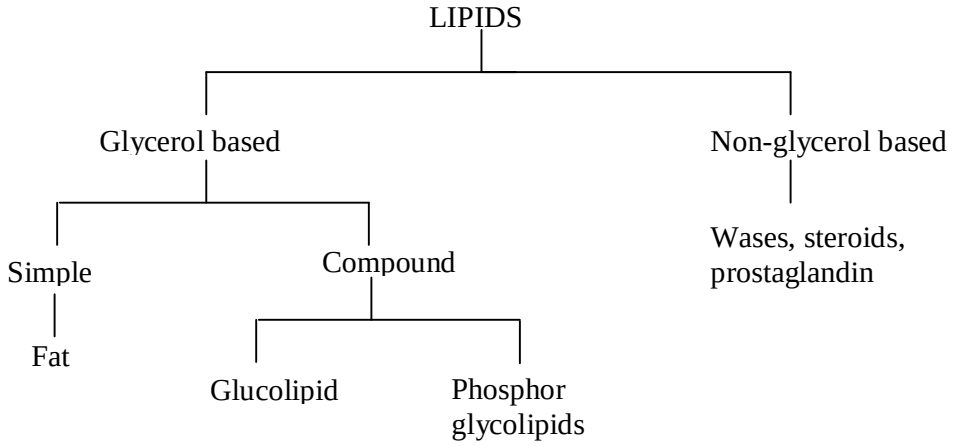
Classification of CHO



- **LIPIDS**

This groups of substance an found in plant and animal tissues, they are insoluble in water but soluble in organic silent such as benzene, ether and chloroform. They act in body as electron carriers as substrate carrier in enzymes reactions and sources of energy in the body.

- **CLASSIFICATION OF LIPIDS**



- **PROTEIN**

These are complex organic compound; they contain C, H, D,. But in addition that all contain nitrogen and sometime sulphuric. The simplest form of protein are amino acid and these are

about 200 amino acid isolated which include Arginme, isoleucine, Leucine, flastine, cysine etc.

- **VITAMINS**

These are derived from the word “Vital amines” and they are required/ministry in very small quantities in animal it is divided into 2 groups, were have fat soluble vitamin and water soluble vitamins.

1. Fat soluble;. A – retional, D_2- ergocalciprol, D_3 – Cholecalciferol, E – Focopherol, K – Phylloguinone, Q – Ubiqumonu.
2. Water soluble vitamin:

   B_1 – thiamin

   B_2 – Riboflavin

   B_3 – Biotic, Folicacid,

   B_{12} – Cyanolobalamin

   C – Ascorbic

- **DIAFSTION**

Many of the organic components of food are in the form of large insoluble substances which has to be broom down into singular form between passing through mucous membrane of the alimentary cannel into the blood and utilized for tissues growth. The baking down process is termed Diatstion. The passage of the digested nutrient the mucous membrane of the alimentary canal is called absorption.

- **PROCESS INVOLVED IN DIGESTION**

1. Mechanical: This includes mastication and muscle contraction of the alimentary canal.

2. Chemical action: it include enzyme secreted by the animal coming from the various digestive juices.
3. Microbial action: These are the action of bacteria, protozoa and fungi and it takes place in ruminant animals.

- **SEASONAL AND PHONOLOGICAL EFFECT**

Plant vary seasonally in chemical composition seasonally various are 1^0ly caused by deference in plant phenology, crude protein is highest. During the growing season. Phosphorus levels also are highest during the rainy season being with plant maturity. Ash content is highest in late spinning and summer as a plant matures its cellulose content increases. Crude fibres also have with plant maturity so also the lignin content with plant maturity. The increases in these constituents' decreases in digestibility corresponding to there increase have been reported by researchers.

- **SITE EFFECT**

Minor variations in plant composition are accounted for by site effect various researchers have examined the effect of specific site factor on plant composition. It should be noted however that the study of site effect is a very complex subject and all changes in plant chemical composites are usually of result of many factor dieting together so at single factor effect an hand to determine or explain;

Temperature: crude protein level of climate herbage spp bases with temperature. Temperature also was found to D_2 ash content of a plant. Phosphorus levels and cell wall constituent also Disease with temperature. Theroux cellulose and lignin content of grasses were found to be greater at lower temperature plant digestibility have been found to decrease with temperature.

The discreprincies in these finding on probability and result of temperature interacting with other site factors therefore additional research is needed on the influence of temperature and other chemical composition before conclusion can be dream.

Moisture: moisture can influence pit composite in as soil moisture or soil precipitation which these are closely related the effect of each can be described separately. The influence of SM in pit composition is difficult to determine bios its to effect is altering growth rate or phonological stages; sol moisture level with influence the MC of plant office in SIM level have been reported to both and crude problem level. Precipitation in addition to altering soil moisture level will influence plant composition by leaching plant nutrient. Leaching of dried herbaceous plant can reduce level of proteins phosphorus, ash and carotene.

Insolation: It appears to influence plant composition although the effect are often indirect bios shaded areas generally have higher levels of soil moisture e.g. shaded plant appeared to be more succulent but this may be due to higher soil moisture it was also fumed that was also higher in protein but this also may be influenced by soil moisture and by somewhat retarded growth caused by reduced solar radiation shaded plant were share to be lower in Nitrogen five extract and sugar the plants growing in sunlight.

Plant digestibility was also repeated to b kindly influenced by increased amount of sunlight.

- **Soil**

The type of soil and levels of nutrient in the soil influenced pant composition as a matter of fact, soil nutrients have a greater effect on plant composition them other sight factor crude protein levels were influenced by soil nutrient level. More specially protein content in plant have been find to be influenced by soil nitrogen level phosphorus level in plant were correlated with soil phosphorus level.

- **Digestion in the mouth**

This is mainly mechanical, mastication helps to break up large partial of food and its mix with sahua ash act as a lubricant sahua is recreated into mouth by 3 pairs of sahuring gland

1. Parotids – sited in front of each ear
2. Submandibular-lie on each side of the lower jar.
3. Sublingual – under mouth the tongue

Sahua is about 99% of 1120, the remaining 1% contract of mucin, inorganic salts and a tears enzyme amylase. It also consist of complex lysozym much digestion does not occur in the mouth serve food is quickly swallow and pass into the Oesphagus down to the stomach where the pH is infavourable for amylase activities flow the some digestion gland can occur in the stomach due to the hydrolyzing actor of x-amylase coming from the mouth, the enzyme of x-amylase acts only on starch, glycogen, polysaccharide and oligosaccharides in some animals.

- **Digestion in the Stomach**

The stomach consist of simple composition and function as an organ for the digestion of food and stage, consist of a cardia is the entrance cardia sphincter, fundus and pylorus teronus) pyloric sphesta. The stomach secret gastric juice which contain of water, pepsinogen mature from of pepsin) (inorganic salt and heft the active activate pepsinogen converting them into pepsin. In young animal instead of pepsin, they have Renin coagulate milk (sucking). In adults it is pepsin.

- **Digestion in small intestine**

The partially digested food learns the stomach and enters the small intestine. It is mix with secrete from the duodenum, liver and pampas. The majority of the digestion and absorption occurs in the 57 the duodenum gland produce an adhere act as a lubricant by desalting the HCL coming from the stomach from entering the SI bile is also secreted by the liver and passes 1 duodenum the bile diet. It consumes Na and K salts in play an important part in digestion by emulsifying fats. The pancreas secrets hormones, such as insulin.

Dieting fats leaves to stomach in the form of large particles in are difficult to hydrolyse. Fat hydrolysis is done by emulsifying by the action of bile salt. The bile salts are detergents is dissolve most of the fatty acids excepts fear such as stearic acid. Enzymes produced by the villi are sucrose is converts sucrose to glucose and fructose.

- Maltose or breakdown maltose to 2 micro leave of glucose.
- Lactose or hydrolyse lactose to one molecule of glucose and one molecules of galactose.

- **Digestion in the large intestine**

Extensive microbial actually occurs in the LI especially the caecum. There unit much in the LI except the production of microbial cells. The LI does not produce any enzyme so most of the digestion occurs in the small intestine.

- **Digestion in Ruminant Animals**

The food of ruminant consists mainly of polysaccharides e.g. cellulose cannot be broken down by digestive enzymes found in the monogastra animals. Ruminants have therefore evolved or special system of digestion that hormones microbial fermentation of food prior to its exposure to their own digestive enzymes.

- **Physiology of Ruminant Digestion**

The stomach of the ruminant is divided into 4 components

1. Rumen
2. Reticulum
3. Omasum
4. Abusuramum

The food is first diluted with large amount of saliva firstly during entering and again during rumination. The breakdown of food is accomplished partly by physical and partly by real matins. The content of the rumen are continually mixed with waves of contactors of the walls of the rumen. During rumination, undigested materials is drawn back from the rumen into the oesphagues back to the mount. Course materials is thoroughly charred before being rehired to the rumen. The time spent by the animals in rumination depend on the fibre content of the food. Each bolus of food is regurgitated and charred 40-50 times 2 receive a thorough mastication. The reticule-rumen provides a continues culture system for anaerobic bacterial, protozoa of fungi. The masticated food and H_2O enters the rumen with partially fermented to yield volatile fatty acids, microbial cells and gases such as millrun and CO_2. The gases can be lost by exaltation (belching). Volatile fatty acids are mainly absorbed true the rumen wall. The microbial cells together with under graded food components pass to the sacrum and abomasums down to the small intestine. These are usually digested by enzyme secreted by the animal and the products of digestion are absorbed.

- **Digestion of Carbohydrates**

CHO Microbial + Enzymes action plyruvic acid

plyruvic acid enzyme action Acetic propionic, butyric acid (con + maltose) Belding

- **Digestion of Protein**

There are 2 forms (1) Protein dieting (2) Non-protein nitrogen e.g. urea

Dieting problem

Problem Rumen micro organic peptides + amino acids

Some degraded rumen acids ----- Ammonin + CO_2

Ammonin + peptide

- **EVALUATION OF FOOD**

Proximate Analysis

Most of the information that we know on the composition of food is based on proximate analysis food is divided into the fractions (i) Moisture (ii) Ash (iii) Crude protein (iv) Crude fibre (v) Ether extract crude fat (vi) Nitrogen free extracts

Moisture: Volatile acids and bases

Ash: Essential and non essential manual elements.

Crude protein: problem, animal nods, amides, B-vitamins and nitrates

Crude fibre: Cellulose, hemicelluloses, lignin

Ether extract (CF): fats, oils, waxes, fat soluble vitamins

Nitrogen free extracts: sugars, fructose, slouch, water, sohess vitamins.

There they are analyzed

- The involve control id determined by drying the food in an oven to a constant weight at 100%.
- The ash content is obtained by igniting the food at 500^0C water all the carbon has been removed.
- The crude problem content is caculated from the nitrogen contents of the food and this is determined by using a modified Kjeldall sulphuric acid digestive technique where the "N" or stands for N is multiplied by 6.25 (to get % CP).
- The ether extract/crude put is determined by subjecting the food to a continuo extraction with problem other 4 a defined period of a time. The residue after evaporation of the ether is called the ether extract content or the crude good fact.
- The fibre contents is determined by subjecting a residual food from the ether evaluation and subjected to boiling acid and bases of a defined concentration. The organic residue that is left is called "Crude fibre".
- Nitrogen firee extracts = Moisture + %Ash + %Cr + %EE + %CP – 100

➢ FEED FORMULATION

Ration formulation is a process by which different feed ingredients are combined in a proportion needling to procure the animal with proper amount of nucleic weighed at a particular stage of production for example in birds.

- **IMPORTANT CONSERVATION OF FEED FORMULATION**

Ration formulation due nor merely muolue monument calculate to meet the requirement of the animal and the flag factors should be considered in mainly feed formulation

- **Factors to considered in mainly feed formulation acceptability in the animal**

The ration been formulated his to be plausible enough to standard intake by H_0 animal

- **Digestibility**

The natural in the feed has to be digested and release into gastro-intestine tract to be utilized by the animal

1. Cost of production

The lead cost formulation rations are to be met whatever a feed in formulated. Presence of anti-nutritional factor or toxins in the feed such as anti trypsin factor in soyabean meal or affects the digestion or some ruminants by making item unavailable.

2. The Annual

- **Methods of Formulation Ration**

- **Square method:** This is relatively easy and simple to father, its certifies only one nutrient require but uses to feed ingredients. Another limitation of the SM is that the level of nutrient been complied should be intermediate between the nutrient conc. of the two feed ingredient being used.

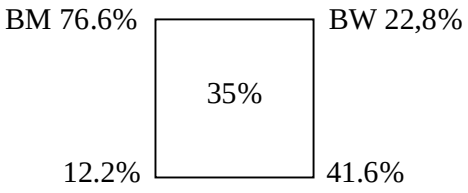
- **Simultaneous equain method:** This is settlement method for the square method using a simple algebraic equation these, the nutrient require is satisfied using a combination of 2 feed ingredients.

- **Two-by-two matric method:** This method solves the mehunt require using 2 different feed important, a 2-by-2 matric is set and series equations are done.
- **Trial and Error method:** This is the most population method for formulating rations of swine and poultry. As the more implies the formulation is manipulated until the nutrient requirement of the animal are melt.
- **Liner programming:** This is a method of determing the least cost continuation of ingredient using a series of mathematical equations. There are many preable solutions to each series of equation. But when the factor or cost of applied then is only one least cost combination and this is a achieved using the computer. Example
    - Square method

      Procedure in using square method

      1. There should be 2 feed ingredient
      2. Make a square drawing
      3. Place each of the ingredient on each side of the square
      4. Place the desire and at the centre of square.
      5. Subtract the desire problem or enough level of feed from that of the feed.
      6. Place the ensure opposite comer of the feedstuff
      7. Ignore any + ve or ve sign
      8. Resume room for other addition after birdman crude protein and e' levels.

e.g. 1. calculate the proportion of a different feedstuff (blood meal and beer waste) that is necessary to give the desire protein level of 35% if blood meal has 76.6% total protein and beer waste has 22.8%. Calculate the amount of feed in kg necessary



Step 1: 35 – 76.6 = 41.6

35 – 22.8% = 12.2

Step 2: Sum up the crude protein after substraction

Blood mean + BW

= 41.6 +12.2

= 53.8

Step 3: Calculate the population of the different feedstuff required

Blood meal $\frac{41.6 \times 100}{53.8}$ = 77.3%

Beer waste $\frac{12.2 \times 100}{53.8}$ = 22.7%

In proportion = 3 parts blood meal and 1 part BW or

Express in weight 77kg BM

22kg BW

- **TRIAL AND ERROR METHOD**

Procedure

1. Make a survey in the market, the feedstuff that are readily circulate.
2. Choice feedstuff that are less experience and can easily be purchased locally.
3. Make a least of your feedstuff especially the one your animal will benefit from 1.
4. Partition your feedstuff into energy guling protein guling feedstuff e.g.

   Blood meal – protein

Cotton feed meal – fat, protein

Feather meal – protein

E.g. compute by trial and error method a feed for broiler that are 6 hour 0-4 weeks old the energy require for broiler is 2800kcal/kg.

Protein require 23% , the following ingredient are choosing;- maize, groundnut, soyabean oil meal, fish meal, corn bean, PKC, BM, Bearers, waster

S/N	**Feedstuff**	**D kcal/kg**		**P%**
1.	Maize	49 × 0.09	32%	4.41
2.	GNC (Groundnut)	8 × 0.45	26%	3.60
3.	SBON (Soyabean)	8 × 0.38	35%	3.04
4.	F. M (Fishmeal)	10 × 0.60	29%	6.00
5.	Corn Bran	16 × 0.12	22%	1.92
6.	PKL	4 × 0.20	22%	0.80
7.	Blood meal	25 × 0.80	25%	2.00
8.	Bremer waste	2.5 × 0.80	22%	0.55
		100kg		22.32% req
				Is 23%

Note:

- One problem is that is due to choice a lot of feedstuff to must the requirement.
- Each of the feedstuff has their limitation e.g. for fish meal cannot be serve pure than 150% because of the digestibility soyabean also.
- Each of those FDS certain amount of the feedstuff must be consider not excess thr provision of the other reign