New Concept of Traceability Process in Pork Production – Monitoring Product Quality and Safety based on Information System

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Abstract: After analyzing pork production currently, the paper constructed the efficient monitoring and management tracking logistics information system which is suitable to Chinese situation for pork production quality safety, it can track the whole production safety information of pork factory production, especially provide the software and hardware platform of traceability from pig farming to pork circulation, it implemented pork production and consumption network management and made the pork traceability system be networking and popularizing, which improved pork production quality and efficiency.

Keywords: Pork production, Traceability system, Networking, Logistics information

1 Introduction

Pork is an important part of human food, however, the pig’s breed, slaughter, sales and other management information aren’t standardized, consumers track information about the disease, veterinary drug residues and other toxic and harmful substances during pork production backwardly. All these have seriously affected the development of pork industries and consumer’s confidence to pork production[1], this will not only restrict our pork products to enter the international market, but also impact the development of the domestic market. Countries around the world have introduced the full quality control model from pasture to table, and regulated the production of feed safety control and management, they have imported hazard analysis and critical control point (HACCP) during livestock breeding, processing, transportation, and established tracking computer system of the forward traceability mode from materials to meat to culturists and the backward traceability mode from meat to materials to consumers. The establishment of pork food security is system controlling project from farm to table; we apply information technologies and integration of pork production to construct a quick security retrospective tracking system from ultimate animal products to the sources and to ensure the entire process security of breeding, slaughtering, processing, transport and storage[2].

2 System Hardware Structure

According to the major aspects of pork production and retrospective information needs of users in the course of pork production, this paper presented client/server (C/S) model during pork production process management and monitoring, and WEB technology will be introduced into the retrospective system of pork production by browser/server (B/S) mode, consumers and producers can achieve the pork production process information traceability and remote monitoring with a simple and friendly mode of operation by WEB browser, this will greatly increase production enterprises automation level and achieve the retrospective information from breeding to table. To improve the reliability of the system, the WEB server and real time production management system maintain relative independence, combining these two kinds of communication network mechanisms, the monitoring system[3] hardware is shown in Figure 1.

The entire network structure of monitoring system is divided into field bus networks and the enterprises information network, monitoring ports have breeding, slaughtering and sales, the server has the central server and WEB server, monitoring ports transmit data of breeding, slaughtering and sales to the central server, WEB server connects with central server by database servers, this connectivity will make a certain time difference with central server when WEB server deals with the
users directive. In order to avoid the conflicts between each other action, Database servers is divided into central database and traceability database, central database mainly stores the breeding, slaughtering, sales data, the traceability database preserves information about pork production and user data, which are concerned consumers. Breeding ports apply radio frequency technology and electronic ear identifier to identify the pig individual and make use of field bus to centralize controlling multi-breeding units, the slaughter and sale side adopt bar code technology to identify each piece of pork by corresponding reader implements acquiring their information. Consumers track the pork quality information through the bar code.

![Figure 1 The hardware system](image)

### 3 Software Design

Pork production information system tracked (shortened form "pork traceability system") is the production mode from factory pig farm to large scale slaughterhouse and supermarket sales, network design of pork traceability system involves different kinds of network integration and application, and different organizations and units, and has windows desk top application program and Web application program, they need synchronism and transmission of communication and data each other. According to the characteristics of the domestic enterprises and need of pork production quality traceability, the paper has designed better mutual intranet employ subsystem based on Client/Server between control and server end; and internet employ subsystem based on Brower/Server mode, the system is made up of database server, Web server and client, etc. Service realizes customer end and service data interchange by offering Web service of windows desk top procedure, system can achieve information flow track of pork production chain and track through this network. The system will run according to the following modes: farming plant, slaughterhouse and supermarket adopt C/S structure, and realize various production data’s input, monitoring and query, etc. Consumers can understand live pig information, such as breed, growth, disease treatment, sanitary standard, butchering and selling according to different authorities, the system adopts B/S structure to have a look the data, and remedies C/S structural system maintain, and reduces the systematic operating cost, and meets different user’s needs. The software module of the whole system includes: server end software, production management system, butcher processing system and marketing system, consumers, etc. 5 modules, their composition and function are shown as the following figure 2. The production management system mainly realizes the management of production information of live pig’s growth course, and mainly includes: live pig dossier, the records of in and out fence, records of breeding and mating etc; management of animal remedy, feed, the sterilizing purchase, storage; controlling growth environment, processing data, historical data inquiry and alarm, etc. Managing expert’s prescription of feed, medical diagnosis on disease and immunity according to different kinds and growth stages, and realizing the expert cultivates. (2) The slaughtering system mainly realizes: information conversion between live pig’s individual identification and body, the live pig transports monitoring, pork test result monitoring, monitoring storage and transportation of pork, and butcher hygiene, realizing key control during pig
The marketing system mainly realizes: monitoring environmental sanitation of pork circulate and sell, health status of sales and pork storage accord with relevant regulations and standards, and pork apart information, and selling information, feedback information of consumers, record management, and offering consumers information inquiry.

The centre database of the server offers service request, data interchange, data share and management of customer end and production management terminal station, slaughterhouse terminal station, sell terminal. Systematic information of production management system and slaughterhouse is mainly managed in the inside, only when the live pig or pork is sold, file information is uploaded to the server of the network; sell information realizes network management directly, it is convenient for user to consult and supervise.

The customer end mainly realizes: users inquire about live pig information and pork information of live pig’s breeding, growth, growth environment, incurability, hygiene, immunity, circulate, etc link, consumers’ feedback information and consumers’ materials, etc.

4 Logistics Information Traceability Process

The paper cites the key links of the pork production and traceability process according to the actual situation of pork production systems, each key elements of the system registers five key content and links, namely: the code, producers, origin, time, features and functionality, pork production flow chart is shown as Figure3.
It can be seen that the importation of production system is raw feed, medicines and pigling, the breeding companies raise pigling by using feed and make immunization on pigling by medicines, transport companies transport goods pig to slaughtering companies, slaughtering companies process and dispose goods pig into pork carcass, pork carcass is circulated to retail store by storage and wholesale, meat arrives consumers by retailer. Every link all establishes relevant records and information conversion among them from breeding materials to meat, For example: electronic ear code of pigs establishes the relationship among drugs and pigs and feed, the relationship can find that each pig makes use of immune drugs and feed and their corresponding manufacturers and their characteristics. Formation process of production information is following: The first step: the keyword of raw materials may query their own corresponding information; Step 2: the keyword of electronic ear code may inquire about the raw materials used; Step 3: the keyword of pig carcass may demand the information of live pig; Step 4: the keyword of meat code see about pig carcass information. Instead consumers may track the information from meat to raw materials by meat code; this process is shown as Figure 4.

5 Data Transmission Course

RFID device can read and write tag information and transfer them to system software, and insert in the corresponding electronic ear column immediately. When electronic ear tag or tag closes to appropriate distance of RFID device, and enters the field of radio frequency of RFID device, the device will acquire tag information and process them, and send back necessary information to RFID tag through the aerial then. The RFID device is divides into the holding type and fixed type, the holding type stores information in own temporarily memory card firstly, after it reads and writes tag information, and transmit them to PC computer through USB or COM; RFID tag information of fixed type is transmitted to PC computer directly, the device can insert them to corresponding position of software system immediately. Consumers land monitoring procedure of Web server and inquire relevant information tables of the database server, and get live pig growth quality information of this meat lump according to two dimensional bar code of the pork lump, the transmission course of the whole data is shown as Figure5.
6 Conclusions

The paper has designed a traceability system of factory pork production by using information network technology, database technology, and animal identification technology. It lies in the information exchange of the whole production chain, and improves the efficiency of production, and actualizes information storage and tracking of pork production. It has monitored the quality of pork and fodder, and constructed a traceability system, and allowed consumers timely access the source information of pork production, and guaranteed the safety and health of meat.

References