FARM MANAGEMENT SYSTEM USING RFID

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DEDICATION

I dedicate this report to my beloved parent and supportive supervisor. Without their patient, support, understanding and most of love, the completion of this report may not have been possible.

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I am very thankful to God because of his consent to me to complete the task in the planned period. I want take this opportunity to thank all those involved directly or indirectly in completing my Final Year Project. Norhidayah Binti Mohamad Yatim was particularly helpful helped me a lot in understanding the method of using Visual Basic software and guiding me through the programming language in order to develop the system. Mr. Hussin Mohd Amin, the owner of Mutual Farm Sdn Bhd who had give a lot of ideas, advices and guidance for me to understand about farming management in order for me to develop a good farming management system. Dr Saifullizam Abd Kadir, the Head of Breeding & Genes Technology from Department of Veterinary Services, DVS from the beginning had give me advices to build this system and how to improve it so it can be use by all the farmers in Malaysia. Lastly, to Senstech Sdn Bhd who sponsored the RFID hardware used in this project and also who give lots of suggestion as the value added to this project so it can practically be used to in real industry.

ABSTRACT

The main focus of this project is to develop a system to facilitate the farmers in Malaysia in particular, in the daily work of their farm. Normally, farmers are too busy managing their farms. Every day they have to review all pen area to determine if there is any problem in livestock. Farmers also need to remember the medication period and the delivery date of livestock. Intensive tasks that sometimes can lead to the risk of health problems and death if farmers did not give the proper treatment of animals at the appropriate time. As a result, the farmer may hire more workers to help them take care of the livestock. So, the farmers need to spent more money to employ them. The way to overcome these problems have led to the objectives of this project which is to create a system that can help the in their daily work on the farm. At the same time, farmers can reduce cost to hire more workers. This system uses RFID technology, where each animal will be tagged with an identity number as a reference. RFID systems will be communicating with the database system which will store all data concerning these animals. In addition, this system is also designed to remind the farmers about the important work to be done every day. At the end, this system is expected not only to facilitate the daily work of the farm but giving a solution that is more practical than the previous system.

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ABBREVIATIONS

RFID	Radio Frequency Identification
ID	Identification
UHF	Ultra High Frequency
MIGHT	Malaysian Industry-Government Group for High Technology
MMCHIP	Malaysia Microchip
RLTS	Real Time Locating System
IBM	International Business Machines.
TIRIS	Texas Instrument (TI)
AIDC	Automatic Identification Data Collection
CCTV	Closed Circuit TV
IATA	Air Transport Association
MOA	Department of Agriculture and Agro-based Industry
DVS	Department of Veterinary Services
NSEP	National Scrapie Eradication Program
CSIP	Canadian Sheep Identification Program
CCIA	Canadian Cattle Identification Agency
EAS	Electronic Article Surveillance
GPS	Global Positioning System
XML	Extensible Markup Language

USB	Universal Serial Bus
IP	Internet Protocol
DOB	Date Of Birth
PC	Personal Computer

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CHAPTER I

INTRODUCTION

1.1   Introduction

This project is focused on goat farming system in Malaysia. As we know, farming is an industry that can provide many benefits in term of income to the farmers. The concept of 'zero waste' is introduced to enable farmers to reap benefits from this industry. However, work on the farm was very busy. Farmers should be examining every movement of sheep, making sure they get enough nutritious meals, health check and ensure that farmyard is always safe and clean. It is better if farmers have an additional worker to take over some tasks easier to farmers to concentrate on more difficult things such as animal breeding and health. The idea of creating this system is because both the livestock industry and the RFID technology are Malaysia's major attractions to grip people especially youth interest to generate decent income.

Appropriate to name the project "Animal Identification Using RFID" of a system that uses RFID technology to identify livestock (sheep) in the field. As note, farmers often face difficulties in identifying and distinguishing each animal that is in the field. Thus, this system can help the farmers by tagging each goat with a chip (RFID chip) that has been programmed to store some data about the goat. These chips are called RFID tag or transponder. The tag comes with a reference number which act as ad ID and will be mounted to the ear of goat. By the reference number, so farmers are easier to identify their livestock. The project "Animal Identification Using RFID" is also accompanied by a software system that will save valuable data on goats. Thus, each goat that was tagged with the tag will have its data in the software system. In addition, this system can also identify 'family' for each goat. Hence, incest among the goats can be avoided because it can affect the health and child to be born.

This project goal also is to reduce the likelihood of loss of livestock. Where is the software system was designed to determine the number of livestock in / out to the goat pen. RFID Reader will be placed at the front door of the goat pen and each time the goats walk through the door the reader will read the tag and then send the data into the database (Refer figure 1.1). If the number of goats out of the pen and into the pen is not the same, it will identify 'lost' goat to the farmers and then he will look around for it around the farm. This method helps the farmer to make sure that all the goats had been walk into the pen. If farmers are not aware of their lost goats, the goats are more likely to get diseases, especially when it rains. The goat that did not go to the pen will probably faces to danger such as falling into the drains and the threat of wild animals.
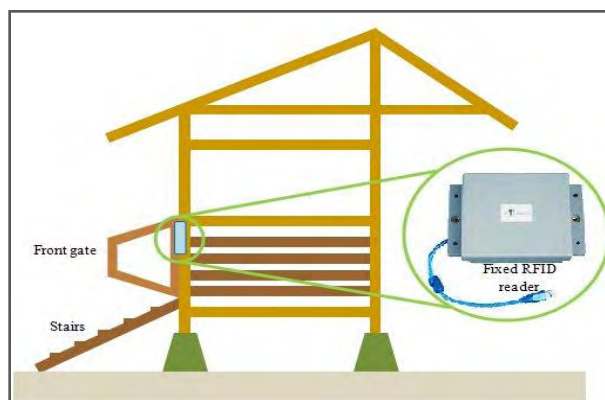
Figure 1.1: The reader will be placed at the front door of the goat pen

This "Animal Identification Using RFID" system also comes with a software system that will be integrate with the RFID reader. Either than saving all the read/write data, the system is designed to keep all the animal information owned by the farmer. So, if the farmer needs to look for the animal data, he can easily search the animal ID, and automatically the system will display all the data of the animal. This system also comes with a list of animal family. The Ram or Ewe that have been categorized as a parent will have their own kids. The software will list all their kids as a family to avoid breeding among sisters/brothers which may affect the growth rate of the goats. Plus, from the family tree option, farmer can analyze the animal that have good stud.

1.2   Objectives

The objective part if this project will display three main objectives of this project that related to the software system and hardware system. These objectives will be the reference during the development of the project. The successfulness of this project is depending on the achieving of these objectives. The objectives listed are:

1. Creating the animal software system

The first objective is to design the Animal Identification Software System. The software part will covers all the important data about the goats such as their profile and family tree. The animal profile will display the animal information such as its name, ID number, date of birth and breeding date. Then the family part will show the family tree of that specific goat. Next, this system also will include the breeding alert where it will alert the farmer as the breeding dates of the goats is on today"s date. The interface of this system is designed by using Visual Basic Professional Edition while the database of the software will be using Microsoft Access 2003.

2. Using RFID hardware system

The second objective of this project is to use the tagging method by using RFID hardware system which includes a reader, two pair of high frequency antenna and some of RFID tags. The reason of using the RDIF reader because it is the most upgraded technology system that emerges now a day. The RFID system is one the evolution of barcode system but at can save more data and the antenna can read the data from longer distance and no need line of sigh between the antenna and the tags.
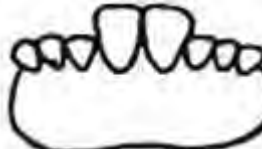
3. Integration between the software and hardware

And lastly, the third objective is to combine the Animal Identification Software System with the RFID hardware to make it more practical and easy to be use by the farmer. The integration between the antenna and software database system is supported by the RFID reader where all the tagged data will be read from the internet based system

1.3   Problem Statement

1. Unpractical system

Earlier, the farmers only use a plastic tag to differentiate between animals with the color tag. For example, the Ewe will use red tag while Ram is tagged by yellow tag. This method contributes to waste because used tag cannot be reused. Plus, farmer still have problems to differentiate their animals; its types, status, and age. Together with the plastic tag is the ID number written by the farmer himself. The referring to the ID number, the farmer writes all the data on a paper in a file. This method not just unpractical instead it is possible to be an error due to human mistake. Plus the written data may possible to be lost or the paper may be thorn or get wet. Moreover, the life expectancy of paper is not long. Where in the last few years, the paper will change color and ink will start to come out. In addition, farmer may have problem to keep all data about all the goats in the farmyard. As solution, he may hire a person to take care of the filing task. Means that farmer needs to allocate an additional budget to hire clerks.

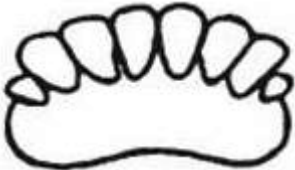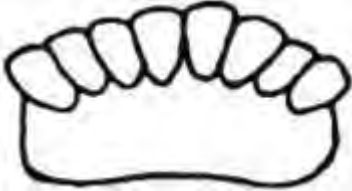| Name	Number of teeth	Teeth Structure
Kid"s Teeth (under 1 year old)	8 milk teeth	
Two-tooth (12-19 month)	2 central incisors 6 milk teeth	
Four-Tooth (18-24 month)	2 central incisors 2 middle incisors	

| Six-Tooth (23-26 month) | 2 central incisors 2 middle incisors 2 lateral incisors 2 middle teeth | |
| Eight-Tooth (24-28 month) | 2 central incisors 2 middle incisors 2 lateral incisors 2 corner incisors | |

Table 1.1: Goat age by teeth structure

2. Farmer unable to identify the animal age

Farmer also has problem to identify the age of their goats. For female goat, six month age is the ideal age for them to be breed while for male is 8 month. Farmer also needs to avoid breeding among the sibling because they may birth unhealthy kids. To do the breeding procedure, the farmer will place one Ram (male) with 20 Ewe (female) in one partition of the barn for three to four days. Farmer has to ensure that all Ram and Ewe already mature to go through the breeding process in order to produce a good breed. Usually, farmer identifies the maturity of the goat by the teeth (Refer table 1.1). This might be a waste of time to check the teeth of each goat to identify their age each time the farmer want to run the breeding process. Sometimes, farmer draws a sign of the animal body as a mark of maturity age to be breed.

3. Missing Goats

There is an incident happen in Pahang last month where the farmer had found his goats dead after three days in a pool nearby his farm. This incident

happens because the farmer did not notice of missing goat. That incident brings out the idea to build this project. This incident not just happen to that farmer, but also to others farmer in Malaysia. The nature of goats grazing around the farm can be a danger to them especially to the kids. Usually farmer fence their farmyard to avoid the goats to move far away and to avoid them from any danger from the wild animals. So, farmer needs to add more budgets to build the fence. Wider farm need more budgets. Plus, farmer needs to count on by one to check if there are any goats that not get into the barn yet everyday.

1.4   Work Scope

The major scope of this project is designed to detect the animal movement in and out of the barn. The RFID system should detect the same animal ID twice a day; first, when it go out from the barn and second when they walk into the barn back again. So at the end of the day, the farmer can look at the database system if there is any animal‟s ID that not been tagged for the second time. Farmer can ensure that there still goats that still walking around the farmyard and then look for them. This can avoid the goats to get sick and danger if they still outside at night. Two RFID antennas will be placed   at the door of the goat‟s barn so that it can detect the tags as they walk in and walk out of the barn (Refer figure 1.2).

There are minor scope of this project is to build the Animal Identification Software System that will be use by the farmer to view all the tagging process information. The software system includes five divisions:

1. Tagging in and tagging out operation

2. Animal Profile
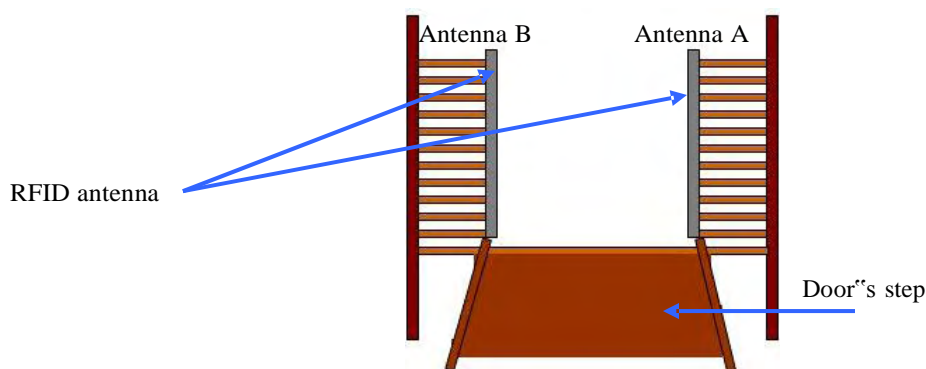
3. Family Tree

4. Breeding Date Alert

Figure 1.2: Pair of antenna at the door gate (front view)

This software system will be used by the farmer with is already been integrate with the RFID hardware system. Tagging in and tagging out will display the tag list that been read by the reader twice a day. The animal profile will display the goat‟s profile that include their name, sex, date of birth, genes types, age, breeding date and number of kids. Farmer also can edit, write new data and delete existing data. In order to avoid breeding among the siblings, this software includes the family tree of the goat. It will display the Ram (father), Ewe (mother) and all kids ID. This system also can remind the farmer for the breeding date of the animal. So, as the goat reach the maturity age (six month), they are ready to be breed. Lastly, the contact information will list all contact information of the farmer‟s friends, food supplier, buyers, and veterinary.

1.5   Methodology

This project is using RFID hardware system which includes set of RFID tags, a reader, a pair of ultra high frequency antenna and personal computer. The Ultra High