APPLICATION OF COMPUTER TO FORMULATION OF POULTRY FEEDS.

A CASE STUDY OF EL-AMIN FEEDMILL, MINNA, NIGER STATE

BY

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CERTIFICATION

I hereby certify that this project is an original work undertaken by me. It has not been submitted before for the award of Postgraduate Diploma in Computer Science

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DEDICATION

This project is dedicated to Almighty God and to my sister Mrs. Clare N.

Nwosu.

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ABSTRACT

This study was focused on the application of computer to the formulation of poultry feeds using EL-AMIN Feed mill as a case study.

The current system (manual) was studied using several facts finding techniques and then analysed. From the analysis a new system was designed. The computer was used because of the various advantages and characteristics it posses, such as high speed, accuracy, storage, automation and its quick accessibility, will go along way to determine the choice of proper combination of ingredients and formulate the least cost rations that will satisfy the requirement of poultry birds.

The programs were written in modules with facilities to add, view edit and to generate reports.

CHAPTER ONE

INTRODUCTION

1.1   OBJECTIVE OF THE STUDY.

The study has an overall objective is to increase the effectiveness and efficiency of an operation or procedure, reduce operating expenses and increase the quantity and quality of the feed produced.

The objective of the study therefore is to design a program that will determine the choice of proper combination of ingredients and formulate the least cost rations to satisfy the requirements of poultry birds so as to maximize gain in weight and hence the value of livestock. The program to be designed and should be able to accept as input

(1)   The various ingredients needed in the feed formulation and the percentage of each of the ingredients.

(2)   Nutrient composition of each of the ingredients.

(3)   Nutritional requirements of the birds with regard to proteins, fats, carbohydrates, minerals and vitamins.

(4)   The cost of each ingredient.

(5)   The quantity to be produced.

1.2   RELEVANCE OF THE STUDY.

There is the need for the development of diets that are most economical by taking advantage of feed ingredients available at economical prices at various times of the year.

There are two methods used in manual method of feed formulation; the triangular square method, the algebraic equation method, trial and error method. In manual method the formulator uses his hands and brain to produce these methods for accurate results, time saving and more efficient services to the feedmillers.

The computer is particularly suited to handling large amounts of data and the computer satisfies the need for a high degree of accuracy and its consistency can be relied upon. It is only computer that can tirelessly perform the same task again without complaint. In manual method human workers become bored and tired and find the constant repetition of the task tedious and begin to make errors and can even record information incorrectly. So with application of computer to feed formulation this problem is solved and you only need to feed in your data and the computer will tell you the quantity of each of the ingredients to mix to get the desired least cost ration.

Finally, the programme will help in financial modelling, as the company would know its income and expenditure any

CHAPTER TWO

POULTRY FEEDS REQUIREMENTS

2.1 WHAT IS POULTRY?

Poultry can be defined as those species of birds that render economic services to man and reproduce freely under his care.

Poultry refers to domestic fowls in general, but many to chickens, ducks, turkeys, guinea fowls, geese, other examples are ostriches, peafowl's and pigeons. Fowls or chickens are more numerous than any other kind of poultry mentioned above.

In the tropics the emphasis is on egg and meat production and only one species of poultry, the domestic fowl is used, whereas economic and nutritional benefits can be derived from keeping other species.

The most useful aspect of poultry keeping is the food the birds produce in terms of high quality eggs and meat. Poultry eggs are also used for vaccine production.

2.2 STANDARDS FOR POULTRY FEEDS.

Proper nutrition is a very important basic prerequisite for successful poultry farming. Well-fed birds are not only more resistant to diseases but also produce better. Therefore, for maximum efficiency in growth and production it is necessary to provide a ration properly balanced for poultry.

The rations (feed) should be such that they satisfy the nutritional requirements of the birds with regard to proteins, fats, carbonhydrate, minerals and vitamins. For computing such rations a good knowledge of the nutrient composition of the ingredients and the right proportions in which they are to be mixed is necessary. Not only the manner of mixing but also the physical state in which the feed is presented must be studied. Diets should be formulated to meet the various requirements, as indicated by the age physiological state of the fowl or chicken.

On the basis of experiments, nutritional standards have been established subject to periodic review by the National Academy of Science of the United State of America.

The National Research council (N.R.C) recommendations cover the needs for crude protein plus its amino contents, energy, minerals and vitamins to the extent that information is available on them. The chick, particularly the broiler, requires more protein and energy than layers to cope with relatively higher rate of physiological activities and particularly growth, including the change of feathers. By contrast, the layers need more calcium and phosphorus for shell formation.

2.3   POULTRY NUTRITION.

In general feed costs represent over 65% of the total costs of producing eggs and poultry meat. Unbalanced rations result in poor feed conversions and higher feed costs.

High quality, properly formulated feeds supply the necessary nutrients for maintenance, production and reproduction with out waste. The components of feed can be divided into three groups.

(1)   Those that promote growth and egg laying;

(2)   Those that supply energy;

(3)   Those that are necessary for health;

The feeding value of feed ingredient is measured in terms of the following nutrients which are all required for maintenance of health growth and production.

(1)   Water

(2)   Protein

(3)   Carbohydrates (starches, sugars and fibre)

(4)   Fats oils

(5)   Minerals

(6)   Vitamins

PROTEINS

Proteins are complex substances made up of various combinations of at least 23 different aminoacids. These promote growth. Proteins can come from animal and from vegetable sources fishmeal, meat meal, Soya bean meal, palm kernel meal, groundnut cakes, and all kind of legumes and their by-products. Part of the protein allowance should be of animal origin. The total amount of protein needed in the ration will depend on

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the type and age of stock being fed. Proteins are required for growth during the early stages of life when the young bird is laying down tissues. In order bird's proteins are required for egg production.

CRUDE PROTEIN.

Crude protein is made up of real protein amides (non-protein nitrogenous compounds). The amount of crude protein in the fed is measured by the Kajeldahl method, which determines all the nitrogen in the feed. The quality of proteins is very important in feeding poultry because birds are monogastric animals. For pullet chicks the crude protein requirements is about 21% while for growers it is 18% and for layers 16%. For broiler starters the level is 21 to 24% and for finisher it is 18 to 20%. The value of a given protein in the fed is governed by its monoacid make up.

CARBOHYDRATES.

The carbohydrates include sugars, starch cellulose, gums and related substances. These are the main source of energy for the body. An excess of carbohydrate is usually stored in the body as fat.

Animals need a supply of carbohydrates in the diet at These are the main source of energy for the body. An excess of carbohydrate is usually stored in the body as fat.

Animals need a supply of carbohydrates in the diet at all ages. Local feed ingredients rich in carbohydrates are maize, rice, millet guinea corn, sweet potato and cocoyam.

If laying birds are given too much starchy food they may become too fat and consequently lay fewer eggs.

FATS AND OILS.

Fat is important for increasing the energy density of rations especially of broiler chicks and of layers. Fats are the richest sources of energy in poultry feeds. They are also sources of essential fatty acids, which are indispensable for normal growth, egg production and reproduction. Fats and oils occur in the germs of grains, oil seeds e.g. soyabeans, groundnuts and in tullows and greases of animal products.

CRUDE FIBRE.

A certain amount of crude fibre is necessary in poultry feeds because;

(a) Crude fibre acts as a medium for bacteria to live on in the caecum. These vitamins pass out of the intestine in the faceces and thus the poultry can only make use of the vitamins, if they are in contact with their droppings.

(b) Crude fibre makes the feed bulky but relatively low in bodybuilding nutrients. This is important when feeding broiler parent stock for checking increase in weight by over-eating.

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MINERALS.

The importance of mineral iron in poultry nutrition cannot be over-stated. Minerals comprise about 1% of the edible portion of the carcass-approximately 9% of the egg is made of mineral iron, mainly calcium minerals represent over 40% of bones which are composed mainly of Calcium and Phosphorus. The major function of minerals is to facilitate digestion, absorption, metabolism and oxidation of food and the elimination of the waste products. The principal minerals required are sodium, calcium, phosphorus, iron, magnesium, potassium and sulphur.

2.4   ⸱ FEED INGREDIENTS FOR POULTRY.

The energy in poultry diets is derived mainly from cereals. Those available in the tropics include maize millet, sorghum, rice, wheat, non cereal carbohydrates included cassava which can be used up to 50-60% of growers and layers diets without detrimental effects on the performance of the birds.

The vegetable sources of protein include groundnut (peanut) meal, copra meal, lima bean (Phaseolus lunatus), acacia seed (Acacia spp), cowpea, Bambaranut, especially after antoclaving and palm kernel meal.

The animal sources are chiefly fishmeal blood meal milk powder and to some extent meat and bone meal. These were considered to be indispensable for obtaining diets that were balanced in amino acids.

Calcium is derived from oystershells, seashells and limestone and phosphorus from bone or defluorinated rock phosphate.

Vitamins are given in synthetic forms, which are supplied singly or as low potency pre-mixes in combination with active ingredients like minerals, antibiotics and others.

Some vitamins are also derived from green leaves which also supply skin and yolk pigment and when given fresh they add succulence and stimulate appetite. In the tropics green feeds that may be used papaya leaf meal kikys grass meal napier grass meal banana leaves bamboo leaves and dried leaves of Adansonia digitata.

There are also local ingredients and by-products, which serve as alternative sources of feed ingredients. They include groundnut cake, African locust bean, melon seed (cirtrullas vulgaris) distillery by-product, poultry and cow manure blood meal, wheat bran, soyabean meal cotton seed, rice bran, rice polishing, cashew nut scrap kernel meal after oil extraction is comparable to groundnut meal in crude protein.

2.5   RATION FORMULATION.

Ration formulation involves development of diets that are most economical by taking advantages of feed ingredients available at economic prices at various times of the year. Ration fed to poultry are combination of available ingredients, that supply the amounts of energy

protein, vitamins and minerals; by combining various ingredients and adjusting the amounts used, the required nutrients level can be achieved.

To achieve this objective, the following must be known.

(1)   The availability of the raw materials

(2)   Cost of the materials

(3)   Nutrient requirement of the animal the feed is meant for.

(4)   Nutrient composition of the raw materials on a balanced ration at the lowest possible cost.

In commercial practice, formulation is often done by a procedure termed linear programming with the aid of computers, data on ration specifications, ingredient costs and feed composition are given to the computer which is programmed to calculate the combination of ingredients that meets the nutritional specifications at least cost.

Computer formulation is rapid and enables a feed manufacturer to change formulas frequently, as ingredient cost changes.

2.6   METHODS OF FEED FROMULATION.

MANUAL: In manual method the formulator uses his hand and brain to produce a feed formula. The manual method is widely used in Africa and established in Pfizer where the micro and macro ingredients are blended in Africa to ensure freshness of the feed.

This is time consuming but with experience more time is saved and the method allows the formulator to be flexible especially where there are problems of scarcity and constant price fluctuations.

COMPUTER: Computers are electronic "brain" which are used in the feed industry to take ingredient costs ingredient composition and nutritional requirements and formulate a desirable ration using the available ingredients.

Computers are used for formulating least cost poultry feeds, which should not be confused with lowest cost formula that contains all, the nutritional elements need for maximum performance. The latter may not produce maximum performance. The latter may not produce maximum performance, which depends on the efficiency of utilisation.

The computer must have the following information or support.

(1)   Specific requirements for each nutrient known to vary in quality and amount in the ingredients.

(2)   Ingredients whose nutrients have high biological value.

(3)   Standard developed for substitutions such as are outlined in the tables on feed composition, and composition and substitutions as recommended under ingredient limitations.

(4)   Maximum and minimum amounts of ingredients.

(5)   Exact amounts specified when possible.

(6)   Premises containing safely levels of the enclosed nutrients.

(7)   Rations manufactured properly and handled, stored and fed according to the planned feeding program.

GUIDELINES FOR COMPUTERS.

Guidelines are essential for ideal computer performance. The computer does not reason, device or make decisions, some desirable specifications are:

(1)   Use ingredients of high biological value

(2)   Formulate rations designed for stating chicks, pullet replacements, broiler, ducks, turkeys or whatever is needed.

(3)   Prepare and store vitamin, antibiotic and antioxidant premises under conditions.

(4)   Test the ration with chicks before using for farm production.

(5)   Always, if possible use fresh ingredients and do not accumulate ground ingredients.

(6)   Don't make erative substitutions of ingredients.

2.7   BRIEF HISTORY OF EL-AMIN FEDD MILL

El-Amin feedmill is situated along Northern bye-pass by old Wushishi of El-Amin Minna. It is one of the branches of El-Amin Nigeria Ltd Minna, which was incorporated in 1980. The feedmill began its operations on the 11th of September 1995 when it went into the first production with the following production number of staff.

Production department

(1)   Miller (production manager)

(2)   Factory Headman (*1*)

(3)   Factory attendants (*4*)

Accounts Department

(1)   Accountant (*1*)

Sales/Marketing

(2)   Invoice clerk (*1*)

(3)   Driver (*1*)

More so, El-Amin feedmill is a business associate to (Pfizer) livestock feeds plc Kaduna mill, where it buys its major raw materials. El-Amin feedmill has the capacity of producing 8 tonnes/day if fully utilised, it has been able to shift its feeds to places like Bida, Gwagwalada, Kuje, Sulejza, Kontagora, Lokoja etc. Feedmill is well known with its quality product, which is the production of mashes viz.

Chick mash

Layers mash

Broiler starters mash

Broiler finisher mash

In fact El-Amin feedmill has been secured number one position of feed marketing in Minna because of its quality, ignoring all other competitors.

CHAPTER THREE

3.0   SYSTEM ANALYSIS AND DESIGN

System analysis is the process of getting gathering and interpreting facts and is defined as the methods of determining how best to use computer with others resources to perform tasks which meet the information needs of an organisation.

Also system analysis is concerned with converting the objective of management as far as information and data are concerned into methods that are amendable processing by a computer. It is a link between software/hardware of computing. It also implies the examination of a separate entity and in relation to the whole.

3.1   FACT-FINDING TECHNIQUE.

Fact finding technique refers to specific method used for collecting data about requirements in other words it refer to various methods of investigation.

There are several methods of gathering information. They include; observation, record searching, special purpose records, sampling, questionnaires and interviewing.

For the purpose of this study interview technique was employed which is by far the most common and most satisfactory way of obtaining information particularly to obtain information about objectives,

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constraints, allocation of duties and problems and failures in the existing system.

Interview was used for collection of information from the manager and individuals in the company who are the current users of the existing manual system of operation. In the process of interview it was disclosed that manual method has been very inefficient and tedious. It is also time consuming.

So if the system were computerised most of this problems would be solved. The computer takes information provided by the nutritionist and being capable of making thousand of calculations in a very short time determines solutions. Computer input respects the knowledge and ability of nutritionists. Effort is exerted upon the solutions that are of economic interest for a given set of ingredient prices. It is possible by linear programming to determine.

(1)   A least cost combination of feedstuffs to most specific nutrient requirements;

(2)   Acceptance or rejection of ingredients; based on their cost and nutritive value.

(3)   Effect of variation in nutrient content of feedstuffs on their economic value.

(4)   Final cost a diet and the cost contributed by each ingredient.

(5)   Relationship between requirements for any specific nutrient and the cost of the feed formulation.

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(6)   Optimum nutrient density of a diet for maximum economic

         return to the feed formulator.

(7)   Cost of replacing any ingredient not in the solution and

         assistance in ordering feed ingredients.

The case study was concentrated on feed formulation but the computer could still be used for many other different applications and that is why the process system is recommended for use by the company to allow the computer to perform other relative tasks as well.

3.2   ANALYSIS OF THE EXISTING SYSTEM

The present technical of production is based on the following stages of production given below as follows:

First feeding of the middling from bags into the elevator passes materials into the silos.

Then from the silo through the efforts of suction pressure passes materials into the (mill) grinding machine, from the grinding machine, through the help of an over head pipe convey materials into the storage tank, where materials are again transferred into the mixer manually.

From the mixer, then it is being discharged into bags and then it is sowed with the sewing machine and now readies for marketing.

The existing manual system serves as a good source of information for the development of the computerised system.

3.3 PROBLEMS OF THE EXISTING MANUAL SYSTEM.

The following can be said to be the problems associate with the present adopted manual system

(a)   The manual system requires a lot of manpower and energy.

(b)   It is tedious, tiring and highly uninteresting.

(c)   Administrative delay.

(d)   It is time consuming.

(e)   Expensive to maintain.

(f)   Accessing information is tiring and time consuming.

(g)   It is ineffective.

(h)   Misplacement and lost of vital papers due to large volume of papers to handle.

(i)   Large human errors due to large volume of data to handle.

(j)   A lot of processes are followed in stages before production of even a tonne is completed.

3.4 ANALYSIS OF THE PROPOSED SYSTEM.

Computers are used for formulating least cost poultry feed and are a tool for accelerating calculations.

Computer offers to all levels of management unusual speed in collecting, assimilating and reporting data to facilitate decision making. It can be used to assist in matters of budget finance, personnel inventory, purchasing, analysis, and long range projections. Computers operated by

prodigious numbers of high-speed additions and subtractions as well as storage and quick retrieval of immense amount of data. As the price of ingredients change the new costs, are fed into the computer and it automatically alters the formula to maintain the nutritional value at the lowest possible price.

3.5 PROBLEMS OF THE PROPOSED SYSTEM.

1. The company needs to train its staff as computer operator and to be able diagnose when there is problem.

2. The company will have to employ a system analyst and a programmer to take care of their data processing department for other applications they may decide to develop.

3. Electronic computers are extremely efficient but lack initiative. The computer does when it is told. It is no miracle gadget. Consequently, the person formulating the feed and the computer must work together. The nutritionist specifies what is necessary and arranges in a set of specifications, information that will provide the computer with exact limits within which it is free to operate. So with computer there is no easy way to assess palatability nutritionists must minimise or be able to assess the sources and magnitude of any variable. In order to make a smooth operation for the computer, certain problems must be mastered.

With respect to personnel training, employees must be instructed in the data needed and how they are presented. All data must be double-checked at every step by personnel before placement into the computer. This system will satisfy a growing need for improved management.

3.6   SYSTEM INVESTIGATION

The computer is a tool for accelerating calculations some companies use computers extensively.

Computers operate by prodigious numbers of high-speed additions and subtractions as well as storage and quick retrieval of immense amounts of data.

However, these functions do not constitute thinking (the use of judgement the imagination), unlike the existing system where the nutritionist uses his brain and thereby spending long hours in trying to write and adjust the feed formulas. A computer offers to all levels of management unusual speed in collecting, assimilating and reporting data to facilitate decision-making. As for updating, with the proposed system the nutritionist doesn't need to start adjusting the feed formula when the prices of ingredients changes he only needs to feed the new cost into the computer and it automatically alters the formula to maintain the nutritional value at the lowest possible price.

The company needs a computerised system in order to get rid of some of its bottlenecks such as errors, delays, system inefficiencies and

there is always the need to increase profits or reduce costs by eliminating these deficiencies. The new system is going to provide faster and better customer service, thereby forcing the company to keep pace in order to remain competitive and meet the needs of increasing sales and book keeping requirements.

The management accepted the system as the computer can help in providing sophisticated techniques on prices, sales mix and cash flow needs. It could still be used for the other applications.

In addition to feed formulas, computers are used for breeder egg operations and broiler operations.

The management will have at hand information which would be too cumber some to produce by the existing system. All this provides invaluable aid in helping management make major decisions on future capital investments.

3.7   PROJECT FEASIBILTY

For testing project feasibility the following has to be undertaken.

(a)   Operational feasibility

(b)   Technical feasibility

(c)   Economical feasibility

Operational feasibility is concerned with the workability of the proposed information system when developed and installed. The management of the company is going to install personal computers and

also train personnel for implementing the system. It now suffice to say that the proposed project is operational feasible. The kind of computer hardware intend to be used is the IBM 486 with a large memory capacity and chance expansion.

Technical feasibility seeks to clarify if the proposed project can be done with cuttent equipment, existing software technology and available personnel.

So technically, the project is feasible as the IBM 486 computer makes use of the kind of software that is being proposed to be used, they include data base management structure which will be keeping data of the organisation. Others are WordStar, Microsoft word for correspondence and spreadsheet for reports. The proposed computer has a lot of technicians who knows how to repair them, there are also parts available in case a replacement is needed.

Finally, financial feasibility was taken into consideration. It is true that at the implementation stage, the money to be invested is much but within a space of time the organisation will recover this in that the automation makes it faster and makes record more accurate. Formula costs can sometimes be reduced when calculated on the computers rather than by hand depending on the number of ingredients used and the fluctuation in their prices. Savings to be realised through the new system would be passed on to the customer through lower prices.

Within a period of time the proposed system will start generating profits for the organisation. Having one through all these the conclusion was reached that the project is very feasible and should be carried on.

3.8   SYSTEM DESIGN.

The objectives of the new system are

(1)   To formulate least cost poultry ration using the available ingredients.

(2)   Acceptance or rejection of ingredients based on their costs and nutritive value.

(3)   Final cost of a ration and the cost contributed by each ingredient.

(4)   To develop an application software for the formulation of poultry feeds.

(a)   The software was designed in such a way it accepts as input the various ingredient needed in the formulation process,

(b)   Nutrient composition of each of the ingredient

(c)   Nutrient requirement of the bird

(d)   The cost of each ingredients.

The first step is to arrive at some estimate of the nutrient requirements of the animal bird which the ration is intended. Nutrient requirements for animals are expressed in terms of energy protein, (and amino acids), animal elements vitamins and fibre. He nutrient analysis of

feedstuffs is essential. How satisfactory the diet will be depended on the reliability of the feedstuff analysis. Update analytical data on feedstuffs are preferred where available; if not, not average composition data can be used from the NRS tables (National Research Council) or composition data from any other reliable source. Ration or diets are only as good as the analytical information used to formulate them. Both the feedstuff for a diet should be considered in formulation. The programs are built to allow users without programming experience to change ingredient composition and requirement data with simple procedures.

The program will copy information about the birds and calculate the levels or recommended intakes for different nutrients. Entering data and instruction is prompted through a series of screens that show the options available to the user at each stage of the entry process. All functions are selected from menus of options on the program. The main menu provides choices of programs to manipulate the ingredient composition database.

3.9   INPUT SPECIFICATION.

(A)   Poultry data.

Nutrients requirement of poultry as per cent of diet or per kg of diet.

i.   Class of poultry

ii.   Age of poultry, gender

iii.   Protein

iv.   Energy K_J/K_g

v.   Fat %

vi.   Crude fibre %

vii.   Calcium

viii.   Available phosphorus

ix.   Amino acids and methionine %

x.   Recommended intakes for different nutrients

(B)   Ingredient data

(i)   Name of ingredient

(ii)   Nutrient level of each ingredient

(iii)   Protein sources-fish meal, meat meal, groundnut cake etc.

(iv)   Energy sources-maize, millet, guinea corn etc.

(v)   Mineral sources-bone meal, oyestorshell limestone etc

(vi)   Vitamins

(vii)   Salts

(viii)   Cost of each ingredient at rate of inclusion

3.10   OUTPUT SPECIFICATION

(1)   The class of poultry

(2)   The quantity of feed formulated (kg/tonne)

(3)   The part of ration or total feed contributed by each ingredient.

(4)   Nutrients requirement of the animal for which the ration is

(7)   Installation price   - ₦ 15,000

(8)   Two air conditioners   - ₦ 40,000

(9)   Personnel training for 3 weeks – ₦ 140,000

(10)   Maintenance   - ₦ 10,000

(11)   Others

(12)   Software development for

3   weeks of 150 man hours

at   ₦300.00/hr   - ₦ 45,000

Formula costs can sometimes be reduced when calculated on the computers rather than by hand, depending on the number of ingredients used and the money realised can be passed. on to the consumer through lower prices ultimately, there will be formula changes due to price fluctuations. Formulas may be run as often as desired due to changes of ingredient costs.

The cost of computer services has dropped drastically in relation to the work that they can do. Modern computers can calculate faster, store more information in their memories, and print results at a higher rate of speed then by the time the system takes off, the drudger of having to put up with so much paper work, doing a lot of calculation will be eliminated.

A lot of money will be saved on paper wastage as the information is displayed on the terminal and correction can easily. be made before the printout is done.

All information needed are stored and could be retrieved whenever they are needed. So it can be seen that the benefits of computerising the company is too much and should be implemented.

intended.

(5)   The amount of nutrient contributed by each of the ingredients

(6)   Percentage protein

(7)   Energy kJ/Kg

(8)   Percentage fibre

(9)   Calcium %

(10)   Phosphorus %

(11)   Methionine %

(12)   Lysine %

(13)   Cost per tonne (kg)

(14)   Cost at rate of inclusion

3.11   COST/BENEFIT ANALYSIS

As stated earlier the computer hardware proposed to be used is the IBM computer.

Below is the cost estimate system.

(1)   System analysis and design for 3 weeks of 50 men hours at ₦600.00 per hour.

(2)   Integrated package   – ₦ 90,000

(3)   Laser jet printer   – ₦ 60,000

(4)   Storage devices   - ₦ 75,000

(5)   Papers for printing   - ₦ 20,000

(6)   Computer personnel   - salary is continuous

CHAPTER FOUR

4.0 SYSTEM DEVELOPMENT AND IMPLEMENTATION

4.1 CHOICE OF LANGUAGE.

The chosen language in Dbase IV (a database management system package DBMS). A database is a collection of data usually files arranged in such a way that it is independent of any particular program or application. A database management system (DBMS) is a software that construct, expands and maintains that data contained in database. It also provide the interface between the user and the data in such a way that it enables the user to records organise, select, summarise report on and otherwise manage data contained in a database.

4.11 OBJECTIVE OF DATABASE SYSTEM.

(1)   Reduce· data duplication inconsistency and increase is its share ability.

(2)   Increase the integrity of the data.

(3)   Increase the speed in implementing system.

(4)   Improve the standard of the system development.

(5)   Provide a management view of the organisation.

4.12 FEATURES OF THE CHOSEN LANGUAGE.

Dbase IV is one of the most popular and powerful DBMS available for any personnel computers. It is an advanced version of

DbaseIV you can design databases, manipulate and edit records and files, perform database query design labels etc. It has 255 fields per record, up to 99 files can be opened at one time. The most significant of dbase IV over dbase III plus is the full relational database capabilities using SQ(structured query language) that is compatible with IBM machines.

4.13   DATABASE FILE DESCRIPTION.

There are 3 database files in use namely.

(1)   Ingredient database file

(2)   Poultry requirement database file

(3)   Output file

(4)   Input file

INGREDIENT DATABASE FILE.

This is the file that contains all the available ingredient used in the ration. It also contains the composition of each of the ingredients as well as the cost at rate of inclusion. The ingredients chosen are those that must meet quality standards secondly the cost of such ingredient must be as low as possible so as to get the least cost ration.

The ingredients are recorded and coded and update by adding any new item to the old record in the file. The file also contains the cost of the available ingredients cost of ingredients is obtained from the purchasing departments. An ingredient replacement cost sheet is

produced every week. It gives the ingredient code and the costs of the particular ingredient. As the prices of the ingredient changes, the new costs are fed into the computer and it automatically alters the formula to maintain the nutritional value at the lowest possible price.

POULTRY REQUIREMENT DATABASE FILE.

This file contains the class of poultry as well as the nutrient requirements as percent of diet or per kg of diet. It contains all information about the birds as per age, class, %protein, energy kJ/kg, %crude fibre, % calcium, % phosphorus, % lysine, % methionine and the level of each of these ingredients required by the bird in question.

4.2 HARDWARE REQUIREMENT.

Intel 80486 microprocessor.

8MB RAM (expandable to 64 MB)

3.5" Floppy disk drive.

101 enhanced keyboard.

14" colour \Laser jet 3/4 printer

120 MB ID8 Hard disk

3.5" Floppy disk drive

101 enhanced keyboard

14" colour SVCA

Laser jet ¾ printer

APC smart uninterrupted power supply (ups)

4.3 SOFTWARE REQUIREMENT.

Microsoft disk operating system version 6.22

Database Management Package (Dbase V)

Microsoft Windows 98

Microsoft word 7 for Windows 95 (Word '97)

4.4 STARTING THE SYSTEM

At the DOS prompt, change directory to dbase; type "DBASE" and press the enter key; insert the program diskette in drive A and change default to the drive by typing "SET DEFAULT. TO A" and press enter key; type "Do feed formulation" and press the enter key. Dbase will execute the programme file called feed formulation. PRG.

During the execution, the program will clear the screen and request the user to type his/her password. If the correct password, the system will start executing other programs, otherwise, the system will display "wrong password entered try again if the user fails to enter the correct password after three consecutive attempts, the system will display "Access Denied" and then will return to dos prompt details can be processed again with different instructions to produce a 2nd file of results.

Entering data and instruction is prompted through a series of screens that show the options available to the user at each stage of the entry process. All functions are selected from menus or options on the screen. The main menu provides choices of programs to manipulate the ingredient composition database.

4.5   TESTING AND DEBUGGING

The purpose of testing debugging is to show that bugs exist is to find the error or misconception that let to the program failure is to define program changes that correct the error. The developed software was tested & debugged with some data whose results were known.

4.6   CHANGE OVER PROCEDURE

The change from the old to the new system may be achieved in a number of ways.

(a)   DIRECT CHANGE OVER: This entails the complete replacement of the old system by the new in one move when a direct change over is planned, system tests and training should be comprehensive, and the change-over itself planned in detail. It can only be undertaken when there is confidence in the new system otherwise it is least expensive but more risky.

(b)   PARALLEL RUNNING: This means processing current data by both the old and new systems to crosscheck the results. In this change

over procedure the old system is kept alive and operational until the new system has been proved for at least one the real operational environment of place, people equipment and time. It promotes user confidence in that it allows the result of the new system to be compared with the old system before acceptance by the user.

The disadvantage is the extra cost and sometimes the user staff funds clerical operations for the two systems very tedious.

(c)   PILOT RUNNING: In pilot running data from one or more previous periods records for the whole or part of the system is run on the new system after results have been obtained from the old system, and the new results are compared with the old. This method is more like an extended system, test, but it may be considered a more practical form of changeover for organisational reasons.

(d)   STAGED CHANGE-OVER

In this method the new system is introduced piece by piece. A complete part, or logical section, is committed to the new, system while the remaining parts on sections are processed by the old system until the selected part is operating satisfactorily before the remainder is transferred, it tends to prolong the implementation period. The recommended change over procedure is direct changeover. The reason for choosing the direct changeover is because the old system is no longer relevant to the needs of El-Amin feedmill. The new system would completely replace the old one.

4.7 POST IMPLEMENTATION REVIEW

This is intended to check accuracy of the new system with a view to identify unusual situation.

This will be achieved through the following approaches.

-The user recording unusual events that effects the system.

-Determining the effects of the new system on the

organisation.

-Sampling the view of current users towards the new system.

4.7 MAINTENANCE

The complete program is self-documentary, with the help of this documentation, any programmer can modify it without any assistance from the originator. Computer software that deal with virus should be acquired to save the entire program from being corrupted program backups have also been made to safeguard against incidental damages or virus infection.

CHAPTER FIVE

SUMMARY AND CONCLUSION

This work has been able to treat the various steps to take in making the proposed project a success.

The system is designed to provide management of El-AMIN FEEDMILL with timely information and to ensure proper accountability.

Before the design of the new system a thorough study of the existing system was carried out to really get first hand information of what is obtainable in the organisation under consideration.

The implementation of the proposed system will ensure improvement in ration formulation in terms of reliability, security, effectiveness and accuracy of results. As data is entered, immediate response is available and all databases for all applications are properly maintained and back up for the systems effectiveness in the new system are guaranteed.

CONCLUSION

In this work, we have made use of database management structure to store every data and information needed, this makes it easier as dbase provides a lot of facilities like updating, editing or modifying and so on. The speed at which the computer executes task is very fast, therefore this will save a lot of time that are waste unnecessarily in

carrying out some tasks. This will also save a lot of money as a task, which, usually takes days to be performed manually, can be done within minutes by the computer. There will be less paper work involved in ration formulation. The most information will be displayed on the screen before the print out is done. Any correction is effected on the screen, thereby saving a lot of money from paper wastes.

Though the cost of computerisation may be high, however, the benefits to be derived from it can easily out weight the cost, provided the system is properly implemented.

RECOMMENDATION

Under the circumstances it was tested the project has been found to work effectively and efficiently.

However, for implementation at El-Amin feedmill 486 IBM computer with 66 MHz speed and a hard disk of storage capacity 640 MB RAM is recommended due to the volume of work expected Laser jet ¾ printer and enhanced key board is recommended.

As subsequent person working on this project should concentrate mostly on maintenance and expansion of the system. This project work even though has been tested and found working does not mean that it is completely free of limitations. It is therefore suggested that further work be carried out on this subject when more materials must have been made available to further improve performance of this system.

There are no sufficient software development materials in the organisation. It is therefore suggested that software development materials be purchased to improve that quality of research work computer staff remuneration should also be enhanced to boost their morale.

In the light of all these advantages and many more. It is recommended that the new system will be the best for the organisation.

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```
*****************************************************
***    SECURITY:  CHIDOLUE MARIA              ***
***    P.G.D. PROJECT                         ***
***    PGD/MCS/206                            ***
***                                           ***
*****************************************************
SET TALK OFF
SET ECHO OFF
SET STATUS OFF
SET COLOR TO W+/B
set escape on
PUBLIC ARRAY CON[20], X[20,40], PR[20]
PUBLIC ARRAY ROW[20,40]
PUBLIC ARRAY C[20]
store 0 to posx, posy
CLEAR
KE = .T.
DO WHILE KE
@4,6 TO 22,70 DOUBLE
@8,8 SAY   "DATE              :  10-09-98"
@10,8 SAY "PROJECT TITLE  :   APPLICATION OF COMPUTERS TO "
@12,8 SAY "                   POULTRY FEED FORMULATION "
@14,8 SAY "A CASE STUDY OF:   EL-AMIN POULTRY"
@22,8 SAY "PRESS ANY KEY TO CONTINUE===>"
KE = .F.
WAIT ""
ENDDO
CLEAR
I = 0
DO WHILE I < 20
   I = I + 1
   CON[I] = 0
   PR[I]=0
   C[I] = 0
   J = 0
   DO WHILE J < 40
      J = J + 1
      ROW[I,J] = 0
      X[I,J] = 0
   ENDDO

ENDDO

SET TALK OFF
SET ECHO OFF
SET ESCAPE OFF
SET STATUS OFF
KE = .T.
DO WHILE KE
@4,32 SAY "EL-AMIN POULTRY"
@6,28 SAY "FEED FORMULATION SYSTEM"
STORE SPACE(1) TO CHOICE1
@7,20 TO 22,60 DOUBLE
@10,22 CLEAR TO 21,59
@12,25 SAY "1 == INGREDIENT COMPOSITION"
@14,25 SAY "2 == NUTRIENT REQUIREMENTS"
@16,25 SAY "3 == FORMULATE FEED"
@18,25 SAY "4 == QUIT"
@20,25 SAY "ENTER YOUR CHOICE"
@20,45 GET CHOICE1 PICT "@!"
```

```
  READ
CLEAR
   DO CASE
   CASE CHOICE1 ='1'
     DO COMPOSE
   CASE CHOICE1 ='2'
     DO COMPOSE
   CASE CHOICE1 ='3'
     DO FEEDS
   CASE CHOICE1 ='4'
     KE = .F.
   ENDCASE
CLEAR
loop
ENDDO
RETURN

PROCEDURE COMPOSE
XE = .T.
DO WHILE XE
CHOICE=' '
@4,20 TO 23,70 DOUBLE
@6,22 SAY "INGREDIENT COMPOSITION"
@9,30 SAY "1 == ADD RECORD(s)"
@11,30 SAY "2 == DELETE RECORD(s)"
@13,30 SAY "3 == MODIFY RECORD(s)"
@15,30 SAY "4 == PRINT RECORD(s)"
@17,30 SAY "5 == EXIT"
@20,30 SAY "ENTER YOUR CHOICE"
@20,55 GET CHOICE PICT "@!"
  READ
   DO CASE
   CASE CHOICE='1'
     DO ADDER
   CASE CHOICE='2'
     DO DELETER
   CASE CHOICE='3'
     DO MODIFIER
   CASE CHOICE='4'
     DO PRINTE
   CASE CHOICE='5'
     CLEAR
     XE = .F.
   ENDCASE
   loop
   ENDDO
RETURN


PROCEDURE ADDER
 store 'Y' to ans
 set stat off
 do while ans ='Y'
  IF CHOICE1·= '1'
  clear
  use ingred
  store Space(16) to mname
  @1,10 Say "Enter Ingredient Name: " get mname Pict "@!"
  read
  ELSE
```

```
        clear
        use require
        store Space(16) to mname
        @1,10 Say "Enter Class of Poultry: " get mname Pict "@!"
        read
    ENDIF
    locate all for upper(name) = upper(mname)
    if found()
        @8,20 say 'Record already exist'
    else
        store 0 to mprotein, menergy, mether, mfibre
        store 0 to mlysine, mmeth, mcalcium, mphospho
        DO GETDATA
        READ
            clear
            append blank
            replace name with mname, protein with mprotein
            replace energy with menergy, ether with mether
            replace fibre with mfibre, lysine with mlysine
            replace meth with mmeth, calcium with mcalcium
            replace phospho with mphospho
    endif
        @10,10 to 12,50
        store 'N' to ans
        @11,12 say 'Are there more records? (Y/N)' get ans pict '!';
                    valid ans $ 'YN' error 'Invalid entry !!!'
        read
        close data
    enddo
CLEAR
return


Procedure DELETER
    store 'Y' to ans
    do while ans= 'Y'
        clea
        @2,15 to 4,55
        @3,20 say 'Deletion of record'
    IF CHOICE1 = '1'
    clear
    use ingred
    store Space(16) to mname
    @1,10 Say "Enter Ingredient Name: " get mname Pict "@!"
    read
    ELSE
    clear
    use require
    store Space(16) to mname
    @1,10 Say "Enter Class of Poultry: " get mname Pict "@!"
    read
    ENDIF
    locate all for upper(name) = upper(mname)
    if found()
        @10,10 to 12,50
        store 'N' to reply
        @11,12 say 'Are you sure? (Y/N)' get reply pict '!';
            valid reply $ 'YN' error 'Invalid entry!!!'
        read
        if reply = 'Y'
```

```
            dele
            pack
        endif
else
    @8,20 say 'Records does not exist'
    endif
    @10,10 clea to 12,50
    @10,10 to 12,50
    store 'N' to ans
    @11,12 say 'Delete more Records? (Y/N)' get ans pict '!'
    read
    close data
enddo
CLEAR
return


Procedure MODIFIER
   use ingred
   store 'Y' to ans
   do while ans = 'Y'
      clea
   IF CHOICE1 = '1'
   clear
   use ingred
   store Space(16) to mname
   @1,10 Say "Enter Ingredient Name: " get mname Pict "@!"
   read
   ELSE
   clear
   use require
   store Space(16) to mname
   @1,10 Say "Enter Class of Poultry: " get mname Pict "@!"
   read
   ENDIF
   locate all for upper(name) = upper(mname)
   if found()
      store name to mname
      store protein to mprotein
      store energy to menergy
      store ether to mether
      store fibre to mfibre
      store lysine to mlysine
      store meth to mmeth
      store calcium to mcalcium
      store phospho to mphospho
    DO GETDATA
    READ
    clear
      replace name with mname, protein with mprotein
      replace energy with menergy, ether with mether
      replace fibre with mfibre, lysine with mlysine
      replace meth with mmeth, calcium with mcalcium
      replace phospho with mphospho
else
    @8,20 say 'Record does not exist'
endif
    @10,10 to 12,50
    store 'N' to ans
    @11,12 say 'Modify more Records? (Y/N)' get ans pict '!';
```

```
                    valid ans $ 'Y/N' error 'Invalid entry!!!'
      read
      close data
enddo
CLEAR
return

Procedure FEEDS
 STORE 0 TO NUM
   store space(1) to pp
   set alternate to "gg.out"
   set alternate on
   use require
   store Space(16) to mname
   @1,10 Say "Enter Class of Poultry: " get mname Pict "@!"
   read
   locate all for upper(name) = upper(mname)
   if found()
      store name to mname
      store amount to PR[1]
      store protein to PR[1]
      store energy to PR[2]
      store ether to PR[3]
      store fibre to PR[4]
      store lysine to PR[5]
      store meth to PR[6]
      store calcium to PR[7]
      store phospho to PR[8]
      close data
      use ingred
*     COUNT TO NUM
      NUM = 4
      VAR = 4
      GO TOP
      i = 0
      do while .not. eof()
       i = i + 1
*     store amount to X[I,1]
      store protein to X[I,1]
      store energy to X[I,2]
      store ether to X[I,3]
      store fibre to X[I,4]
      store lysine to X[I,5]
      store meth to X[I,6]
      store calcium to X[I,7]
      store phospho to X[I,8]
      skip
      enddo
      close data
      DO GETPRICE
      READ
      * SET UP SIMPLEX TABLE
      I = 0
      DO WHILE I < VAR+1
         I = I + 1
         J = 0
         DO WHILE J < NUM
          J = J + 1
          IF I <= VAR
             ROW[I,J] = X[I,J]
```

```
            ELSE
                ROW[I,J] = -PR[J]
            ENDIF
            ENDDO
            K = J
            DO WHILE K < NUM+VAR+1
              K = K + 1
              IF K = NUM + I
                ROW[I,K] = 1
              ELSE
                ROW[I,K] = 0
              ENDIF
            ENDDO
            if i <= VAR
                ROW[I,K+1] = CON[I]
            else
                row[i,k+1] = 0
            endif
        ENDDO
        i = 0
        do while i < VAR+1
            j = 0
            i = i + 1
            ?
            DO WHILE J < NUM+VAR+2
              J = J + 1
              ?? STR(ROW[I,j],8,2)
            ENDDO
        enddo
    ?
    ?
        @ 22,20 get pp pict "!"
        read
        flag = 1
        do while flag = 1
            DO PIVOT
            i = 0
        do while i < VAR+1
            j = 0
            i = i + 1
            ?
            DO WHILE J < NUM+VAR+2
              J = J + 1
              ?? STR(ROW[I,j],8,2)
            ENDDO
        ENDDO
          ? posy, posx
          ?
          ?
          ?
          ?
        @ 22,20 get pp pict "!"
        read
        if pp = 'G'
            flag = 0
        endif
        enddo
wait
    DO PRINTAN
else
```

```
         @8,20 say 'Record does not exist or invalid Class of Poultry'
WAIT
endif
CLEAR
return


Procedure PIVOT
clear
i= 0
small= 0
posx = 0
do while i < NUM+VAR+2
    i = i + 1
    if (row[num+1,i] < small )
       small = row[num+1,i]
       posx = i
    endif
    loop
enddo
if posx = 0
    flag = 0
    return
endif
i = 0
do while i < VAR
    i = i + 1
       con[i] = row[i,NUM+var+2]/row[i,posx]
enddo
i = 0
small= 99999999
posy = 0
do while i < VAR
    i = i + 1
    if (con[i] < small .AND. con[i] > 0 )
       small = con[i]
       posy = i
    endif
    loop
enddo
i= 0
DIVI = ROW[posy,posx]
do while i < NUM+VAR+2
    i = i + 1
    row[posy,i] = row[posy,i]/DIVI
enddo
i = 0
do while i < VAR+1
 i = i + 1
 DIVI = ROW[I,posx]
 if i <> posy
    j  = 0
    do while j < NUM+VAR+2
     j = j+ 1
     row[i,j]=row[i,j]+(-DIVI*row[posy,j])
    enddo
 endif
enddo
i= 0
flag = 0
```

```
do while i < NUM+VAR+2
    i = i + 1
    if row[num+1,i] < 0
        flag = 1
    endif
enddo
return


Procedure PRINTE
define window user from 1,1 to 22,79 none color W+,B
activate window user
set stat off
set alternate to 'feed1.out'
set device to screen
        set alternate on
        set space on
        DO HEADING with val(choice1)
        if choice1 = '1'
            use ingred
        else
           use require
        endif
        go top
do while .not. eof()
    ? '|',name,'|',str(protein,2),'|',str(energy,5),'|',str(Ether,5,2),
    ?? str(Fibre,5,2),'|',str(Lysine,4,2),'|',
    ?? str(meth,4,2),'|',str(Calcium,5,2),'|',str(Phospho,5,2),'|'
    ? replicate ('-',79)
    skip
enddo
?
DO KEEY
set alternate off
wait
close data
deactivate window user
return

Procedure PRINTAN
define window user from 1,1 to 22,79 none color W+,B
activate window user
set stat off
set alternate to 'feed2.out'
set device to screen
        set alternate on
        set space on
        DO HEADING with 3
?
?
? space(30) ,mname
?
        USE INGRED
        GO TOP
        I = 0
?
?
do while I < NUM
  I = I + 1
  ? "X",STR(I,2),SPACE(5),NAME,SPACE(10),STR(ROW[NUM+1,VAR+I],9,4)
```

```
      j = 0
      c[i] = 0
      do while j < VAR
        j = j + 1
        c[i] = c[i] + (X[j,i] * row[num+1,var+j])
      enddo
      SKIP
   enddo
   ?
   *?   "AMOUNT                          :" ,STR(C[1],9,2)
   ?    "CRUDE PROTEIN %                 :" ,STR(C[1],9,2)
   ?    "ENERGY kJ/kg                    :" ,STR(C[2],9,2)
   ?    "ETHER EXTRACT (0.1)%            :" ,STR(C[3],9,2)
   ?    "CRUDE FIBRE %                   :" ,STR(C[4],9,2)
   *?   "LYSINE %                        :" ,STR(C[5],9,2)
   *?   "METHIONINE %                    :" ,STR(C[6],9,2)
   *?   "CALCIUM %                       :" ,STR(C[7],9,2)
   *?   "PHOSPHORUS % (Available)   :" ,STR(C[8],9,2)
   ?
   set alternate off
   wait
   close data
   deactivate window user
   return


PROCEDURE GETDATA
CLEAR
@1,10 to 22,70 DOUBLE
@ 4,15 SAY "NAME                              : " + MNAME
@ 6,15 SAY "CRUDE PROTEIN %                  :" GET MPROTEIN PICT  "99"
@ 8,15 SAY "ENERGY kJ/kg                     :" GET MENERGY PICT "99999"
@ 10,15 SAY "ETHER EXTRACT (0.1)%            :" GET METHER PICT "99.99"
@ 12,15 SAY "CRUDE FIBRE %                   :" GET MFIBRE PICT "99.99"
@ 14,15 SAY "LYSINE %                        :" GET MLYSINE PICT "99.99"
@ 16,15 SAY "METHIONINE %                    :" GET MMETH PICT "99.99"
@ 18,15 SAY  "CALCIUM %                      :" GET MCALCIUM PICT "99.99"
@ 20,15 SAY  "PHOSPHORUS % (Available) :" GET MPHOSPHO PICT "99.99"
RETURN


PROCEDURE GETPRICE
CLEAR
@1,10 TO 22,70 DOUBLE
use ingred
go top
i = 0
*CON[1] =0
do while I < NUM
    i = i + 1
    @ 3+i,15 SAY "PRICE OF "+NAME GET CON[I] pict "999999.99"
    READ
    skip
enddo
close data
return



PROCEDURE HEADING
parameter kk
? space(14),"***********************************************************"
? space(14),"*       E L - A M I N      F E E D      M I L L           *"
```

```
?  space(14),"*                                                      * "
?  space(14),"*    F E E D S   F O R M U L A T I O N   S Y S T E M   *"
?  space(14),"*******************************************************************"
?
if kk = 1
?  space(23),"*********************************"
?  space(23),"* NUTRIENT LEVELS OF INGREDIENTS *"
?  space(23),"*********************************"
?
?  REPLICATE("*",79)
?  "| INGREDIENTS          | A |   B  |   C  |   D   |   E  |  F  | ·G
?  REPLICATE("*",79)
else
if kk = 2
?  space(24),"***************************************"
?  space(24),"* NUTRIENT REQUIREMENTS OF POULTRY *"
?  space(24),"***************************************"
?
?  REPLICATE("*",79)
?  "| CLASS OF POULTRY | A |   B  |   C  |   D   |   E  |  F  |  G
?  REPLICATE("*",79)
else
?  space(23),"*************************************"
?  space(23),"*  DIET COMPOSITION AND ANALYSIS *"
?  space(23),"*************************************"
endif
ENDIF
RETURN


PROCEDURE KEEY
?
?  "KEY:"
?  "A = CRUDE PROTEIN %      B = ENERGY kJ/kg      C = ETHER EXTRACT (0.1)
?  "D = CRUDE FIBRE %       E = LYSINE %          F = METHIONINE %"
?  "G = CALCIUM %           H = PHOSPHORUS (Available) %"
RETURN
```

```
******************************************************
*          E L - A M I N    F E E D    M I L L        *
*                                                      *
* F E E D S    F O R M U L A T I O N    S Y S T E M   *
******************************************************

        ****************************************
        *  NUTRIENT REQUIREMENTS OF POULTRY  *
        ****************************************
```

ASS OF POULTRY	A	B	C	D	E	F	G	H
ICK STARTERS	20	11088	3.40	5.00	1.00	0.73	1.00	0.50
OWERS	18	10460	3.30	7.20	0.82	0.60	1.00	0.43
OILER STARTERS	23	12134	4.20	3.50	1.25	0.86	1.00	0.43
ROILER FINISHER	20	12134	2.30	3.50	1.09	0.80	0.80	0.40
AYERS	16	11213	3.30	6.70	0.84	0.51	3.50	0.50
REEDERS	16	10837	2.80	5.00	0.84	0.51	3.20	0.55

```
:
: CRUDE PROTEIN %    B = ENERGY kJ/kg    C = ETHER EXTRACT (0.1)%
: CRUDE FIBRE %      E = LYSINE %        F = METHIONINE %
: CALCIUM %          H = PHOSPHORUS (Available) %
```

```
***************************************************
*        E L - A M I N    F E E D    M I L L       *
*                                                  *
*  F E E D S   F O R M U L A T I O N   S Y S T E M *
***************************************************


        ****************************************
        * NUTRIENT LEVELS OF INGREDIENTS *
        ****************************************
```

GREDIENTS	A	B	C	D	E	F	G	H
IZE	10	14359	4.00	2.00	0.25	0.18	0.01	0.09
INEA CORN	11	13807	3.00	2.00	0.35	0.10	0.04	0.32
LLET	10	10711	4.00	8.00	0.40	0.18	0.02	0.10
HEAT MIDDLINGS	17	7824	3.50	8.50	0.90	0.25	0.10	0.30
ALM KERNEL MEAL	18	9100	6.00	12.00	0.64	0.39	0.21	0.16
ICE BRAN	11	11966	12.50	12.50	0.50	0.24	0.04	0.46
ROUNDNUT CAKE	45	11046	6.00	5.00	1.60	0.48	0.20	0.20
SOYABEAN MEAL	42	11297	3.50	6.50	2.80	0.59	0.20	0.60

Y:
= CRUDE PROTEIN %   B = ENERGY kJ/kg   C = ETHER EXTRACT (0.1)%
= CRUDE FIBRE %   E = LYSINE %   F = METHIONINE %
= CALCIUM %   H = PHOSPHORUS (Available) %

```
*****************************************,****************
*       E L - A M I N    F E E D    M I L L         *
*                                                    *
*  F E E D S   F O R M U L A T I O N   S Y S T E M  *
******************************************************

        ************************************
        *  NUTRIENT LEVELS OF INGREDIENTS  *
        ************************************
```

GREDIENTS	A	B	C	D	E	F	G	H
.IZE	10	14359	4.00	2.00	0.25	0.18	0.01	0.09
.LM KERNEL MEAL	18	9100	6.00	12.00	0.64	0.39	0.21	0.16
ICE BRAN	11	11966	12.50	12.50	0.50	0.24	0.04	0.46
ROUNDNUT CAKE	45	11046	6.00	5.00	1.60	0.48	0.20	0.20
OYABEAN MEAL	42	11297	3.50	6.50	2.80	0.59	0.20	0.60

```
:
= CRUDE PROTEIN %     B = ENERGY kJ/kg      C = ETHER EXTRACT (0.1)%
= CRUDE FIBRE %       E = LYSINE %          F = METHIONINE %
= CALCIUM %           H = PHOSPHORUS (Available) %
```

```
***********************************************************
*          E L - A M I N    F E E D    M I L L            *
*                                                         *
* · F E E D S    F O R M U L A T I O N    S Y S T E M     *
***********************************************************


           ***********************************
           *   DIET COMPOSITION AND ANALYSIS  *
           ***********************************
```

LAYERS

X	1	MAIZE	0.2901
X	2	PALM KERNEL MEAL	0.0000
X	3	RICE BRAN	0.4136
X	4	GROUNDNUT CAKE	0.1900

```
CRUDE PROTEIN %          :      16.00
ENERGY kJ/kg             :   11213.00
ETHER EXTRACT (0.1)%     :       7.47
CRUDE FIBRE %            :       6.70
```

```
************************************************
*       E L - A M I N    F E E D    M I L L     *
*                                               *
*  F E E D S   F O R M U L A T I O N   S Y S T E M  *
************************************************

            ************************************
            *   DIET COMPOSITION AND ANALYSIS  *
            ************************************


                    CHICK STARTERS


X  1        MAIZE                          0.3487
X  2        PALM KERNEL MEAL               0.0000
X  3        RICE BRAN                      0.2188
X  4        GROUNDNUT CAKE                 0.3135

CRUDE PROTEIN %           :      20.00
ENERGY kJ/kg              :   11088.00
ETHER EXTRACT (0.1)%      :       6.01
CRUDE FIBRE %             :       5.00
```

```
***************************************************
*        E L - A M I N    F E E D    M I L L          *
*                                                     *
*  F E E D S    F O R M U L A T I O N    S Y S T E M  *
***************************************************


        ***********************************
        *   DIET COMPOSITION AND ANALYSIS *
        ***********************************


                        GROWERS


X  1        MAIZE                           0.3140
X  2        PALM KERNEL MEAL                0.4921
X  3        RICE BRAN                       0.0000
X  4        GROUNDNUT CAKE                  0.1334

CRUDE PROTEIN %              :       18.00
ENERGY kJ/kg                :    10460.00
ETHER EXTRACT (0.1)%         :        5.01
CRUDE FIBRE %               :        7.20
```