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The Development of Decision Support System for Production of Layer

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Abstract. The Decision Support System for Production of Commercial Layer was developed based on the demand analysis. VB .NET 2005 and SQL SERVER 2000 was used as main methods for system development. With this system, the data of alternation, growth, breeding, environment, immune for layer production can be recorded, edited, analyzed and be given by a report forms. With this system, the production efficiency can be raised.

Keywords: layer; DSS.

1 Introduction

For a large-scale layer enterprise, there must be many batches of chickens kept at the same time. And there must be many differences for observed indicators among those batches. Therefore, it was very difficult to ensure that each chicken goes according to plan production. This problem can be solved by developing one decision support system for production of commercial layer. In terms of computer software for layer production, one computer software for breeding was developed by Cai Juandeng, breeding data can be treated and various kinds of genetic parameters can be obtained by this soft [1]. One management system for chicken breeding data was developed by Xiao Fan, which has the pedigree matching, hatching management, determination of egg, report query etc[2]. One system of data acquisition and input for egg production was developed in 1993 by Yang Ning using bar code technology and handheld computer technology [3]. One digital breeding platform for breeding pig was developed by Zhao ruixue [4]. One management information system for layer farm was developed by Wu Xiaohong [5]. In addition, the computer software is also used in retrospective [6], disease diagnosis [7] and so on. The Decision Support System for Production of Commercial Layer was developed in this study aimed at recording and analyzing the data of growth, feeding, egg production, environment, immunization, and disease, changes during brood period, Incubation period, and laying period and out. By management and statistical analysis of production data, the overall situation and problems can be controlled by managers with this system, and the objective, scientific decision can be made by managers.

2 Principle and methods

2.1 The production flow-sheet of layer

There are four stages during a production cycle of goods layers. They can be listed as follows: birth, incubation, egg, and out. The brood period is from its birth to six weeks. The incubation period is from the seventh to twentieth weeks. The egg period is from twenty to seventy-two weeks; then layer is out, different indicators need to be obtained in each period.

2.2 The development methods and system framework

In general, one chicken farm is composed of several branches. moreover easy of use is required, and therefore the C/S framework was used in this system. One computer was set as server and the computer in every branch was installed client soft; to access the data in server by set the only IP address. The operating system for developed this soft was selected as windows XP, and Microsoft VB.NET 2005 was selected as development language[9], the excel component of Microsoft office was used to import and export data, the third party component Dotnet Charting was used to generate figure. Microsoft SQL Server 2000 was used as database.

3 Result

The system was divided into 6 modules based on the production processes of layer: the management of farm and house, data input, statistics and report forms, curve diagram, system management and help. The initial data of one batch of chickens was recorded after being introduced; the data generating in every production processes was record synchronously. All of data were done statistics in a statistics and report forms module, and also produced daily, weekly, periodic report. The function and structure of system can be found in figure 1.

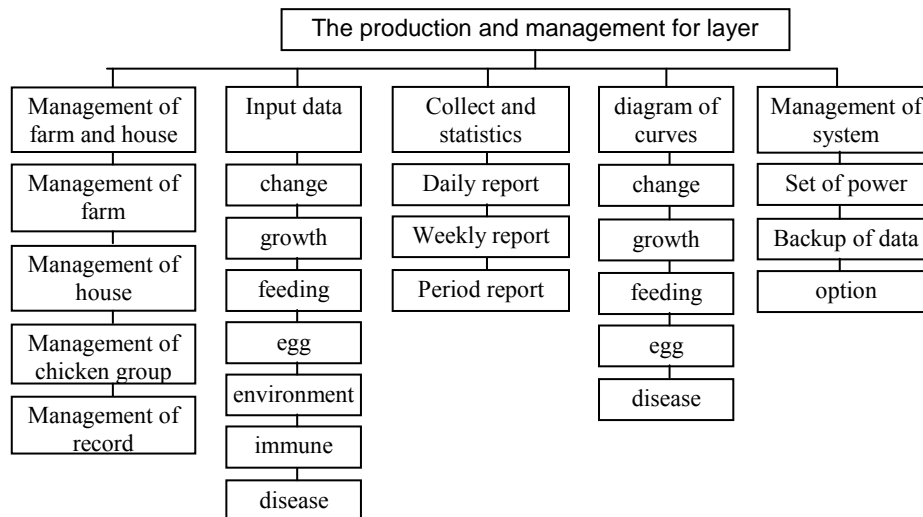


Fig. 1. The function and structure of production and management system for layer

3.1 The introduction of one batch of chicken

The basic data of one batch of chicken include information generated when they were introduced and information generated in every production stages. Those data mainly included serial number, species, source, approach date, born weight, quantity, stocking rate and survival rate after 24 weeks, date when increase light, egg date etc. because different species of chicken have different breeding standard, and those procedures such as increasing light and egg, mix chicken groups must be completed within the limited periods, therefore the standard of production was compiled in software, and the program will compute everyday according to this standard, the current status of chickens can be get, and the attention for change house, increase light, mix groups, etc. was gave to user automatically (fig. 2) .

存栏公鸡	存栏	顺逆季	来源	代次	入育雏舍	入育成舍	入产蛋舍	加光	见蛋	混群
422	4100	顺季	本地...	商品鸡	√ 2009-09-02	√ 2009-10-14	应入未入...	应加未加光	应见未见蛋	应混
495	4984	逆季	哈尔滨	商品鸡	应入未入...	应入未入...				
468	4937	顺季	内蒙古	祖代	应入未入...	应入未入...	5日后入产...		今日见蛋	应混
0	4959	顺季	哈尔滨	商品鸡	应入未入...	应入未入...	应入未入...	应加未加光	应见未见蛋	应混

Fig.2. The introduction of chickens and attentions in key production processes
The data can be modified at any time and export into excel table. The production data need to be backed up and separated when production cycle of one batch of chicken has closed, then the data of this batch of chicken can be deleted from database.

2.2 The management of change data for one batch of chicken

Death, eliminate, marketing, output and input of chickens are main changes of one batch of chicken in production. These data and data of herbs must be recorded in to computer every day. In order to facilitate data recording, few data (such as death and eliminate etc.) need to be input and closing stock will be computed by numbers of yesterday automatically. By this ways, the efficiency would be improved significantly. The changes of data can be statistics, daily, weekly, and period report and figure of one phase can be generated in system. By these results, more scientific measure can be made by managers. By contrasted to standard, the conclusion of production can be got(fig. 3).

The screenshot shows a software interface for managing chicken production data. The main window has a tree view on the left with categories like '鸡群管理' (Chicken Group Management), '鸡舍管理' (Chicken House Management), and '鸡只管理' (Chicken Individual Management). The main area displays a table of chicken group data. A pop-up window titled '鸡群变动统计' (Chicken Group Change Statistics) is open, showing a table of changes and summary statistics.

鸡群编号	出生日期	存栏合计	鸡舍公栏	鸡舍母栏
200912001	2009-09-01	4322	432	4100
200912002	2009-12-02	5470	495	4969
200912003	2009-12-03	2773	0	2773
200912005	2009-06-15	4959	0	4959

鸡舍编号	鸡舍名称	变动日期	变动原因	变动公栏	变动母栏
03	1号舍	2009-11-11	死亡	5	6
03	1号舍	2009-11-11	死亡	1	2
03	1号舍	2009-11-11	淘汰	1	3
03	1号舍	2009-11-11	销售	4	3
03	1号舍	2009-11-11	转出	1	1
03	1号舍	2009-11-11	转入	2	2
03	1号舍	2009-11-13	死亡	0	3
		2009-11-15	死亡	2	2
		2009-11-15	转出	2	0
		2009-11-15	死亡	0	2
		2009-11-17	淘汰	2	0
		2009-11-19	淘汰	0	1
		2009-11-20	淘汰	1	0
		2009-11-23	淘汰	0	4
		2009-11-23	死亡	1	0
		2009-11-23	转出	0	1
		2009-11-25	死亡	1	1
		2009-11-26	死亡	0	1
		2009-11-28	死亡	0	1
		2009-12-02	淘汰	1	0
		2009-12-03	死亡	1	2
		2009-12-06	淘汰	2	2
		2009-12-06	死亡	2	2
		2009-12-06	淘汰	2	2
		2009-12-06	销售	2	2
		2009-12-06	转出	2	2
		2009-12-06	转入	1	2
		2009-12-09	死亡	1	1
		2009-12-09	死亡	1	0
		2009-12-09	淘汰	0	2
		2009-12-11	销售	0	2
		2009-12-11	死亡	1	0

Fig. 3. The changes data of one batch of chicken

2.3 The management of growth data for one batch of chicken

The growth was the main observation for management during brood and incubation period. Sound skeletal structure is necessary for egg production. It is very important to monitor records and analyzation of the chickens growth information. Only the weight of chicken at Pre-laying (from 21 to 28 week) need to be record weekly. Based on the general requirement of layer farm, body weight, uniformity,

系统管理 (网络版 V1.0)

文件 系统管理 窗口 帮助

纵向生长

纵向生长编号: 2009-09-01

出生日期: 2009年9月1日

体重: 602.2

体长: 60.2

月龄: 0.0

纵向生长数据表

纵向生长编号	出生日期	体重(g)	体长(cm)	月龄
20090901	2009-09-01	602.2	60.2	0.0
20091002	2009-10-02	547.9	49.5	0.084
20091102	2009-11-02	539.8	48.0	0.083
20091205	2009-12-05	499.8	0	0.083

纵向生长

纵向生长编号	体重(g)	体长(cm)	体长增长率(%)	体长增长率(%)	体长增长率(%)
2009-09-01	60	40	3.4	3.4	3.4
2009-09-09	140	80	4.2	4.2	4.2
2009-09-16	180	145	4.5	4.9	4.9
2009-09-23	270	220	5.8	5.8	5.8
270	6.6	6.6	6.6	6.6	6.6
360	7.4	7.4	7.4	7.4	7.4
410	8	8	8	8	8
500	9	9	9	9	9
590	9	9	9	9	9
730	9	9	9	9	9
820	9	9	9	9	9
910	9	9	9	9	9
960	9	9	9	9	9
1040	9	9	9	9	9
1090	9	9	9	9	9
1140	9	9	9	9	9

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820	9	9	9	9	9
910	9	9	9	9	9
960	9	9	9	9	9
1040	9	9	9	9	9
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270	6.6	6.6	6.6	6.6	6.6
360	7.4	7.4	7.4	7.4	7.4
410	8	8	8	8	8

2.4 The management of feeding data for one batch of chicken

The feeding is associated with each period of production. The difference among those periods is the feed. Therefore feeding methods, the number of feed, feed consumption, water consumption, feeding time, difference between planning and the actual feed consumption, protein and metabolic energy intake and other related information need to be recorded in database. By comparing, the information whether the actual feed consumption has met the standards will be reminder to user. In addition, the feeding data can be statistics, daily report, weekly report, report of one phase and figure of changing can be generated in system. Thus managers can investigate the reason for insufficiency or excessive, and take effective measures timely (fig.5).

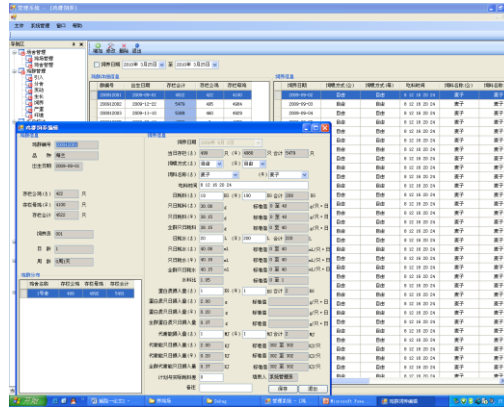


Fig.5. The management of feeding data for one batch of chicken

2.5 The management of production data for one batch of chicken

Egg number, number of unqualified eggs, fertilized eggs, ratio of feed to egg need to managed. Those data can be input from three routes: ①input by manager directly, ②generated from system by computed, ③obtain from computer directly or generate from system daily. The number of hatching egg, number of goods egg, number of double-yolked egg, number of soft egg need to be recorded by manager daily. And laying rate, pass rate of hatching egg, ratio of commodity egg to total egg, double yellow egg ratio, ratio of soft eggs, broken egg rate, fertilization rate, hatching rate, etc generated from system by computed. Every data can be count(fig.6), and statistical graph can be generated(fig.7).

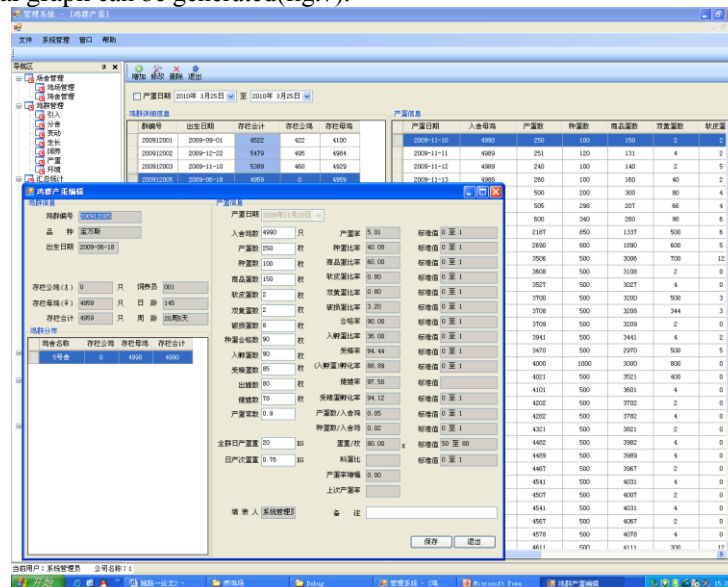


Fig.6. The management of production data for one batch of chicken

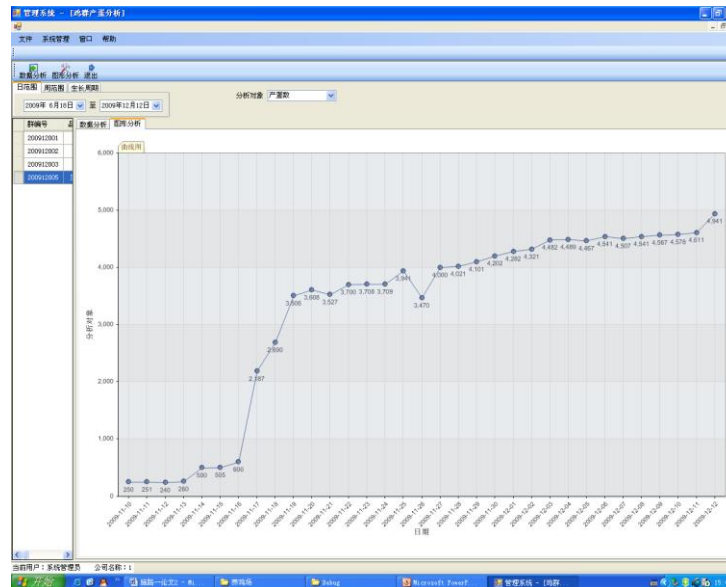


Fig.7. The statistical graph of production data for one batch of chicken

4 Discussion

4.1 Data inputting of management system

Too many items and large amounts of data are main factors that restrict the application of software in practices. Although some data can be recorded by auto technology, however, some data still be input manually. It is so important that reduce the input by hand and improve the efficiency. The reducing of input was considered in any parts of this system, besides the keying order of textbox was adjusted, many data can be computed by system automatically. Moreover, the association of items among different modules was enhanced in system, and user can find the data that he wanted in place where he wanted.

4.2 The intelligence of management system

Generally, many batches of chicken will be feed simultaneously in one large-scale farm, and different batches of chicken will be produced at different stages. Different items need to be managed for each batch of chicken. In order to improve the intelligence of system, the production information will be retrieved and computed by production standard every day, and the works need to be completed can be displayed

in a form. The software can be used to look over new task.. By this way, the fault in will be reduced significantly.

4.3 decision support for production of management system

The main purpose that a manager using the software is to do statistics and analyzes production data, thereby finding out the problem during the production, so that making the work plans on the basis of current data. This quest was considered thoroughly when this system being designed and developed. The production data in every procedure can be statistics by day, week and period, and the statistical graph can be generated directly.

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