опыт производства высокоэффективных комбикормов на каждом технологическом этапе, пути повышения эффективности управления персоналом, производством и использованием комбикормов.

Закрепление теоретических положений и эксплуатации программы «КормОптим» проводилось на практических занятиях под руководством к.с.-х.н. Василия ГРЕЧИШНИКОВА, ведущего программиста ООО «Корморесурс», RU. На общих и индивидуальных занятиях рассматривались вопросы, связанные с особенностями обновления баз данных о качестве компонентов для расчета рецептов комбикормов, работы с базами данных программы расчета рецептов комбикормов, основами расчета и оптимизации рецептов комбикормов с помощью программы «КормОптим».

Каждый день работы МШК завершался вечерним дискуссионным клубом участников, где активно обсуждались перспективы внедрения информационных технологий в оценку качества комбикормов и

эффективность технологических процессов их производства; вопросы повышения эффективности использования человеческих, интеллектуальных, сырьевых, энергетических и финансовых ресурсов в борьбе за создание конкурентных рецептов и комбикормов.

Заключительным этапом работы МШК был индивидуальный практический экзамен по расчету и оптимизации рецептов и программ кормления сельскохозяйственной птицы и свиней.

На научном Совете Международной Школы Кормов (ISF) после подведения итогов и результатов экзамена состоялось торжественное вручение Сертификатов участникам, успешно сдавшим практический экзамен. Праздничная церемония закрытия IV-й сессии Международной школы Кормов прошла на морском берегу.

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AUTOMATION OF TRACEABILITY PROCESS AT GRAIN TERMINAL LLC "UKRTRANSAGRO"

Abstract

A positive trend of growth in both grain production and export is indicated. In the current marketing year the export potential of the Ukrainian grain market is close to the record level. However, the high positions in the rating of world exporters are achieved not only due to the high export potential, but also because of higher quality and logistics. These factors depend directly on the quality of enterprise management and all processes occurring at it. One of the perspective ways of enterprise development is the implementation of the traceability system and further automation of the traceability process. European integration laws are obliging Ukrainian enterprises to have a traceability system. Traceability is an ability to follow the movement of a feed or food through specified stages of production, processing and distribution. The process of traceability is managing by people, which implies a human

factor. Automation will allow, in a greater extent, to exclude the human factor that will mean decreasing of errors in documentation and will speed up the process of grain transshipment. Research work on the process was carried out on the most modern grain terminal - LLC "UkrTransAgro".

The terminal is located in the Ukrainian water area of the Azov Sea (Mariupol, Ukraine). Characteristics of the terminal: capacity of a simultaneous storage - 48,120 thousand tons, acceptance of crops from transport - 4,500 tons / day; acceptance of crops from railway transport - 3000 tons / day, transshipment capacity - up to 1.2 million tons per year, shipment to the sea vessels - 7000 tons / day. The analysis of the automation level of the grain terminal is carried out. The company uses software from 1C - «1C: Enterprise 8. Accounting for grain elevator, mill, and feed mill for Ukraine». This software is used for quantitative and qualitative registration at the elevator in accordance with industry guidelines and standards. The software product has many functions, but the management of the traceability process is implemented to a small extent. The traceability process at the grain terminal of LLC "UkrTransAgro" is considered and described. The expediency of development of the automated control system of the traceability process is justified.

The organizational structure of the enterprise is analyzed. The process of traceability was divided into subprocesses. The process model of the traceability process is developed. The interfaces of the developed software are described. Functional part of interfaces considered. The further ways of modernization of the developed software are determined.

Keywords: traceability, process model, grain terminal, automation, traceability system.

Ukraine occupies a high position in the world in terms of export grain crops. As a result of the last months of the 2016/17 season the export volumes of basic grains continue to show a noticeable increase. Since the beginning of the 2016/2017 marketing year to foreign markets was delivered at 14.5% more Ukrainian wheat than in the same period last season. Of course, for the growth and retention of export volumes of grain enterprises that are connected with the grain industry should be continuously improving.

One of the important ways of enterprise development at the moment is the implementation of a traceability system and further automation of the process of traceability. Since September 2015 all Ukrainian enterprises associated with the food industry are required to be certified according to the international standard ISO 22000. This is evidenced by the Law of Ukraine "About the basic principles and requirements for safety and quality of foodstuff". Certification to this standard implies the existence of the traceability system on each Ukrainian enterprise.

Traceability - an ability to trace (origin, movement and location) of a food product in all the processes (at all stages) of its development, production, treatment, utilization and destruction.

A traceability system - totality of data and operations that is capable of maintaining desired information about a product and its components through all or part of its production and utilization chain. Enterprises that have passed ISO 9000, ISO 22000, have traceability systems and this could guarantee the quality of products (quality production process and storage) products. But traceability process is managed by people what implies a human factor. As a result of automation of traceability process:

- the human factor is excluded to a greater extent;
- the exchange of information about the product will pass as quickly as possible;
- the almost complete absence of mistakes during filling out various forms and documents that contain information about the product;
- will allow to transit from paper data to electronic data.

Research on the process of traceability was carried out on the example of the enterprise "Ukrtransagro" LLC. "Ukrtransagro" is the most modern grain-storage complex in the Ukrainian water area of the Azov Sea which provides services for the receipt, accumulation,

storage and shipment on vessels of grains and oilseeds, as well as other services of the grain terminal. "Ukrtransagro" LLC - grain terminal at Mariupol Sea trade port (Mariupol, Ukraine) with the capacity of simultaneous storage of 48,120 thousand tons and handling capacity to 1,2 million tons per year. The terminal has all the necessary transport infrastructure and interchanges. Railway station "Mariupol-port" has sufficient capacity of 300-400 wagons per day. The terminal is equipped with an automobile reception for two trucks, which enables simultaneous acceptance of different cultures of different quality. The acceptance of rail wagons is capable of simultaneous unloading of 3d wagons.

Now let us analyze the level of automation of the enterprise. The company "Ukrtransagro" LLC uses software of the firm 1C, namely the "1C: Enterprise 8. Accountancy of elevator, mill and mixed fodder in Ukraine."

This software is intended for automatization of the quantitative-qualitative accounting at grain elevators, mills and mixed fodder mills of Ukraine. The accounting is maintained in accordance with industry instructions and standards. This program meets the requirements of main documents:

- The law of Ukraine "On grain and grain market in Ukraine" (№ 37-IV passed by the Verkhovna Rada of Ukraine dd 4 July 2002);
- DSTU 2422-99 Grain procurement and comes. Terms and definitions;
- "Instruction of accounting and registration of operations with grain and products of its processing in the grain and grain-processing enterprises" (order of the Ministry of agrarian policy of Ukraine, dated 13 October 2008 No. 661);
- Technical regulations of the grain warehouse (order of the Ministry of agrarian policy of Ukraine from June 15, 2004, No. 228);

The product can be integrated with automated control systems operating technological processes (ACSTP). The mechanisms of communication with the automated process control systems used at enterprises for production management have been implemented. On the basis of the received from ACSTP data, the operational accounting of grain is carried out simultaneously.

Relative to traceability, in this product it is possible to mark out the automation of grain accounting and the formation of normative documents. Only these functions can be attributed to traceability, despite a great set

of product functions. This is not enough to provide quality control traceability.

The concept of "traceability" is rather new, but also very important for Ukraine. All laws that contain any articles concerning the traceability of food products are of European integration and that is the reason the Ukrainian enterprises should implement the traceability systems as fast as possible to maintain competitiveness and reach the European level.

Certainly, developers have provided a lot of solutions for management of the elevator in general, but in general they don't pay enough attention to the process of "traceability". Moreover, nowadays only one developer is known at the market with such product – the company 1C. It is quite well-known and popular among enterprises, but also has its own drawbacks. Software products are not always of a low cost, the management implemented only in general, and there is not enough attention paid to the traceability process. The software contains "hard" interfaces that demand a number of funds for staff training.

Enterprises of Ukraine, certainly, should pay attention to the process of traceability as at the moment the quality management of the process of traceability is relevant and promising direction of enterprise development. The focus of the software is being developed, aiming at managing the process of traceability. The interface of this

product is simple enough so it does not require additional costs for staff training. Enterprise that has an AEMS (Automated enterprise management system) can use this product as a supplement. Small companies can use this product as the primary software. The cost of developing software product is cheaper than at other developers known at the software market.

The company "Ukrtransagro" LLC applied to a linear-functional organizational structure. It is based on the observance of one-man management, the linear construction of structural units and the distribution of management functions between them. The advantages of such type of structure are prompt decision-making, improving the quality of managerial decisions.

Due to this structure, the company will receive higher quality and operational management decisions. It is advisable to choose such an organizational structure for the management of a small company, which occur in routine processes. The form of the above organizational structure is shown in Fig.1.

At the grain terminal, the main process of traceability process is that to collect information about the product at all stages of grain transshipment, the transfer of collected information both between units (inside the enterprise) and beyond, the formation of normative reports and forms, the storage of information.

Organizational structure of LLC "UkrTransAgro"

Figure 1 - a copy the organizational structure of "Ukrtransagro"

Fig.2 - process model of traceability process

The input of the traceability process includes the quantitative and qualitative indicators of customer grain, its origin, the carrier companies, charterer etc. Also, the input includes quantitative and qualitative indicators of grain, but the actual ones, received due to their laboratory, have an archive of grain storage data, namely under what conditions this grain was stored, what processes occurred with it (underworking, drying) and in what conditions, what quantity of grain is shipped. At the output of the process, we have generated reports that contain the sorted information received at the input, and have a more accessible form.

Although, the transshipment takes place mainly on sea transport and transport outside Ukraine, the terminal stores information about the consignee, the country where the grain will be received. Moreover the each lot of grain is bound to paper documents, such as: quality certificate, waybill, power of attorney for the shipment. These documents are kept for a long time in paper form and we can track the lots of grain and find out certain documents by urgent need.

At this grain terminal traceability process can be divided into these subprocesses:

- Transportation Acceptance
- Weighing
- Sample selection
- Unloading and placement
- Shipment

With a help of ARIS Express tools process model of traceability process was built. Process model is shown in Fig.2.

The developed software product is planned to implement 5 interfaces, which in turn correspond to each of the subprocesses. Let to consider the function part of the interface.

Transport Acceptance

The car is accompanied by supporting documents, which contain information about the client and about the cargo. The terminal operator enters the data from the supporting documents in a special form, after that the data is entered into a database and classified in special tables. Data input is possible in two ways, manually or automatically (using a barcode reader).

Weighing

When a car drives onto the weight the actual gross mass is fixed. The program received the actual index weight, compares it with the specified index and displays a report on the compliance / non-compliance indicators. In the case of compliance of indicators, transport passes to the next stage. In the case of non-compliance report is generated and by clicking the button to send the report to the client.

Sampling

Using an automatic sampler, a sample is taken,

the results of the analysis of the sample are recorded in the program, and the actual and declared quality indicators are compared. As during weighing, a report on the compliance / non-compliance of indicators displays in a simplified form. There is a function of a detailed report (by pressing a button). If the actual figures do not correspond to the declared, a report for the client is generated and a button for "sending the report to the client" appears. If the figures correspond – there is a function of sending data to the operator PTL the next stage.

Unloading and placement

If the actual weight and quality indicators correspond to the declared parameters, the operator receives notification that the car has received the unloading permit and a prompt on choosing the route of discharge in a form of № of silo is displayed. Each silo is attached with certain indicators of the quality of cereals, based on these data the program compares the quality indicators at the stage of sampling and recommends a number of silo for unloading. Also displays the loading level of the proposed silo as a percentage. There is a function for more information on the silo, by pressing the button displays the actual load weight indicator in a silage in tonnes and indicators of the quality of grain stored in the silage.

Shipment

An application for shipment comes in the form of a custom's order with the declared weight indicators and grain quality indicators. The operator PTL fills out the form located in the interface, in accordance with the received request. By pressing the button it displays a recommendation to the shipment in a form of № of silage where cereals are stored with appropriate quality indicators. Also it provides a function that allows you to get more information on the silage.

Conclusion

The automation of the traceability process at the grain terminal of "UkrTransAgro" LLC was implemented by software development. The interface of developed software is very easy to use and thus does not require additional training of staff of the grain terminal. The use of such software will reduce the time for acceptance and registration of transport which will increase the daily volume of transshipment and reduce idle time of transport, therefore, it will increase the income of the terminal.

Also, there were defined the ways of further modernization of the software product, namely:

- Using the bar-code scanner during transport acceptance
- Connection of SCADA-systems of the enterprise with the database of the software product (MySQL)
- Connection of laboratory equipment with the database of the software product (MySQL).

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**АВТОМАТИЗАЦІЯ ПРОЦЕСУ ПРОСТЕЖУВАНOSTІ НА
ЗЕРНОВОМУ ТЕРМІНАЛІ ТОВ «УкрТрансАгро»**

Анотація

Визначено позитивну тенденцію зростання виробництва зерна, так і його експорту в Україні. Експортний потенціал зернового ринку України наближений до рекордного в поточному маркетинговому році, але високі позиції в рейтингу світових експортерів досягнуті не тільки завдяки високому експортному потенціалу, важливу роль відіграють так само якість і логістика. Ці фактори залежать безпосередньо від якості управління підприємством і всіма процесами, що протікають на ньому. Одним з актуальних шляхів розвитку підприємства є впровадження системи простежуваності і подальша автоматизація процесу простежуваності.

Євроінтеграційні закони зобов'язують українські підприємства мати в наявності систему простежуваності. Дано визначення поняттям «Простежуваність» та «Система простежуваності». Описані недоліки управління процесом простежуваності на підприємстві. Відзначені переваги автоматизації управління процесом простежуваності.

Дослідницька робота проводилася на сучасному зерновому терміналі - ТОВ «УкрТрансАгро». Термінал розташований в українській акваторії Азовського моря (Мариуполь, Україна). Наведені характеристики зернового терміналу, а саме об'єми одноразового зберігання, об'єми приймання культур, потужність по перевалці та об'єми відвантаження.

Проведено аналіз рівня автоматизації на зерновому терміналі. Надано опис програмного забезпечення, що використовується на підприємстві. Позначені недоліки програмного забезпечення, що використовується, щодо управління процесом простежуваності. Розглянуто і описано процес простежуваності на зерновому терміналі ТОВ «УкрТрансАгро». Обґрунтовано доцільність розробки автоматизованої системи управління процесом простежуваності. Проаналізовано організаційну структуру підприємства. Процес простежуваності був поділений на підпроцеси. Розроблена процесна модель процесу простежуваності. Описано інтерфейси розроблюваного програмного забезпечення. Розглянута функціональна частина інтерфейсів. Було обрано шлях реалізації автоматизації процесу простежуваності. Визначено шляхи подальшої модернізації програмного забезпечення, що розробляється.

Ключові слова: простежуваність, процесна модель, зерновий термінал, автоматизація, система простежуваності.

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