Development and application of computer assisted Breeding system in rabbit breeding farm

Xibo Qiao[1], Hongchao Wu[1], Suping Sun[1], Mingyong Li[2], Zhaopeng Wang[2], Jingui Dong[2], Xinzhong Fan[1,*]

[1] College of Animal Science & Technology, Shandong Agricultural University, Taian, P. R. China，271018; [2] Qiaodao Kangda Rabbit Breeding Ltd Co. Jiaonan, P. R. China，266400

Abstract: In order to meet the requirement of national modern rabbit husbandry and breeding management based on animal breeding theory and the computer application technology，the Modern Rabbit Management Software that can run on Windows9X/Me/NT/2000 /XP was programmed with Visual FoxPro9.0, which could enhance veracity and efficiency of selection & breeding of rabbit. The software could perform the selection of rabbit, the request of breeding and the tasks of production management for different scale rabbit farms. The software show it's convenience to operation and efficiency to breeding management from the using in six rabbit farms, which had great auto-action to implement production management automatization of rabbit farms and improve the efficiency of breeding.

Key Words: Rabbit breeding, Software, Management system, VisualFoxPro9.0

1 Introduction

With the development of rabbit husbandry in recent years, the rabbit farm scale is getting larger and larger. At the same time, much more breeding data and production management information need to be analyzed and processed timely. Breeding farm need to use scientific management and advanced breeding technology to improve the population quality and culture efficiency, which were difficult by the traditional method. With the maturing of computer science, almost any information can be digital Processed by modern information technology. What's more, it is low cost, high storage capacity, high-fidelity and fast computing speed. At the same time, modern information technology can be networked in the information superhighway, thus breaking the traditional time and space view, and then effectively reducing the time and space distance. So the enterprise management information is an important means of realizing the management of modern rabbit breeding farm to be scientific and standardization. And mass data information of breeding rabbit is a reliable guarantee to improve the accuracy of rabbit breeding. Therefore, according to the management

The research was funded by the Project of Kangda Meat-type Rabbit Hybrid-lines Breeding
*Corresponding Author. E-mail:sdfxz@163.com

of breeding rabbit farm and the actual situation of rabbit breeding, we have developmented "modern computer assisted breeding system in rabbit breeding farm", so as to provide an efficient platform for the realization of scale management of rabbit breeding farm and breeding rabbit selection.

2 Design of system

2.1 Development Process

The design and development of the system are in accordance with the structured method. The system is divided into seven parts: problem definition, feasibility study, requirement analysis, software design, software coding, software testing, software distribution and maintenance.

2.2 Structural analysis

2.2.1 Data flow diagram of system

Data flow diagram (DFD) is the basic tool for software requirement analysis, which can describe the data flow and software model effectively and intuitively. Reasonable data flow can improve the efficiency of software development. The DFD of the system is shown in Figure 1.

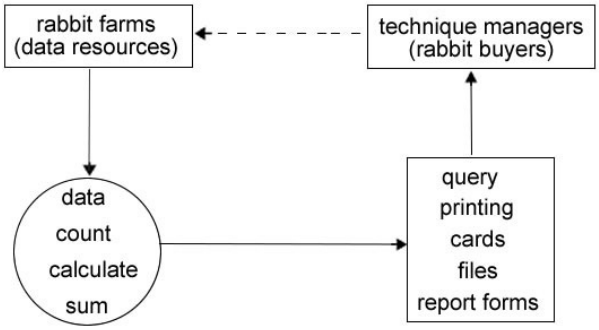

Fig.1 Data flow diagram of the system

2.2.2 Module structure of system

Module structure diagram can show the composition of the software structure vividly and clearly. A scientific and rational module structure diagram can not only effectively guide the software design but also provide basis and help for future maintenance and upgrades of the software. According to the modern rabbit breeding and production management, the structure of the software module is divided into three layers. The first layer is the main control module used for the control of the five sub-layer control module, which is formed by functional modules performing different tasks (Figure 2).

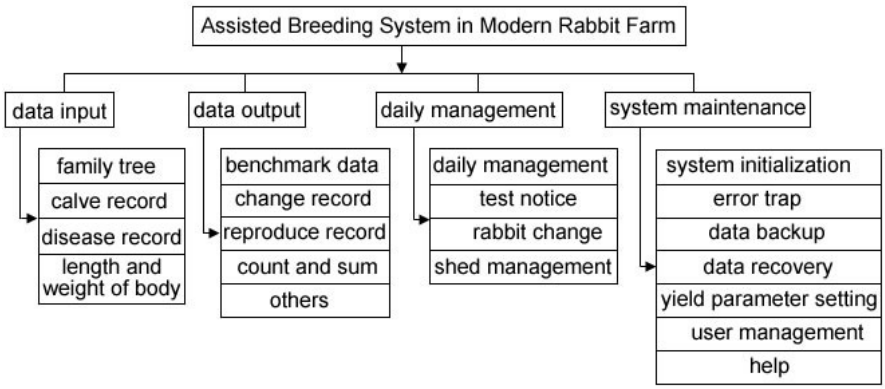

Fig.2 The module structure of the system

2.3 Design of database

According to the requirement analysis of the system, the design of the database must give full consideration to the rationality, integrity and security of data structure, which is in favor of programming and system maintenance and upgrading. On the basis of these main principles, the software has designed breeding rabbit pedigree, breeding determination, body identification, breeding records, production management records and disease prevention records of more than 20 data table and views, and used the index and database technology that fits SQL (Structured Query Language) relation. All of the technology can enable the database to have the good independence, sharing and the extendibility, and simplify the difficulty of program [1, 2].

2.4 Development tools and running environment

The development of this system includes two aspects. One is the establishment and maintenance of database at the backstage; the other is the development of application in the front. The former requests the database with strong consistency and integrity, and high data security, the latter requests the application with complete function and easy operation. We chose Visual FoxPro, the Windows relational data tools, as the development tools, and use the relational database languages-SQL to query and manipulate database. The graphics operating interface of Visual FoxPro has reduced the workload of programming and improved the operation efficiency and reliability of the application [1, 2]. Thus, Visual FoxPro is the best choice for the development of the system.

3 Function of system

The main modules of the system consist of four parts.

3.1 Input, modify and delete breeding rabbit data

In this section we can input, modify and delete the pedigree information, performance measurement records, breeding records and birth records of breeding rabbit. The module uses the automatic check and transaction processing technology to checkout unreasonable data, and adopts the strategy that "either a total success, or a total failure" to deal with misuse, power failures and crashes, etc. so as to maintain consistency and integrity of the data table.

3.2 Query, analysis and output breeding rabbit data

In this section we can query, analysis and output the basic information, performance measurement data and other records of the breeding rabbit and farm. This module can not only judge the genetic relationship among breeding rabbits, query and output various data of the breeding rabbit needed for breeding, but also analysis the whole situation of rabbit breeding farm, such as age distribution, conception rate, fecundity, etc. To facilitate the management of rabbit breeding farm, the module provides information of breeding rabbit on the card for printout, and has designed data interface with Word and Excel software. Users can print and output the data conveniently and timely.

3.3 Assess and rank breeding value

After carrying on standardized processing to all data, the system used multi-trait index selection to estimate the breeding value of breeding rabbit, and then changed it into the relative breeding value, which were assessed following the species and sex. And then classified and compared the relative breeding value of breeding rabbit within the group in accordance with the overall performance, body conformation, reproductive performance and growth performance. The results can not only enable producers to understand the comprehensive ranking of each breeding rabbit in the current group, but also be used as a basis for matching breeding rabbit selection.

3.4 Module to maintain system functions

The module mainly included the production parameter settings, system data initialization, data migration, data backup, data recovery, user management and help. The production arrangement in various breeding rabbit farms were not the same, and might change with the enhancement of the technical level. The production parameters, such as lactation, pregnancy testing period, postpartum mating time, were different in different farms. So many production parameters were listed in the system for technical personnel to set and adjust, so as to make data processing more suitable for actual production. System data initialization could calculate and analysis data in time. Data backup and restore could achieve multiple preservation and improve data security. User management (including password changes) was to further strengthen

the security of the system so as to prevent unrelated person to operate the system.

4. Test run of system

After fully debugged and tested, the software has been running in core breeding farm and progenitor breed-rabbit field in Qingdao Kangda Rabbit Development Limited Company. The application shows that this software has the following advantages: (1) Owing to the beautiful and succinct interface and the simple operation, people with little computer foundation can operate it easily. (2) The operation of data input and output is very convenient, and the output of the breeding information is scientific and rational. (3) The installation, maintenance and upgrade of the system are convenient. (4) The running of the system is fast and stable, and takes up less system resources. The system can help personnel do assisted breeding effectively and improve the management efficiency of breeding rabbit enterprises.

5 Advices and Discussion

5.1 Strict data management

The main contents of data management are to input, modify, delete and backup the data of breeding rabbit and breeding rabbit farm. The accuracy of the data will directly affect the statistical analysis and summary. Only the strict and detailed data management can ensure every single function module of the software to achieve its function. Therefore, on data management, we recommend that technical personnel should not only adhere to achieve long-term continuous management but also enhance data backup so as to ensure the safety and integrity of data.

5.2 feedback of running information and demand change of the software is the basis of software upgrade.

Because that breeding rabbit management involves numerous data and complex technology, and different breeding rabbit farm have different management, the development cycle of the software is very long. And then in the process of using the software, various problems will be exposed. Therefore, software upgrade is required in order to meet the development and change of modern rabbit breeding and management. Software upgrade mostly depends on the feedback of the demand information of the users and the running circumstances of the software itself.

5.3 Enhance the establishment of internet-based networked Database

The establishment of internet-based breeding rabbit database can not only extend the sharing and using of breeding rabbit data, but also conducive to statistical analysis

and estimation of genetic parameters. On the basis of statistical analysis, technical personnel can grasp the direction of rabbit breeding easily. Moreover, with the acceleration of information superhighway, enterprises gradually begin to improve benefit by issuing supply and demand information on the web. In fact, the internet-based breeding rabbit database in our country, which is still quite weak, remains to be strengthened.

References

1. Jimin Shi, Guanquan Tang. Development of Visual FoxPro and its Application [M]: Beijing tsinghua university press, 2000.
2. Minhua. Chang Database Technology and Development Course [M], Beijing: Electronic Industry Press, 2000.