



SUCCESSFUL DEVELOPMENT OF RURAL AREAS IN NORTHEASTERN BULGARIA BY CREATING AND IMPLEMENTING A SOFTWARE PRODUCT FOR MILK AND DAIRY PRODUCERS

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ABSTRACT

A large portion of the territory of Bulgaria, more than 80%, falls within the so-called rural areas. The situation is similar with the European Union, with more than 85% of its territory falling within these specific areas, whereas rural areas in the United States of America encompass more than 90% of the territory of the states. Naturally certain nuance differences exist in the definitions that different countries in the world use to define an area as a rural area and this report reviews these specifics. A portion of these particular activities are related to the development of livestock breeding and the production of milk and dairy derivatives.

The purpose of this report is to encompass and analyze the advantages of the creation, the implementation and approbation of software product in the production and processing of milk and dairy products in Northeastern Bulgaria.

Several main conclusions have been made in the scientific report, with the general conclusion being that on the basis of the computer program developed and implemented in practice, an easier method of work is ensured, while taking into account the specific pre-production and production processes, as well as processing operations in the area of dairy production and the creation of complete dairy products with added value.

Key words: rural areas, software product, computer program, milk and dairy products

INTRODUCTION

Rural areas are characterized with the development mostly of agrarian business, as well as fewer people per square kilometer and their homes and farms situated at a significant distance from one another (1). Agriculture is the main type of activity in most rural areas. Most people among the ones who live in rural environment deal with crop production, livestock breeding or related to them processing activities or value adding activities. This is typical for all areas around the world, however some small differences exist between the specific definitions

for a rural area in European Union member states, the United States of America and other countries, by way of example the United States of America, the US Census Urban and Rural Classification defines them as populated areas with population less than 1 000 people over a territory of 2.6 square kilometers (a square mile). (2) In the United Kingdom, rural areas are the ones which fall within the rural environment areas and in the area of local governance, their share of the population is more than 26% of all population, residing in a rural environment. Germany is divided into 402 administrative areas, out of which 295 are rural areas. In all European countries, rural areas are known as areas falling behind in their development, with the exception of Germany and Switzerland, where most of the residents of these areas work in the crop production and livestock breeding sector, including production of milk and dairy products.

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According to the perceptions of the United States of America, a rural area is: “Open territories and settlements with fewer than 2,500 residents, whereas the territories defined as rural areas can have population density 999 per square mile or up to 1 person per square kilometer” (3). The definitions referred to hereinabove evidence that certain differences exist in the number of residents per square kilometer, but what’s common for all these definitions is that these are territorially individualized units in areas falling behind in their development, distinctive with its lower rate of urbanization and high degree of employment of the local population in the area of agrarian activities and the business processes, related thereto. The main characteristics of rural areas on a global scale are the following: People residing in these areas are always closer to the environment. This is also the main reason why they are more connected to crop raising and livestock breeding processes and are affected to a much higher degree by the environment. (4) Rural communities are much smaller than urban communities and population in rural communities is significantly lower. Everyone knows everyone else in villages, and agriculture is the main type of profession which provides income of the population residing in these areas and it also is the source of food of plant and animal origin. Rural communities are homogeneous in nature, most of them are mainly related to the agrarian business and the products produced and processed as the result of agrarian business and despite the fact that some portion of the population is occupied in other activities as well, the numbers of workers in other sectors are much lower than the agricultural business sector.

METHODS

Rural environment residents interact with one another and communicate much more than urban residents. They know each other well and they often start business ventures together and add value to a certain product. This is the case for milk production and milk processing in dairy farms with the purpose of creating a finished product. Rural areas are also typical for certain customs in the production of foods, with certain holidays, festivals and traditions that help rural areas realize a portion of the completed production. Despite everything listed

hereinabove, Europeans consider these areas disadvantaged and lagging in their development and therefore the European Union has established and applies a special program to support these areas, known under the name Operational Programme “Rural Development”. The objective of this program is supporting entrepreneurial initiatives in the area of development of agricultural and non-agricultural activities in the rural environment, which will secure funds for the development of the business of people residing therein. During the first programming period, which encompasses the period 2007-2013, mostly agricultural activities and forests have been supported, as well as activities which ensure the competitiveness of people residing in such areas. During the second programming period encompassing the period 2014-2020, emphasis has been applied not only on main agricultural activities, related to crop production and animal breeding activity, but also on implementation of new technologies and innovations in the rural environment. Therefore, development and implementation of software products not only signify a courageous research project, but also a well-thought out strategy for development of the specific agrarian business. In this particular case this refers to implementation of software for the production and processing of cow’s and sheep’s milk and yogurt and the production of derivative products. The advantages stemming from the application of such software are: decreased number of multiple manual entries and collection of paper invoices, reporting documents and physical media; Facilitations and centralized access to information from the developed software information product, which provides full data about the milk received, the quantity and prices of said milk, and the method of using the milk to produce the end feedstock. The production of milk in Bulgaria has always had an important strategic importance for our country due to the fact that it has numerous pastures and population, which values and loves this high-value food product. Processing this product and the production of cheese from this product is viewed as inseparable part of the process of adding value to the initial product, widely covered in the main trends under Operational Program “Rural Development” during the third programming

period. The European dairy sector crisis has resulted in decreasing purchase prices of dairy, but over the course of the last few years it has additionally stimulated the development of this sub-type of agrarian activity in the country with the objective of creating added value and production of end product-cheese, yellow cheese, curd. This has created prerequisites for looking for new adequate solutions in the development of software product, which has provoked our scientific research interest toward the development and implementation of this software product in several prominent dairy farms in Northeastern Bulgaria. Bulgaria has excellent potential for export of dairy products outside of the country. The demand for good quality white brined cheese and yellow cheese, produced using traditional Bulgarian recipes. During the first programming period, which encompasses the period 2007-2013, mostly agricultural activities and forests have been supported, as well as activities which ensure the competitiveness of people residing in such areas. During the second programming period encompassing the period 2014-2020, emphasis has been applied not only on main agricultural activities, related to crop production and animal breeding activity, but also on implementation of new technologies and innovations in the rural environment. Therefore, development and implementation of software products not only signify a courageous research project, but also a well-thought out strategy for development of the specific agrarian business. In this particular case this refers to implementation of software for the production and processing of cow's and sheep's milk and yogurt and the production of derivative products. The advantages stemming from the application of such software are: decreased number of multiple manual entries and collection of paper invoices, reporting documents and physical media; Facilitations and centralized access to information from the developed software information product, which provides full data about the milk received, the quantity and prices of said milk, and the method of using the milk to produce the end feedstock. The production of milk in Bulgaria has always had an important strategic importance for our country due to the fact that it has numerous pastures and population,

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RESULTS

The information system for servicing the dairy processing companies has been created in 1994. The product's initial version has been developed on Turbo C and a CXL library has been used to build the windows and menus. The database is realized on the basis of BTRIEVE 5.10. (12) With the development of technology, it has been further developed for a Windows version of the Delphi 7 (13) database and the operational environment of the Firebird 2.5 database. (7, 8 and 9) At this stage, the system has been used in more than 8 dairy processing companies.

The conceptual layout is shown in **Figure 1**. The information system has been realized on a module principle, depending on the technological features of the processing activity.

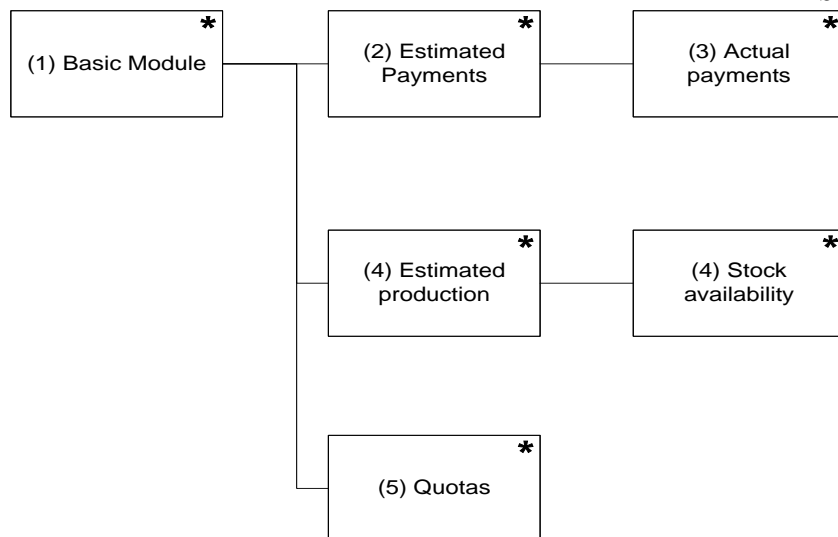


Figure 1. Main information system modules.

The functional capacities of the separate modules are the following: (1) Basic Module. This is the main information system module. It is used for input and processing of day-to-day information and its summarization in defined monthly reports. The main assignment of one information system in the area of the dairy processing industry is grading and evaluation of the dairies purchased. Most of the enterprises in this sector do not

process their own produced milk, and instead they rely on their purchasing by tens, and in certain cases hundreds medium and small producers. This necessitates the performance of a complex and labor-intensive process on evaluation of milks with different characteristics. To this end, the primary document on purchasing and evaluation of milk is the transportation list of a particular buyer (Figure 2).

Заклук: 11/Симеон Симеонов		Млеко: Каве Месе: Фев а м F1 - Поно:					
Дата: 24-02-2006г.		Физ.л	Ма ден	Пла	и Вода	т° Ки	СБ0
ИЗКУПЕНО		5145	3.570%	28.41	0.1%		8.551
1	218 Ломни а	121	3.900%	29.00	0.0%	0° 0	8.500
2	183 Сливен и	22	3.370%	27.90	0.0%	0° 0	8.500
3	9 Овпа ово	232	3.440%	28.60	0.0%	0° 0	8.500
4	179 Доб ево	325	3.800%	28.60	0.0%	0° 0	8.500
5	180 Свобода	35	3.800%	28.40	0.0%	0° 0	8.500
6	70 Д ково	14	3.600%	28.00	0.0%	0° 0	8.500
7	71 Д ково-2	136	3.700%	28.40	0.0%	0° 0	8.500
8	173 Доб ин	241	3.800%	28.20	0.0%	0° 0	8.500
9	231 Ас и	113	3.520%	28.40	0.0%	0° 0	8.500
10	331 Ас и о -3 ООД	162	2.000%	30.00	0.0%	0° 0	8.500
11	42 К джиево	38	3.370%	27.90	0.0%	0° 0	8.500
12	65 Севе н к	155	3.860%	28.30	1.4%	0° 0	8.500
13	230 Ко и ен	514	3.400%	27.60	1.0%	0° 0	8.500
14	224 Кап. Дини ово	77	3.600%	29.00	0.0%	0° 0	8.500
15	18 Теле иг	71	3.500%	28.00	0.0%	0° 0	8.500
ПРЕДАДЕНО		5110	3.370%	27.90	0.9%		8.500
1		5110	3.370%	27.90	0.9%	0° 0	8.500
2						0° 0	
3						0° 0	
4						0° 0	
РАЗЛИКА		-35	-0.20%	-0.51	+0.0%		-0.051

Figure 2. Sample screen of purchased milk per certain rate

The information that it contains support the dairy processing company in grading the milk purchased on the main indicators: quantity, fat content, density, availability of water impurities, temperature and acidity. On the one hand, the data determine the obligations to the dairy producers, and on the other hand they are compared to the indicators of the milk delivered to the enterprise. The objective is to determine the differences between the purchased and delivered (paid and processed) milk. On the grounds of the day-to-day documents, the monthly payable to each producer is calculated using the method of average weighted values.

In many processing enterprises, the value of milk is not determined only on the basis of quantity. For this purpose, the term “adjusted liters” is defined. This means that the physical liters are transferred using some of the indicators: fat content, density or DFFR (dry fat-free residue, which includes the indicators fat content and density).(9)Adjustment is performed to base values. The assignment of base values requires the constant maintaining of several categories,

because differences exist between the standards for milk originating from different animal species. A total of 18 categories of milks with specific characteristics are maintained in the developed system. Another main functionality from the module is summarizing the monthly results. The decisions taken on the basis of the monthly results shall be related to:

- analysis of the monthly results of margins between the purchased and delivered milks with the purpose of minimizing losses (**Figure 3**); measures shall be taken in case of existence of specific quantities of low quality milks; data for payables to producers shall be summarized and the projection payments shall be prepared (sample screen on **Figure 4**). During the initial years of the realization of the information system, a formula of ratio to standard indicator has been used: $Q_{result} = Q_i \text{ Indikatori} / \text{Indikatorstandart}$, Q_{result} represents adjusted liters, Q_i are the purchased physical liters, Indikator i are the indicators of the purchased milk, Indikator standart is the standard value for the particular indicator.

*24/02/06 Filipopolis-RK Ltd., Plovdiv

Reference for purchasers (cow's milk) from the 01.02 to 31.02.2006 for the month of: February

Name of purchaser	Quality of Milks										Spoil. Liters
	K	Phys.	Water	Dewat.	Average	Average	Avg.	Equalized	Average	Cpst of	
	[liters]			Milk	Fat	density	DFFR	acc. DFFR	Price	Milk	
	[L]	[%]	[L]	[%]	[L]	[L]		[L]	[Leva]	[L]	
Total purchased	200	0.0%	200	3.000%	27.00	8.500	200	0.1500	30.00		
Total delivered	200	0.0%	200	3.000%	27.00	8.500	200	0.1500	30.00		
1 Georgi Nedelchev	0	0.0%	0	0.000%	0.00	0.000	0	0.0000	0.00	0	
Total purchased	114227	0.0%	114173	3.731%	28.71	8.500	114173	0.3000	34251.95		
Total delivered	114060	-0.0%	112452	3.674%	28.18	8.500	112452	0.3000	33735.65		
5 Kolcho Kirov	-167	2.0%	-1721	-0.057%	-0.52	0.000	-1721	0.0000	-516.30	0	
Purchased	1 144469	-2.0%	144445	3.752%	28.47	8.500	144445	0.3000	43333.61		
Purchased	2 350	0.0%	350	3.430%	28.90	8.500	350	0.1500	52.50		
Total purchased	144819	-0.0%	144795	3.751%	28.48	8.500	144795	0.2996	43386.11		
Total delivered	145000	0.0%	143669	3.671%	28.43	8.500	143669	0.3000	43100.59		
24 Bojan Dimov	181	-2.0%	-1127	-0.080%	-0.04	-0.000	-1127	0.0000	-285.52	0	
Total purchased	58335	-0.0%	58318	3.630%	28.76	8.500	58318	0.3000	17495.35		
Total delivered	57800	0.0%	57668	3.529%	28.78	8.500	57668	0.3000	17300.47		
30 Ivan Handjiev	-535	0.0%	-650	-0.102%	0.02	0.000	-650	0.0000	-194.88	-419	
Total purchased	141475	0.0%	141365	3.703%	28.56	8.500	141365	0.3000	42409.38		
Total delivered	141120	0.0%	140001	3.624%	28.37	8.500	140001	0.3000	42000.41		
32 Pavel Pavlov	-355	-0.0%	-1363	-0.079%	-0.19	-0.000	-1363	0.0000	-408.97	-73	
Total purchased	1317016	0.0%	1315378	3.697%	28.54	8.500	1315378	0.2993	393687.50		
Total delivered	1311740	0.0%	1299478	3.610%	28.37	8.500	1299478	0.3000	389813.44		
Monthly total:	-5276	0.0%	-15900	-0.087%	-0.17	0.000	-15900	0.0000	-3874.06	-3373	

Figure 3. Excerpt of a monthly reference for losses from purchased and delivered milk.

At the next figure, you can see the summarized data from the monthly reference for the obligations to the producer.

Reference for purchasers (cow's milk) from the 01.02 to 31.02.2006 for the month of: February

Name of purchaser	Quality of Milks									TOTAL FOR MONTH [L]
	Phys. liters	Water liters	Dewatered Milk	Average Fat	Average density	Avg DFFR	Avg Price	Cost of milk		
	[L]	[L]	[L]	[%]	-		[L]	[L]	[L]	
1 Радга	2	200	0.0	200.0	3.000%	27.00	8.500	0.1500	30.00	
	1	3067	0.0	3067.0	3.800%	28.48	8.500	0.3000	920.10	950.10
3 Димитров	1	3671	0.0	3671.0	3.774%	28.49	8.500	0.3000	1101.30	1101.30
4 Димитров	1	1794	15.5	1778.5	3.824%	27.74	8.500	0.3000	533.55	533.55
5 Каляева?	1	1612	0.0	1612.0	3.800%	28.40	8.500	0.3000	483.60	483.60
7 Кулина?	1	1079	0.0	1079.0	3.680%	27.48	8.500	0.3000	323.70	323.70
8 Божидаров	1	20232	0.0	20232.0	3.691%	28.06	8.500	0.3000	6049.60	
	2	1580	0.0	1580.0	3.440%	28.30	8.500	0.1500	237.00	6306.60
9 Димитров	1	5502	0.0	5502.0	3.506%	28.47	8.500	0.3000	1650.60	1650.60
10 Димитров	1	5689	0.0	5689.0	3.794%	28.03	8.500	0.3000	1706.70	

575 ПК Димитров 1270091292	1	36730	0.0	36730.0	3.721%	28.60	8.500	0.3000	11019.00	11019.00
579 ПК МАДАРСКИ КОМБИ	1	44790	0.0	44790.0	3.829%	28.07	8.500	0.3000	13437.00	13437.00
605 Колева?	1	10780	75.5	10704.5	3.728%	27.43	8.500	0.3000	3211.35	3211.35
620 ЗК "Кулина"-7. Е-7а Валя	1	71831	0.0	71831.0	3.707%	28.46	8.500	0.3000	21549.30	21549.30
637 ЗИП "Кален" 7. Кален	1	9093	0.0	9093.0	3.609%	28.09	8.500	0.3000	2727.90	2727.90
817 Геога Димитров-ЦЕРНА	1	2977	6.4	2970.6	3.604%	28.02	8.500	0.3000	891.17	891.17
896 Рад Колева	2	543	0.0	543.0	3.426%	29.04	8.500	0.1500	81.45	
	1	1625	0.0	1625.0	3.610%	28.28	8.500	0.3000	487.50	568.95
906 Божидар? Кулина? Димитров	1	7543	0.0	7543.0	3.729%	28.67	8.500	0.3000	2262.90	2262.90

TOTAL		1317016	1638	1315378	3.697%	28.54	8.500	0.2993	393687.44	

Figure 4. Excerpt from the monthly reference for debts to producers.

After 2005, the methods for calculation has been changed according to an order by the Ministry of Agriculture, Foods and Forestry and until now the adjustment method is applied by adding or subtracting one tenth of the standard indicator. The method of adjustment of physical liters is very important, because using different calculations methods enables the receipt of large limits in the sums of money payable to the producer. (2) Estimated payments. The objective of this module is the projected determination of the sums of money payable to each dairy producer. This means it provides an opportunity for the management of the enterprise to determine the projected monthly payables on the basis of several criteria, which are: cost of raw materials for processing; value of different categories of milk (cow's, sheep's, etc.); payables to the specific producers. Other than the assignment of particular prices for each producer, the system also allows a choice of a particular method for calculation of the adjusted liters. The objective is for the enterprise to have the freedom of renegotiating the conditions for each particular producer. (3) Actual payments. The module presents functionalities on the actual payment of dairy products depending on the type of dairy producer. If the supplier is a company, an invoice and a payment order shall be issued. In case the milk has been purchased by a group of producers,

a pay sheet and a cost order shall be completed for each member of the group. Naturally the deliverables form the projected and actual payments often differ. The reasons for this may vary: payment of additional commissions, renegotiating terms and conditions, etc. The existence of a module for projected payment is necessary due to the following reasons: planning of monthly costs for raw materials (respectively determining the prime cost of the ready production); planning of cash availabilities for a particular period of time during which the payables can be paid off; minimizing in future periods of the margin between actual and projected payment. (4) Estimated production. The operation of this module is directly related to the production of a specific dairy product. Algorithms have been assigned for expected quantity of complete production, depending on the yield (raw material consumption per unit of output) and quality indicators for the available quantity of milk in the enterprise. The objective is to optimize the production process and the technologists shall have obligations for specific results. Parallel to the production of a particular product, a technological map shall be completed. It shall contain information such as: date, time, lot, team, quantity of raw materials, projection product quantity, actual produced quantity. On the one hand, this map allows for observing the

waste of raw materials, and on the other hand it supports the optimization of algorithms for projected production. Updating algorithms is mandatory due to the fact that each enterprise purchases milks with different characteristics and/or produces specific products. (5) Stock availability. This functionality module is approximating a warehouse information system. It provides the option to report the following data: storage of a particular lot of products with characteristics such as: product type, production date, packaging type, quantity, price; follow-of

the process of storage and ripening of the complete production per lots; sales to clients; turnover and availabilities per type of product; transferring the product from one type of packaging to another type of packaging; observing the availability of packaging materials. The system offers a flexible approach to change the nomenclatures settings for the types of products and the number and type of warehouses for ripening of the complete production. Sample screens have been shown in **Figures 5 and 6.**

Reference on goods

From date: 1.2.2013 r. To date: 28.2.2019 r.

Warehouse: СКЛАД

ID	Group	Product	Quantity	Tin cans
Warehouse: СКЛАД				
Date: 1.8.2013 r.				
1	БАЛКАН 0,500 КГ.	Кашкавал	385.6	918
1	ОВ.СИР 30% РР 0,800	Сирене	331.0	331
1	ОВЧЕ СИР. Ч.В. 15 КГ	Сирене	181.7	12
1	КОЗЕ 15 КГ.	Сирене	150.0	10
1	ДРЕБ.СИР. 5 КГ	Сирене	12.0	2
1	КРАВЕ СИРЕНЕ 4КГ	Сирене	524.0	131
1	КР. СИР П-ТА 14КГ	Сирене	154.0	11
1	КР. СИРЕНЕ РАЗФ.15	Сирене	480.0	32
Date: 2.8.2013 r.				
2	БАЛКАН 1КГ.	Кашкавал	440.0	440
2	МАСОВ 8 КГ. РР	Сирене	952.0	119
2	ОВЧЕ СИР. Ч.В. 15 КГ	Сирене	225.0	15
2	ОВЧЕ СИРЕНЕ 4 КГ 30:	Сирене	52.0	13
2	КОЗЕ 15 КГ.	Сирене	135.0	9
2	КРАВЕ СИРЕНЕ 4КГ	Сирене	224.0	56
2	КР. СИР П-ТА 14КГ	Сирене	154.0	11
				36983.00

Figure 5. Excerpt from reference for a period of reported production quantities.

Reference per good

From date: 1.2.2006 r. To date: 1.2.2018 r.

Group: Други

Code	Name of good	Initial	Tin cans	Income	Tin cans	Expense	TTin cans	Balance	Tin cans
Group: Други									
600	ИЗВАРА 17 КГ	0.00	0	68.00	4	1139.00	67	-1071.00	-63
601	ИЗВАРА 17 КГ	0.00	0	0.00	0	1615.00	95	-1615.00	-95
				68.00	4.00	2754.00	162.00	-2686.00	-158.00
Group: Кашкавал									
300	ВИТОША 0,500 ИЗНОС	0.00	0	0.00	0	656.20	1620	-656.20	-1620
301	ВИТОША 1 КГ.	0.00	0	1111.00	1111	801.75	818	309.25	293
302	ВИТОША 0,500 КГ.	0.00	0	0.00	0	74.98	173	-74.98	-173
303	ВИТОША 7	0.00	0	189.00	27	154.17	21	34.83	6
305	БАЛКАН 50/50 В.П 0,5	0.00	0	0.00	0	22.39	34	-22.39	-34
306	БАЛКАН 50/50 В.П 1КГ	0.00	0	0.00	0	15.37	15	-15.37	-15
310	БАЛКАН 1КГ.	0.00	0	6828.00	6828	5778.70	5904	1049.30	924
311	БАЛКАН 0,500 КГ.	0.00	0	6040.50	15354	9990.12	24300	-3949.62	-8946
312	БАЛКАН 7 КГ.	0.00	0	0.00	0	0.00	0	0.00	0
313	БАЛКАН 9 КГ.	0.00	0	702.00	84	620.50	80	81.50	4
314	КАШ КАГЛИАТА 1КГ.	0.00	0	0.00	0	0.00	0	0.00	0
315	КАШ КАГЛИАТА 0,500КГ	0.00	0	0.00	0	0.00	0	0.00	0
320	БАЛКАН 30% 1КГ	0.00	0	0.00	0	0.00	0	0.00	0
321	БАЛКАН 30 % 0,500 КГ	0.00	0	0.00	0	0.00	0	0.00	0
322	БАЛКАН 30% 9 КГ.	0.00	0	0.00	0	0.00	0	0.00	0
				144880.36	63964.00	169003.28	102899.0	-24122.92	-38935.00

Figure 6. Excerpt from a reference for turnover of production quantities.

(5) Quotas. After the accession of Bulgaria to the European Union in 2007, the directive for production quotas for certain agricultural production has been applied to the sector of milk production. Therefore, a module “Quotas” has been developed to the information system to service the processes for follow-up of the producers’ quotas. For this purpose, the following functionalities have been developed: maintaining information for individual quotas for separate producers of cow’s milk; daily follow-up for filling the individual quotas; monthly reports for performance and outstanding balance on the individual quotas, with the purpose of renegotiating the conditions with the producers; reports according to the form of Fund “Agriculture” for formation of the state quota for production of cow’s milk.

The module also supports restrictions for the purchased milk in order to avoid penal measures in case of over-performance of the individual quotas. A portion of the realization of the database in separate modules is apportioned into separate months with the purpose of optimizing the processes on information processing. This principle is applied in full with the modules 1, 2, 3 and 5. (10) Module 4 has its own database, without having a direct connection to the data of the remaining modules. (11) The information system has been developed and maintained since 1994 and is functional to this day, and many functionalities have been added or removed from this information system, depending on the regulatory or technological provisions in the sector.

CONCLUSION

Development of the milk sub-sector as a main unit in the livestock breeding economy of our country is the main part of the opportunity for development of rural areas in Bulgaria. An additional incentive for this development is created by the specific measures and sub-measures to the Operative Program for development of rural areas to the programs of the European Union. Parallel to this, the implementation of new information technologies and innovations in the sector create good prerequisites for a more rational and effective implementation of the production and realization processes in the specific agrarian business.

The developed specialized information system in the area of milk production and processing of dairy products encompasses all important elements, inherent to the pre-production, production and commercial processes. This includes the specific criteria for 18 categories of milk with specific characteristics, type and quality.

An important functionality of the computer program is that it summarizes monthly results. Based on these monthly results specific decisions are taken regarding the received monthly results as regards to the differences between the purchased and the sold milks with the purpose of minimizing specific losses. Concrete measures are also taken in case of established quantities of low-quality or poor quality milk, which ensures higher quality of the end products offered;

The developed and implemented information system for milk and dairy products processing and production has been approbated and implemented successfully in 8 independent dairy processing enterprises and dairy farms. It has been tried since the time of its creation and implementation and over the quarter of a century (25 years) it has successfully undergone all stages of upgrading and replacement of a large portion of its functional teams. During this time period of significant duration, the information system has successfully provided the necessary data to determine payables to dairy producers, by creating an opportunity for comparison of the specific indicators of the milk delivered to the dairy companies and the quality and the quantity of the produced end products. The differences between the purchased and the delivered (processed) milk shall be determined on the basis of that.

In conclusion we can summarize that the existence of the specific information system to a large degree facilitates and simplifies the organizational, administrative, production, processing and commercial processes in the specific dairy companies. This gives us the grounds to conclude that the software product is not just innovative in its parameters, but is also extremely useful and significant for the operational and management processes of dairy production and processing. Furthermore, its implementation and use in the real practice

allows the improvement of the work processes and strict compliance with the EU standards, related to the specific milk quotas. The information system application on multiple occasions has facilitated the organizational, administrative, production and commercial processes, and also creates real prerequisites for exercising an easier and more organized access to a richer data set and information required for the management process.

Through the implementation of the information system, the companies become more independent and self-operating;

It is easier for companies to communicate with their counterparties, by maintaining separate batch databases for all of their suppliers, and also for their clients.

Much of the functionality of the information system and its high economic significance and effectiveness can be explained with the high level of diversity of functionalities, which are included in the component structure of the computer program. The highest grade for the quality and the practical significance and availability of the software product is the long service life, the practical application and the constant updating of the specialized information database and the specific functional modules which the information system successfully operates with in the current highly competitive market conditions.

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