A DAIRY FARM RECORDS MANAGEMENT SYSTEM

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DECLARATION

I OGWAL KENNEDY CHRIS, declare that this dissertation is my original work and has never been submitted to any other institution for purpose of academic reward.

Signature: .....

Name: OGWAL KENNEDY CHRIS

Date: 23/08/19

APPROVAL

I certify that this dissertation is an individual original work and has been submitted to the School of statistics and planning.

Signature: .....

Supervisor: Ambrose Serunjogi

Date: 23/08/2019

DEDICATION

I kindly dedicate this dissertation to the Almighty God, my parents, friends, supervisor and classmates of B. Stat computing.

ACKNOWLEDGEMENT

The Almighty God has been the strength and pillar of my life, His love, grace, blessings and mercy have seen me through this academic journey. With great honor, I thank my father Mr. Ameny Sam for the endless support and provision towards my academics and my beautiful mother Mrs. Ekel Irene whose love has kept me standing.

Great thanks also to my supervisor Mr. Sserunjogi Ambrose and all other lecturers for the guidance towards completion of this project. A special thanks also goes to my B. Stat computing classmates who have been there to support in every way making the completion of this project a success.

I also thank Mr. Taremwa Precious the head of the dairy unit at MUARIK for allowing me to visit the dairy unit and showing me how the various records are kept at the unit.

ABSTRACT

Dairy farming is largely practiced in the western and southern parts of this nation. The highest number of the farmers carry it out on a small scale but still contributing to 9% of the GDP of the nation.

This project led to creation of a computerized records management system for the dairy farms which solves problems of inaccuracy in records and lack of the very farm records. The system keeps records of all cattle on the farm and monitors their productivity and health. The records kept include; animal statuses, treatment, service, pregnancy and calf records. The system also manages employee and milk distribution records with their various reports inform of graphs for easier interpretation.

The farm manager logs in into the system through providing his username and password thus enabling him to edit the employee details and also manage the milk distribution records. The veterinary doctor also logs into the system and he is able to monitor the animal statuses, edit the treatment, service, pregnancy and vaccination records of the cattle. The milk maid also has access to the system through providing his username and password enabling him record milk collected that day from the various lactating cows and he also determines which cows are lactating and when they will be moved to non-lactating group.

This system is designed using NetBeans, My SQL and IDE java language. It is a desktop application that runs on windows computers that have the java environment installed in them.

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LIST OF ABBREVIATIONS

DFD	Data flow diagram
IDE	Integrated development environment
MUARIK	Makerere University Agricultural Research Institute Kabanyolo
SQL	Structured query language

CHAPTER ONE: INTRODUCTION

1.0 Background of the study

Dairy farming is an agriculture extension that deals with rearing of cattle for the main purpose of milk production. Dairy farming is widely practiced in the nation as Uganda is a tropical region with plenty of pasture provided by rainfall thought the year. Dairy farming is a major activity in the southwestern, central, and northeastern parts of Uganda, with the sector contributing significantly to the economic, nutritional, and employment opportunities of the rural communities in those areas.

According to (" Industry Focus: Dairy Industry in Uganda," 2016) the dairy industry is a major contributor of GDP (9%) of national economy which makes dairy farming a key source of living for the people in the nation. The government Dairy Development Authority (DDA) and (Ladu, 2018) stated that annual national milk output stood at 2.2 billion liters. This therefore calls for proper dairy record keeping which provides a chance of increased profitability from the adventure.

1.2 Statement of problem

There are many dairy farmers who do not take records on their farms and the little that take the records do it manually bringing about a high risk of errors and loss of data. The dairy farmers don’t see the need of the records as they are ignorant of the impact it can bring to their farms and finances. The database management system for the dairy farm records will make the record keeping simpler and needful as it will provide analysis that will influence key decisions taken on the farm such as kind of feeds to give animals and the frequency of treatment. According to (Dexcel, 2010) automation of farm activities including record keeping to reduce costs is a major

feature of future dairy farming. The database management system for the record taken on dairy farms will therefore enable farmers to continue being major players in the dairy industry even in the future.

1.3 Objectives

The major objective of this project is to create an electronic dairy records database management system that will provide storage and statistical analysis for the farmers.

The other objectives of the project are;

- To improve on dairy farm records management;
- To provide statistics that will help in financial planning decisions;
- To provide reports that determine the productivity of individual cows;
- To monitor routine management activities on the farm;
- To equip the farmer with reliable information that will help in livestock management decisions.

1.4 Scope of study

The dairy records database management system will specifically work for small-scale farms in Uganda. This is because according to (Kabwanga & Yetisemiyen, 2015), small-scale farmers dominate Uganda's dairy production owning over 90% of the cattle population of Country.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

There are many domesticated animals in Uganda but a few are kept for the purpose of milk production. People rare goats and cows for this very purpose in Uganda though cows are the dominant ones. Below is an overview of dairy farming in Uganda.

Dairy farming is practiced in all regions of the country with the western and central regions being the most dominant ones in terms of milk production accounting for 50% of total production in the country. This production is predictable and available all year round. During the dry season, the northern, northeastern, and eastern parts of the country experience a drastic reduction in milk output. The cattle kept are predominantly indigenous breeds, accustomed to the weather and husbandry practices as practiced by the herder communities, conditions that many exotic breeds could not withstand. Exotic breeds have been introduced, but the majority of farms have mixed breeds, whose productivity, although higher than the traditional breeds, does not match that of the exotics. (" Industry Focus: Dairy Industry in Uganda," 2016)

Dairy farming is carried out in different systems which are the various methods and models for keeping the cattle on the farms. According to (Mubiru & Baltenweck, 2007), Uganda practices five different dairy production systems, listed in descending order of intensification: zero-grazing, semi-intensive, fenced, tethered and herded. The agriculture practice in Uganda is largely subsistent and this applies also to milk production. (Ekou, 2014)

2.1 Records taken on dairy farm

Records are data variables which can be transformed into information needed for influencing key decisions on a farm. Records taken on the farm are few but very important and necessary for

success of farm activities. The three main elements in dairy farm record keeping are the milk productivity, fertility, and health. (Mulligan & O'Gardy, 2007)

2.2 Need for records database management system for dairy farms

Records are an inevitable part of any successful adventure or activity, every farmer therefore aiming at succeeding or getting the most of his efforts would require a helping hand offered by records. According to (Jeyabalan, 2010), a noteworthy point in the development of the dairy industry is proper record keeping. Record keeping improves a farmer's decision making significantly, as errors are eradicated and saves the farm's vital scarce resource, mainly over time. The ultimate purpose of a recording system is to improve the level of herd performance by achieving things better, running the farm more competently, or reducing the possibility of poor future performances.

Dairy industry in Uganda has been deeply affected by the various cattle disease epidemic outbreaks and the end result has been loss of large number of cattle. The impact or effect of these outbreaks can be greatly reduced through proper dairy health record keeping made possible through electronic database management systems. Health records of a cow will tell the farmer on when to repeat a treatment, and help him to know exactly how a disease has preceded, as well as the effectiveness of the given treatments. (Jeyabalan, 2010)

According to(Mulligan & O'Gardy, 2007), the reduction of fertility in dairy herds is one of the most crucial reasons affecting a farmer's profitability. In order to overcome this problem, the first element that has to be taken into consideration is to maintain proper fertility records. Recording milk production of each cow per lactation is also an important aspect in a dairy farm. The availability of continuous lactation records is the most important tool for efficient milk

production, and can be a guide in proper feeding, breeding, and weeding out the low-producing and unprofitable cows. (Hodgson, 1957)

All of the above call for an efficient records database management system for a dairy farm. Technological evolution has provided a comprehensive toolset far surpassing traditional methods over which accurate and highly sophisticated management of animal capital can be performed. (Voulodimosa, 2010)

2.3 History of automation of dairy farm records management

The trace of earliest records taken from cows goes back to as early as 1854 which was a production record of 232 kilograms of churned butter in 350 days by the jersey cow, flora 13 while computerization of dairy records took a long while to be established with the first attempt being made in 1951. (Voelker, 1981)

After world war 2, records managers came up with the idea of automation of records in order to be able to process recorded information as immediately as possible. (Rhodes, 1991)

2.4 Advantages of automation of dairy farm records management

According to (Trevarthen & Michael, 2008), the capabilities of automated systems are hard to achieve using traditional paper-based techniques. This is because the farmers are able to easily and immediately view information of individual cattle, analyze, manipulate and sort data hence generating reports using the automated systems which is difficult with paper based techniques.

This is possible because computers provide valuable and efficient assistance in organizing, summarizing, analyzing and legibly putting facts at finger tips (Conlin, 1974) hence enabling farmers to easily deal with increased complexity of decision making (Pietersma, Lacroix, &

Wade, 1998). They accomplish this through sensitivity analysis with speed processing and accuracy. (Jofre-Giraudo, Streeter, & Lazarus, 1990)

Economically, automated systems provide short term dairy management and operational control (Devir, Renkema, Huirne, & Ipema, 1993) through integrated systems that support exchange of information by interdependence among levels. (Pietersma et al., 1998) This reduces labor needs (Trevarthen & Michael, 2008) and operational costs creating a large economic effect on farm management. (Arendzen & Van Scheppingen, 2000)

Automation of the system also enables easier monitoring of activities which helps predict ovulation and artificial insemination times (Stevenson, Hill, Nebel, & DeJarnette, 2014) making the servicing of cows on heat a success.

Lastly, reports generated by automated systems help in cross relations between farm aspects and aid in detection of problem areas (Noordhuizen & Buurman, 1984) bringing about increase in average milk production. (Tomaszewski, Van Asseldonk, Dijkhuizen, & Huirne, 2000)

2.5 Challenges of automation of dairy farm records management

Uganda and Africa generally has high illiteracy rates with just major efforts being taken to reduce the rates. There are few farmers who really have the knowledge and skills to effectively use the records database management system. The utilization of a computerized recording system by small scale farmers is very rare and not given the priority. Among the main reasons for the lack of usage are due to the cost of buying the system which is expensive, complexity of the program, and the level of computer literacy (Jeyabalan, 2010).

2.6 Conclusion

With the introduction of computer studies in primary and secondary schools during early stages of learning, many people are getting equipped with the skills and knowledge required to run such a records database management system. This makes it such a relevant tool for the farmers in the nation.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter involves the stages or steps involved in designing of the proposed system. The stages will involve collection of data, designing of the system and then also the implementation of the system.

3.2 Statistical Hypothesis

Ho represents the null hypothesis while **Ha** represents the alternative hypothesis

Ho: There is more productivity while using manual system as compared to using the computerized system for dairy farm records management.

Ha: There is less productivity while using manual system as compared to computerized system for dairy farm management.

3.3 System analysis and design

3.3.1 Data collection

Before designing of the system, I visited MUARIK dairy unit along gayaza road and learnt about the various records kept on the farm and the system that they use for management of the records. I collected the primary data using a questionnaire.

3.3.2 Review of existing system

The existing system at MUARIK dairy unit is both manual and computerized but largely manual involving a lot of records being kept on paper templates with some few later being filled into Microsoft excel sheets.

3.3.3 Problems of existing system

The major problems of the existing system include the following;

- The system is largely paper based therefore making the whole process time consuming. This is because it takes time to consistently pen down all the daily records kept on the farm;
- There are also too many records to be taken making it tiresome. The records kept include breeding, production, health records and many others making it quite tiresome for the manager to maintain;
- The risk of data loss. This is because the records are kept on papers which are later put in files kept in manager's office. These files can be easily stolen by crafty individuals when they access the office illegaly.

3.4 Implementation methodology and system design

3.4.1 Software tools

The proposed system was designed using Java net beans which uses the java programming language and environment. The system was designed with MY SQL database and XAMPP server which runs the database.

The context diagrams and level one dataflow diagrams were designed using visual paradigm software and the references and citations were inserted using Endnote.

3.4.2 Hardware requirements

The proper use and running of the proposed system requires a computer with at least 2GB RAM and above.

CHAPTER FOUR: THE PROPOSED SYSTEM

4.1 Introduction

This chapter deals with the functions and processes of the proposed system.

4.2 System requirements

4.2.1 Functional requirements

- The system captures animal statuses;
- The system edits and captures new employee details;
- The system captures milk distribution records;
- The system captures total amount of milk produced by individual cows per week;
- The system provides milk distribution and production reports using of bar graphs;
- The system also captures lactating and non-lactating cow details.

4.2.2 Non-functional requirements

- The system runs in a windows environment;
- The system requires passwords and usernames in order to be accessed;
- The system requires a farmer to have a computer to be able to operate it.

4.3 Description of proposed system

- The proposed system is an improvement of the current manual system with automation and computerized management of the records hence reducing the burden and tiresomeness of the records;
- The system is operated by the farm manager, veterinary doctor and milk maids with the manager as the administrator;

- The system captures the animal, service, milk, employees and routine management records of the farm;
- The system also provides reports about milk production and the distribution.

4.4 Data flow diagrams for proposed system

The context diagram shows an overview of the entire system and how it relates with the other external entities such as the manager, veterinary doctor and so on. The details of the major processes of the system are described in the level one DFD.

4.4.1 Context diagram

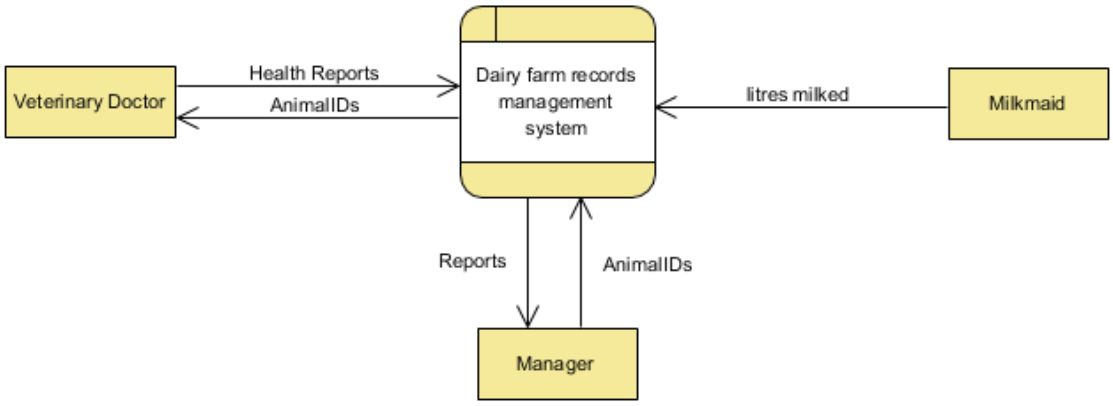


Figure 1 Context Diagram

4.4.2 Level one DFD

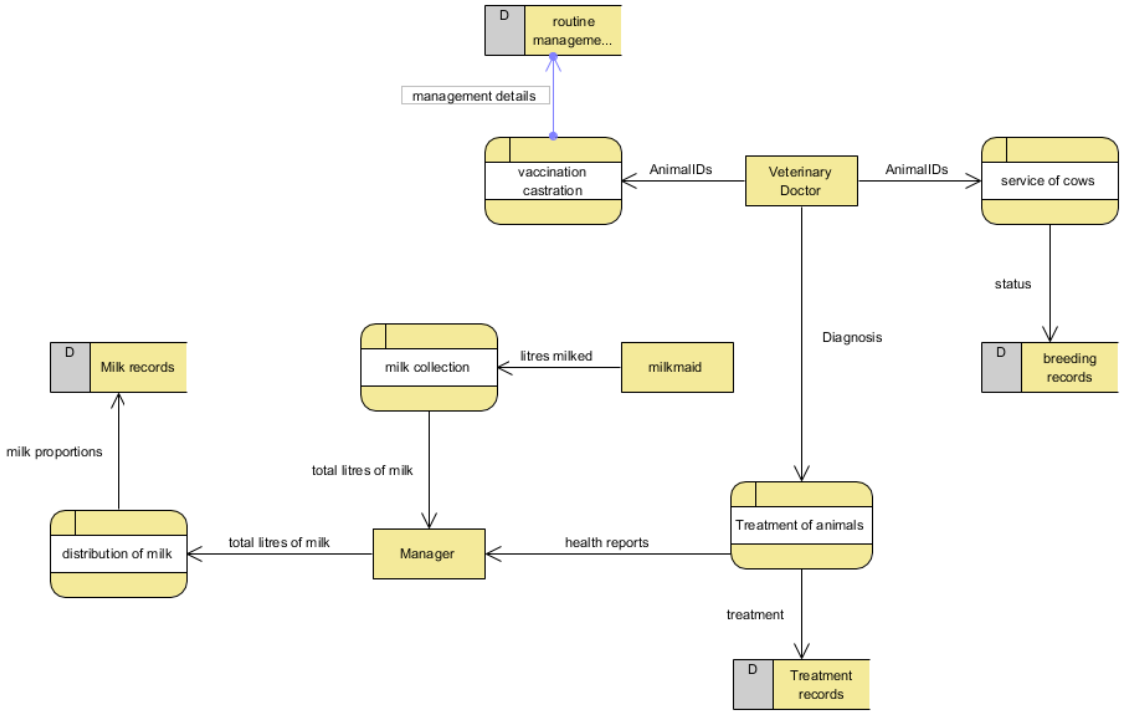


Figure 2 level one DFD

4.5 Data dictionary for proposed system

TABLE NAME	ATTRIBUTE NAME	CONTENTS	DATA TYPE	REQUIRED	PRIMARY KEY
Animal		Animal table			
	Animal ID	Name and tag number	Varchar(70)	Yes	PK
	Lactating or milking	Confirmed pregnant Serviced not confirmed Not yet serviced	Char(10)	Yes	
	Dry or not lactating	Confirmed pregnant Serviced not confirmed Not yet serviced	Char(10)	Yes	
	Young stock	Sex	Char(10)	Yes	
	Calves (0-6 months)	Sex	Char(10)	Yes	
	Calves(6-13 months)	Sex	Char(10)	Yes	
	Total	Numbers	Int(10)	Yes	
Status		Status table			
	Date	Date	Date/time	Yes	
	Animal ID	Name Tag number	Varchar(70)	Yes	PK
	Status	Slaughtered Died Sold	Char(255)	Yes	
	Reason or remark	Description	Char(255)	Yes	

Treatment		Treatment table			
	Animal ID	Name Tag number	Varchar(70)	Yes	PK
	Date first seen	Date	Date/time	Yes	
	History	Signs and symptoms	Varchar(255)	Yes	
	Diagnosis	Disease detected	Varchar(255)	Yes	
	Treatment	Drugs prescribed	Varchar(255)	Yes	
	Remarks	Description	Char(255)	Yes	
Service		Servicing table			
	Animal ID	Name Tag number	Varchar(70)	Yes	PK
	Date first seen on heat and serviced	Date	Date/time	Yes	
	Sire used	Semen used	Varchar(255)	Yes	
	Pregnancy control dates	Date period	Date/time	Yes	
	Status confirmed	Yes or no	Char(20)	Yes	
	Date of calving	Date	Date/time	Yes	
	Name of doctor	Names	Char(255)	Yes	
Calf		Calf table			
	Date	Date	Date/time	Yes	
	Animal ID	Name Tag number	Varchar(70)	Yes	PK

	Sex	Male Female	Char(10)	Yes	
	Weight at birth	Weight in kilograms	Varchar(20)	Yes	
	Sire used	Semen	Varchar(255)	Yes	
	Dam number	Name Tag number	Varchar(70)	Yes	
Milk		Milk table			
	Animal ID	Name Tag number	Varchar(70)	Yes	PK
	Amount sold	Liters sold	Char(20)	Yes	
	Amount given to staff	Liters given to staff	Char(20)	Yes	
	Amount given to calf	Liters fed to calf	Char(20)	Yes	

Table 1Data dictionary

4.6 Screenshots of designed system

4.6.1 Log in panel



Figure 3 Screenshot of log in panel

4.6.2 Aministrator's panel

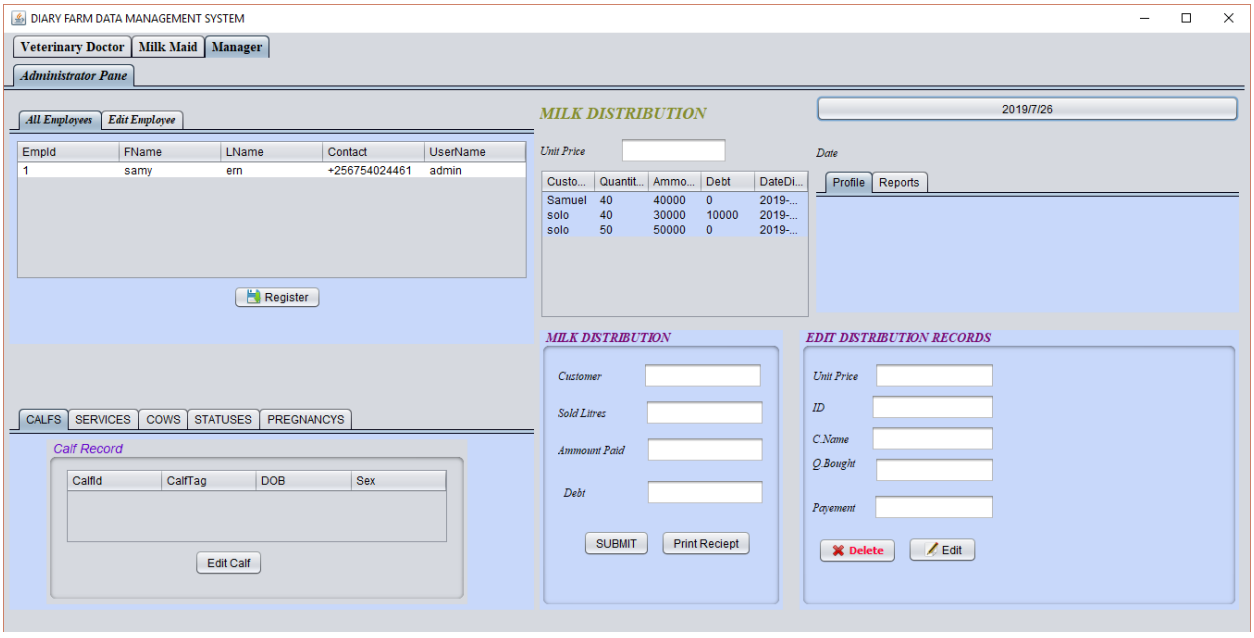


Figure 4 screenshot of administrator's panel

4.6.3 Veterinary Doctor's panel

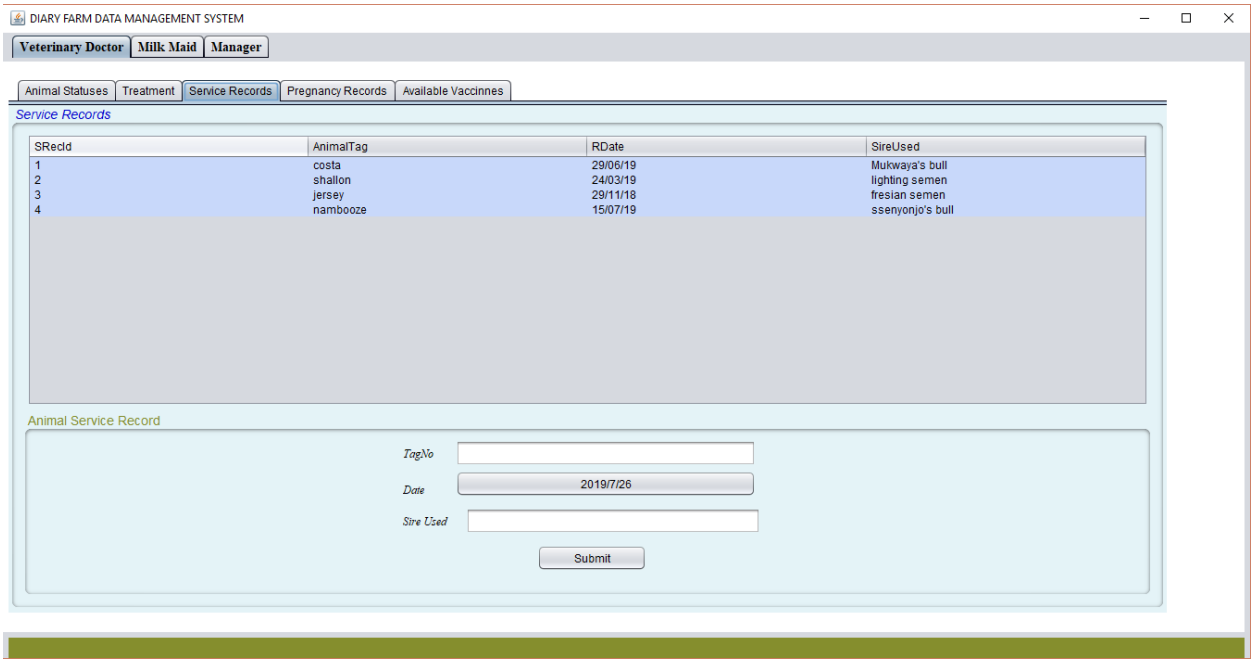


Figure 5 Screenshot of Veterinary Doctor's panel

4.6.4 Milk maid's panel

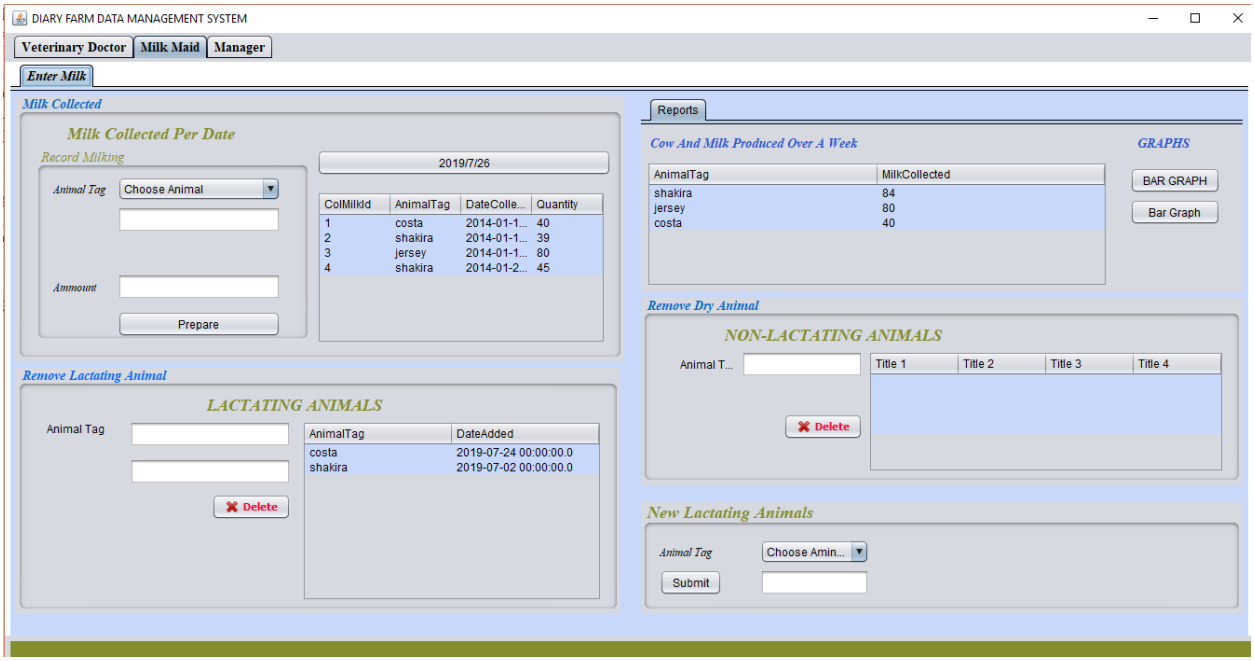


Figure 6 Milk maid's panel

4.6.5 Graphical report panel

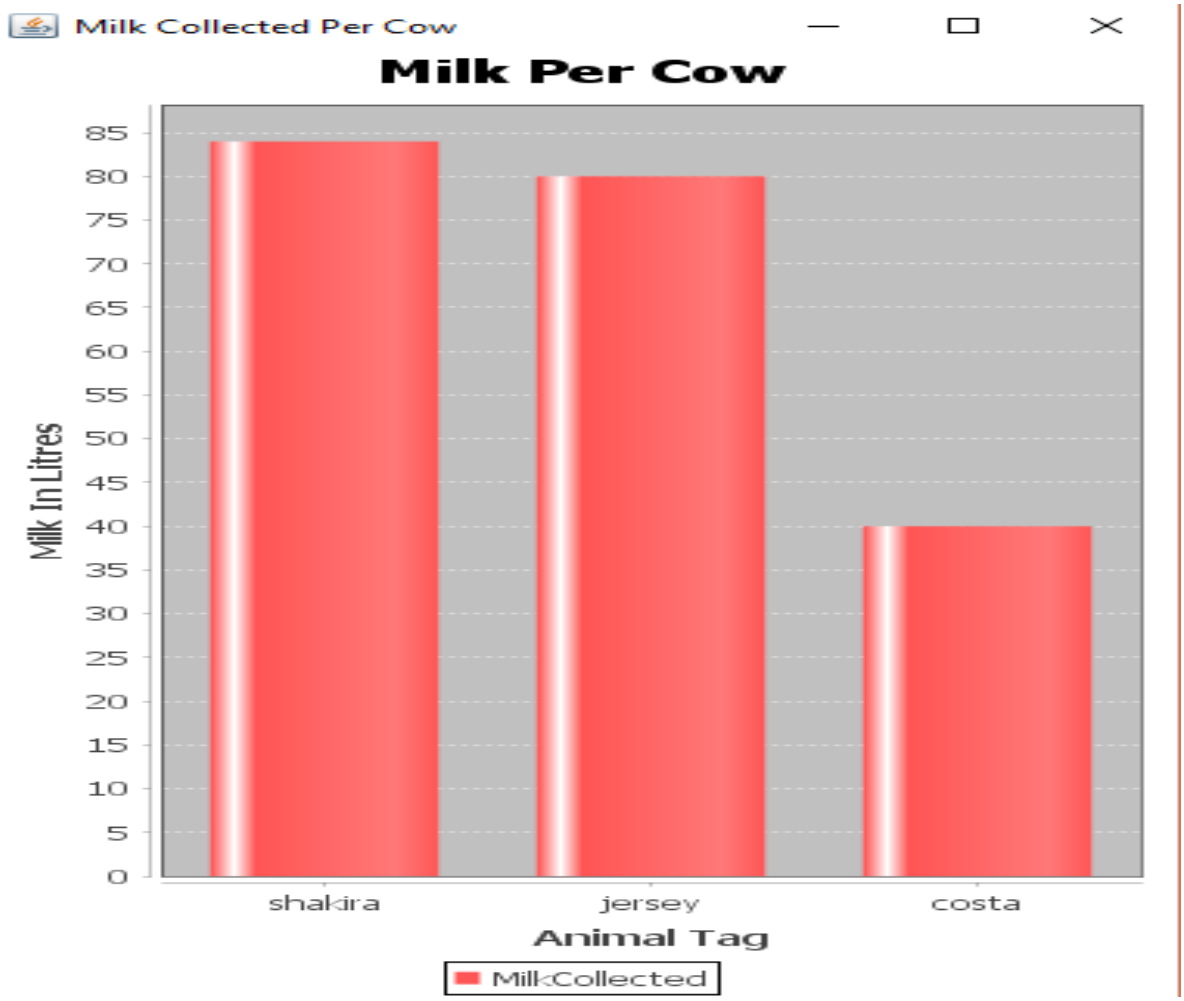


Figure 7Bar Graph report of the milk collected per cow

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Dairy farming involves keeping of a variety of records which are many in number and so making it very tiresome. This therefore leaves many farmers without records which are very necessary for proper decision making and progress of farm activities. The computerized system brings forth an ease and efficiency in taking records for the farmers with timely and accurate reports for proper decision making. The system is therefore of great benefit to the farmers.

By objective one, I was able to design a computerized dairy farm records management system that improves on the management of the dairy farm records;

By objective two, the dairy farm records management system generates reports on the milk distribution of the farm containing the amount sold and revenue earned with the various pending debts;

By objective three, the system is able to generate reports regarding the total amount of milk produced per individual cow thus determining their productivity;

By objective four, the system has the veterinary doctor’s panel where he is able to service and also administer vaccines to the different cows on the farm;

Finally, the system also provides the status of all cattle on the farm whether they are in good health or poor health so that they can be disposed of or which treatment is required hence managing the cattle.

5.2 Recommendation

To enable the best use of the system, I recommend training of the farmers and equipping them with the computer skills required to run the system. I also recommend the automation and computerization of all processes and activities carried out at the dairy farm from milking, herd monitoring and so on to bring about increased yields and incomes to farmers.

5.3 Conclusion

In conclusion, this system is quite efficient and easy to use, it therefore saves the farmers time and brings improvement in farm yields due to improved record keeping. The system meets the needs and expectation of farmers with timely and accurate farm reports. There is also need or improvement and adjustment according to how different farms manage their records but the system provides the general outlay and model of dairy farm record management.

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APPENDIX

The syntax of the proposed system database;

```
<?php
  $Server="Localhost";
  $UserName= "root";
  $PassWord="";
  $db="covenantdb";
  $con =mysqli_connect($Server,$UserName,$PassWord,$db);

  // $Create ="CREATE DATABASE covenantdb";

/*if (mysqli_query($con, $Create)) {
   echo "Database created successfully";
} else {
   echo "Error creating database: " . mysqli_error($conn);}

   $Use="USE covenantdb";

*/
 $Employee= "CREATE TABLE Employees(EmpId int(5) primary key not null auto_increment,
UserName varchar(25) not null, FName varchar(25) not null, LName varchar(25) not null,
PasWord varchar(25) not null,Contact varchar(25),Email varchar(25))";
 if (mysqli_query($con,$Employee)) {
   echo "Tables created successfully";
} else {
   echo "Error creating database: " . mysqli_error($con);}
```

```
 $Cows="CREATE TABLE Cows(CowId int(5) primary key not null auto_increment, CowTag varchar(25) not null, Weight1 int(5) not null)";

 if (mysqli_query($con,$Cows)) {

    echo "Tables created successfully";

} else {

    echo "Error creating database: " . mysqli_error($con);}


 $Calf="CREATE TABLE Calf(CalfId int(5) primary key not null auto_increment, CalfTag varchar(25) not null, DOB date not null, Sex varchar(25), SireUsed varchar(25) not null, CowTag varchar(25) not null, Comment Text(500))";

 if (mysqli_query($con,$Calf)) {

    echo "Tables created successfully";

} else {

    echo "Error creating database: " . mysqli_error($con);}


 $Status="CREATE TABLE Statuses(StatusId int(5) primary key not null auto_increment,AnimalTag varchar(25), SDate date , StatusName varchar(25), Comment Text(500))";

 if (mysqli_query($con,$Status)) {

    echo "Tables created successfully";

} else {

    echo "Error creating database: " . mysqli_error($con);}


 $TRec="CREATE TABLE TRec(TRecId int(5) not null primary key auto_increment, AnimalTag varchar(25) not null, RDate date , Diagnosis varchar(225), Treatment varchar(225))";

 if (mysqli_query($con,$TRec)) {

    echo "Tables created successfully";

} else {

    echo "Error creating database: " . mysqli_error($con);}
```

```
 $PRec="CREATE TABLE PRec(PRecId int(5) primary key not null auto_increment,
AnimalTag varchar(25) not null, RDate date, SDate1 date ,SDate2 date, SireUsed Varchar(25)
not null)";

 if (mysqli_query($con,$PRec)) {

    echo "Tables created successfully";

} else {

    echo "Error creating database: " . mysqli_error($con);}


 $SRec="CREATE TABLE SRec(SRecId int(5) primary key not null auto_increment,
AnimalTag varchar(25) not null, RDate date, SireUsed varchar(25))";

 if (mysqli_query($con,$SRec)) {

    echo "Tables created successfully";

} else {

    echo "Error creating database: " . mysqli_error($con);}


 $Sire="CREATE TABLE Sire(SireId int(5) primary key not null auto_increment, SireTag
varchar(25) not null, SireType varchar(25), SireWeight int(5), DOB date)";


 if (mysqli_query($con,$Sire)) {

    echo "Tables created successfully";

} else {

    echo "Error creating database: " . mysqli_error($con);}


?>
```