DESIGNING AN INFORMATIC SYSTEM FOR THE FUNCTIONING OF A VETERINARY PHARMACY IN THE RURAL ENVIRONMENT IN ROMANIA. CASE STUDY PORK TRANSABILITY

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Abstract

The design approach of an information system for monitoring pig meat traceability (SIMTCP) can not ignore the feeding of animals.
Starting from this premise, in this paper are presented the modeling assumptions, considerations and UML diagrams for processes of feeding pigs at farm level. Scientific research results were obtained in the detail analisys phase of SIMTCP, during of the deployment of the research project „Designing an information system to monitoring the traceability in pork production", financed by the Competitive Grants Scheme (SCG), developed with the support of Modernization of Information and Knowledge Systems in Agriculture Project (MAKIS).
At the end of communication are worded conclusions and guidelines for future research in the areas of product traceability, food safety and new information and communication technologies, taking into account trends and requirements of a sustainable global economy.

Key words: *information systems design, UML, pork traceability, feeding traceability, new IC&T.*

INTRODUCTION

The european regulation defines traceability as "the ability to trace and follow a food, feed, food-producing animal or substance intended to be or expected to be incorporated into a food or feed, through all stages of production, processing, and distribution" and applies to all food and feed except primary production for private domestic use or private domestic consumption. All food and feed companies are legally bound to have traceability systems (European Union, 2002, cited by Meisinger et al., 2008).

Traceability for swine livestock is recognized like an effective component of any food safety control system, serving consumers' increasingly requires concerning a better quality of pork. The practical value of a traceability informational system is affirmed by improving consumers' trust in meat quality and by the encouragement of pork industry (Zhao, Teng and Wang, 2009).

The analysis of causes of disease or of quality non-compliance of meat has highlighted the need to obtain information on the modality and origin of animal feeding and water ([TRA1]).

Development of society and the improvement of living standards, consumers' demand for high quality meat products is constantly increasing ([TRA1])..

Over 90% of specialists participating in a seminar on traceability theme in Dublin (2008) concluded that full traceability will become increasingly important for feed additive and feed suppliers within the European marketplace. Also, over 50% considered that trace mineral and energy regulations will pose the biggest challenge to pig production in the future ([TRA2]).

Our research methodology included revealing state of knowledge by literature and materials of mass - media review. Also, ideas, information were extracted in workshops framework, organized with farmers and representatives of the authorities (Ministry of Agriculture and Rural Development, Romanian Association of Pigmeat Employers, veterinary organisms, farmers' associations etc.) and were performed general and detailed analysis by documenting in pigs farms. Finally, using UML methodology, models were developed to manage various aspects necessary for traceability, including the feeding of pigs.

In this research material, are presented UML diagrams of use cases, classes and activities that describe data and processing sequences structures, revealed as necessary for feed management subsystem.

1. FARM INPUTS TRACEABILITY

European regulations define traceability as „the ability to follow a food, feed, food-producing animals or substance incorporated into food or feed in any stage of production, processing or distribution". All food or food producing companies are legally bounded to have traceability systems ([EU 2002], cited in Meisinger et al., 2008).

In Romanian economy, many suppliers exist for agriculture sector. This can be classified in the following groups ([TRA3]):

- Housing (stables, electricity, cooling facilities etc.);
- Equipment (milking machines, tractors, irrigation etc.);
- Feed;
- Medicine;
- Seeds, fertilisers and insecticides;
- Water.

Pigs' feed and medicines can play an important role in the food chain and have implications for the quality composition of agri- food products that people consume.

Consequently, in the feed industry are envisaged the development of programs to ensure feed quality which imply ([TRA3]):

- Creating posibilities to tracking and tracing of pig feed;
- Applicating The Hazard Analysis and Critical Control Point (HACCP) principle into risk evaluation and control;
- Ensuring knowing of the whole feed chain (included raw materials suppliers);
- Implementing and using of an early warning system.

At the pigmeat farms (producers) level, feed traceability represents an „insurance policy" for the organization image, in case of unexpected negative situations, caused by pigmeat qualitative non - compliance form feed or water quality reasons.

Farmers are motivated, not only obligated by the general context, to invest in corresponding facilities at higher quality standards at their farm or lands to produce pork.

In Romanian economic environment, it is the farmers' own responsibility to achieve a healthy economic situation for their business (also in countries like Italy, Germany or Denmark, as the research team remarqued during the documentation visits), but in a transition contry like Romania are required interventions and support financial resources from the State part, to institutional and technical development – basic condition for increasing chances to compete on the international pigmeat market.

Romanian farmers need information about how to implement a Good Agriculture Practice (GAP) and technologies for livestock breeding, feeding, control of animal health status and use of veterinary drugs. Regarding the welfare of animals, the owners are obliged to satisfy the biological needs of each category of animal and provide safety, food and water ([TRA3]).

Starting with tis considerations, we elaborated diagrams to make possible collecting information concerning inputs like pig feed in a feed traceability subsystem.

2. UML DIAGRAMS FOR MODELING FEED TRACEABILITY SYSTEM

In this paper three diagrams were selected as relevant, for depicting a complete image of data processing and treatments of the system of feed traceability at farm level.

Food administration is followed both by lots of animals, locations, and on lots of fodder, fodder categories and raw materials incorporated into feed.

Use cases diagram related to operations designed to record managed farm feed is given in Figure 1.

Classes of objects structure required to manage data related to feed administrated to farm animals is shown in Figure 2.
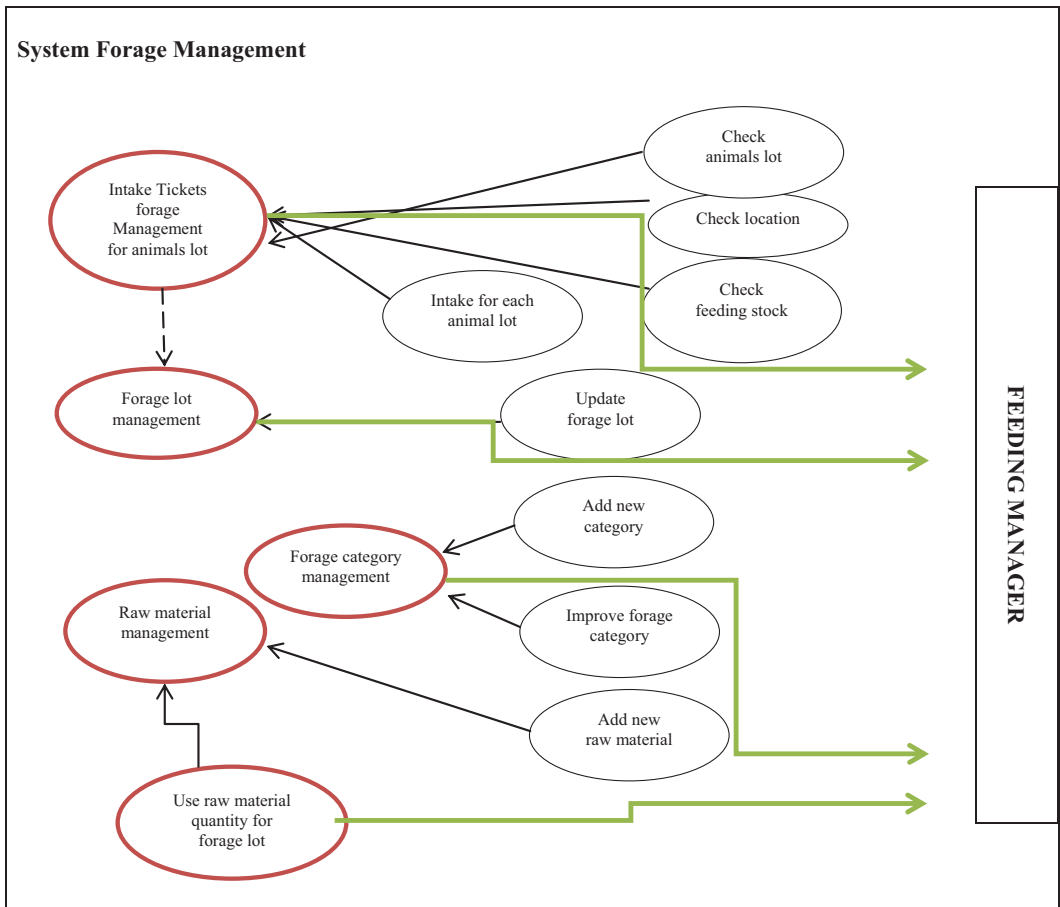
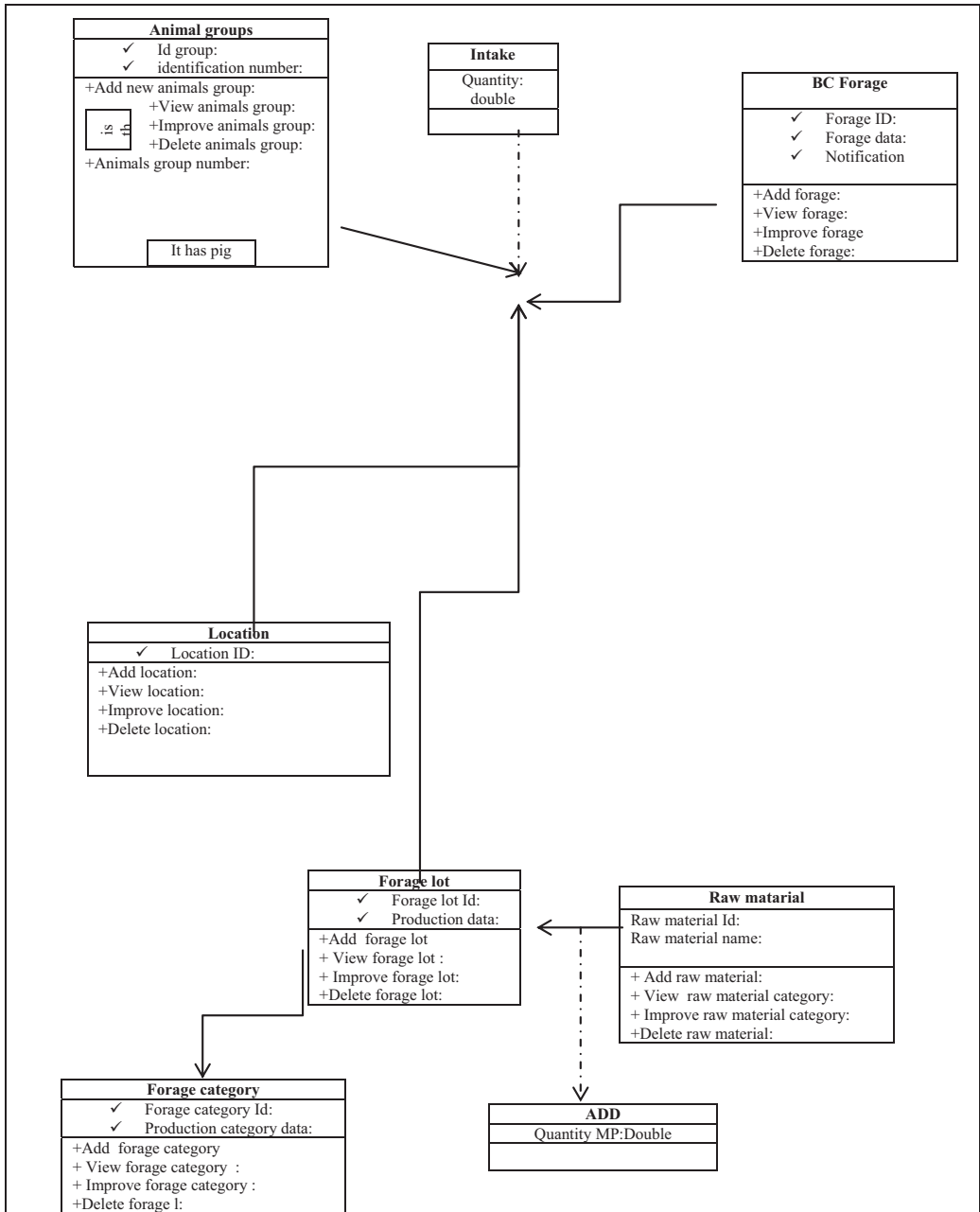Figure 1. Use cases diagram for fodder traceability system

Figure 2. Classes diagram for feed traceability

The system can register the consumption documents, recording feed consumption, the quantities of each feeder element and the date of feeding by lots and locations. Each lot may consist of one or more pigs. For each piglet calved in farm are recorded its parents - sow and boar.

The models propose feed management by lots of feeds, categories and given the quantitative composition of raw materials.

Appropriate data processing operations are illustrated in feeding activity diagram on Figure 3.
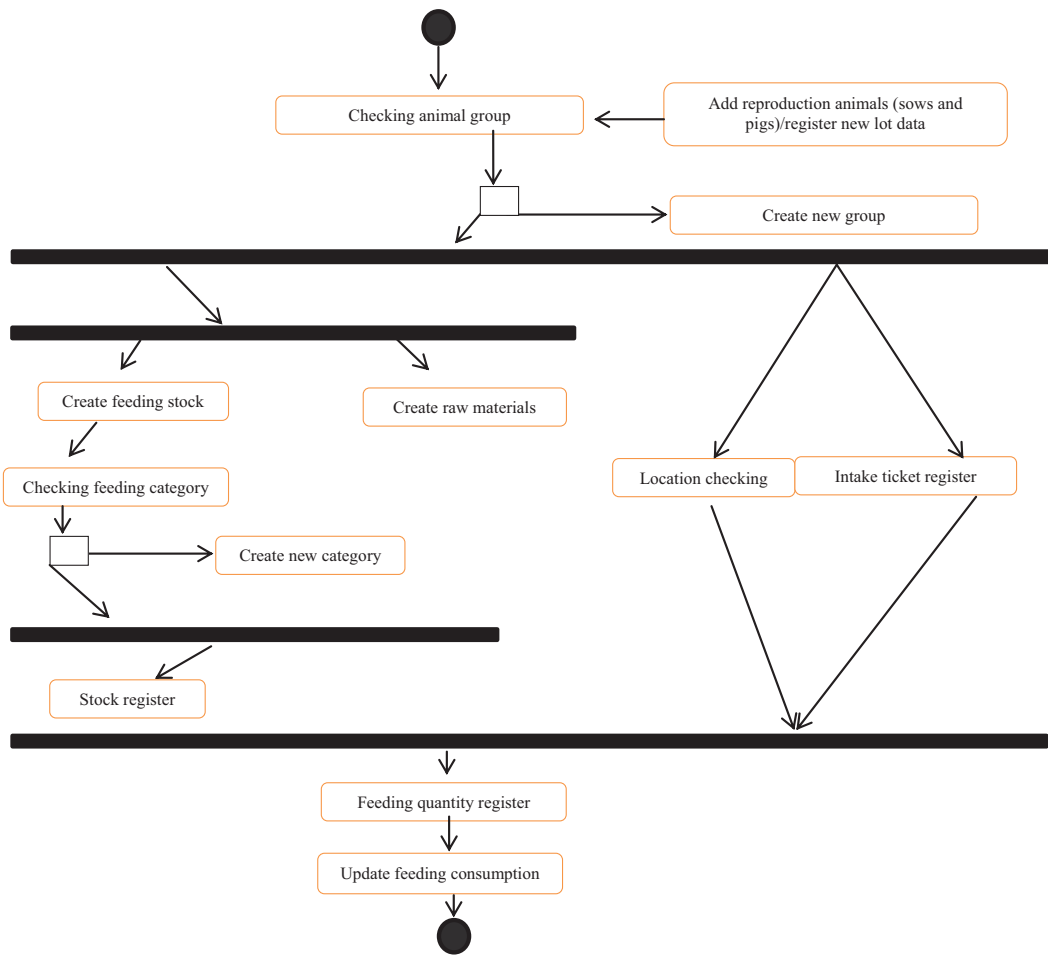
Figure 3. Activities diagram for fodder traceability

3. NEW IC&T

The quality of information tracing to the farms depends on instruments and technologies used for. Traceability systems included databases, datawarehouses, OLAP technology tools, modern technology for intelligent identification, for pork quality monitoring and controlling.

Concerns about the traceability of agri - food product led to the announcement of the completion by IBM in October 2009, of an application for mobile phones (iPhone app) called Breadcrumbs, designed to provide consumers access to information about food, especially groceries. "Breadcrumbs" will be able to scan bar codes and provide a summary of the ingredients, date of manufacture but, in addition, any time of recall of product. Reading barcodes is performed using the iPhone camera, and information offered to the consumer are taken from the Web.

Modern technology has enabled smartphones connection to the Internet objects (convergence of the Internet with real-world objects), devices like the iPhone might become sensor and RFID reader, which allows consumers to interact with real world objects in much more details.

"Breadcrumbs" is a begining for future devices to reach the consumer, providing it with information until now remained inaccessible, like where and when food will be consumed, how long they stayed on the shelf before being

purchased and whether about counterfeit products (MacManus, 2009).

Current information society traverses a revolutionary phase of food and consumer demands. Hence, many challenges arise related to ethics, food availability and accessibility information. Traceability management issues must be efficient so that costs generated by food safety measures do not become increasingly higher.

In the Great Britain case, Graham (2008) reaffirms the need of taking global trend in farming policies, consumer protection and agri - food products traceability, but in view of existing conditions and national goals. This idea is welcome for a country like Romania too, which should make greater efforts to meet requirements on multiple levels, imposed by the European Union or various international fora.

CONCLUSIONS

Pig food traceability becomes possible. However, from the literature and practice we can detach difficulties and limitations of this approach, which can affect farms.

Notermans (2003) identifies the possibility that, in case of bulk delivery of ingredients in food preparation, ingredients are used from several batches, in which case the delivery dates, the identification of the prior storage facility and of delivery weight or volume may be the only benchmarks to verify this point.

Then it may be not be possible a clear separation between individual batches of feed - finished goods, because of required to add of ingredients.

Another issue is that, in emergency cases, traceability operations must be performed quickly, which requires the existence of performant information systems, well designed for the express purpose of ensuring traceability, but can be costly.

Other difficulties related to the organization may be:

- The nature and size of manufacturing plant and storage space of feed and water;
- Exchange of information between different parts of the production chain;
- Level of knowledge of farmers and staff in terms of feed safety and traceability;

- Degree of cooperation within the food industry.

During the next stage of development of the traceability system, the research team must take into account all these observations in the system reengineering approach, for food traceability subsystem functionality can be improved.

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