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## MARKET INFORMATION SYSTEM FOR AGRICULTURAL PRICES IN ROMANIA

### ABSTRACT

The paper presents the result of a project by which the establishment of a market information system for the agricultural markets in Romania was envisaged. On the web site [www.preturi-agronet.ro](http://www.preturi-agronet.ro) in the created database, the prices of the main crop and animal products are displayed on the basis of certain inputting mechanisms discussed and agreed with the five partners (associations and professional organizations in the field) involved in project development. The paper presents the infrastructure used for the program design and the partial results concerning the inputting for agricultural prices in the created database.

**Keywords:** agricultural prices, market information system.

**JEL Classification:** Q19, Q13.

### 1. INTRODUCTION

Although in agriculture a series of measures and policies were adopted that made it possible for Romania to join the European Union, there is no dedicated market information system in place that enables the Romanian farmers to participate under fair conditions on an increasingly integrated and global market. This market information system will imply the increase of farmers' abilities to compete on a Single Market, in an economy governed by the computer science, information and technology, in order to make it easier for farmers and investors in the field to better understand the dynamics of local, regional, national and even international markets. As a result, the project will contribute to the increase in the level of knowledge and information of players on the agricultural markets and it will benefit all the operators from the agri-food chain: farmers, exporters, wholesalers, processors, etc. The system will permit them to make correct decisions and minimize the business risk. This will also benefit the government officials and decision-makers for the accurate analysis of the sector and the formulation of adequate policies in this sector.

The main objective of the paper is to facilitate the access of target groups to information in real time on the agricultural prices practiced in Romania by main types of markets.

This objective is reached by means of an Information System for the Agricultural Markets. In this respect, the main objectives were the following:

1. Identification of end-users and establishment of the necessary information type. The establishment mechanisms for basic information taking over in cooperation with the associations and professional organizations.
2. Design and creation of the database PRETURI AGRO (agricultural prices).
3. Design and creation of site for the presentation, communication with beneficiaries and on-line dissemination of the information on agricultural prices found on the site
4. Database implementation and setting into operation
5. Information system maintenance and development
6. Design, development, multiplication and distribution of the Information Bulletin "MARKET REPORT" among the target groups.

## 2. LITERATURE REVIEW

The economic theory underlines that the market transparency and the free movement of information represent an essential condition for the operation of competition markets.

"A market information system is an instrument that involves the collection on a regular basis of information on prices and, in some cases, quantities of widely traded agricultural products from rural assembly markets, wholesale and retail markets, as appropriate, and dissemination of this information on a timely basis through various media to farmers, traders, government officials, policy makers and others, including consumers" (Shepherd, 1998:<http://www.fao.org/DOCREP>).

The government officials' role to provide information to the players in the agricultural sector is extremely important, as in a competitive market economy the information is a vital factor in minimizing the risk. The more informed a farmer or agricultural entrepreneur is, the better the decision he / she makes in running his / her own business.

In the economic literature, it is almost unanimously agreed that agriculture is a risky business. Antle and Hatchett (1986), for example, characterize the risk in the agricultural business in relation to the production decisions. The quality of these decisions and hence the success on the agricultural markets depend on the information available to farmers at the respective moment.

The government officials' role in providing accurate information is very important. Caswell (1997), for example, in one of his works suggests that among all the governmental programs, the farmer information activity is fundamental. Among other studies that highlighted the importance of the government's role in providing information to the players along the agri-food chains we mention those

by Hayami and Peterson (1972). Knutson (1983) explained the government's role in providing market information and stated that the free access to information contributes to the creation of more efficient and competitive markets. At the same time, at the European Union level, there are such studies and functional systems that are operated under public-private level, while others under public or private system (e.g., in Great Britain, Germany, France, etc.).

### 3. MATERIAL AND METHOD

#### 3.1. Design of Agronet Price application

For the beginning we present the infrastructure used for designing the AGRONET Price application:

1.	Application server operating system	Windows 2008 Enterprise
2.	SGBDR	SQL Server 2008
3.	Web Server	IIS 7.0
4.	Report Server	SQL Server 2008 – Reporting Services
5.	Application development framework	Visual Studio Team System 2008
6.	Programming languages used	T-SQL, VB.NET

It must be highlighted that this infrastructure was selected to accommodate a larger range of applications necessary for the information/research activity and to be a platform for computer-assisted research.

The paper presents the application as it is available on [www.preturi-agronet.ro](http://www.preturi-agronet.ro) and it covers three components devoted to:

- preparation of data provided by partners
- search in the database – search engine
- reporting – the report system that accompanies the application.

These components are in line with a 3-tier<sup>1</sup> architecture:

- data layer – a relational database, in our case SQL Server 2008
- business layer – a family of objects (classes) implementing the business logic components with functionalities for data access (loading from data layer and saving the modifications back in data layer)

- user interface layer – the part that displays the data from the business objects for the user and permits their modification and the business logic execution on the user's command.

<sup>1</sup> 3-tier is a client-server architecture where the user interface layer, the business layer, and the data layer are developed and maintained as separate, independent modules, most often by the platform on which they are developed.

### 3.2. Data management

The **Preturi AGRO NET** web application system interacts with the **IAE-MIS (Institute of Agricultural Economics-Market Information System)** database developed in SQL Server 2008. The loading level of database and its componency are presented in the system report from Figure 1.

Disk Usage by Table					
[IAE_MIS]					
on CK-WIN2K8 at 06.07.2009 14:43:48					
This report provides detailed data on the utilization of disk space by tables within the Database.					
Table Name	# Records	Reserved (KB)	Data (KB)	Indexes (KB)	
dbo.NomCanCom	6	80	16	8	
dbo.NomCatCalit	18	16	8	8	
dbo.NomCatProd	9	16	8	8	
dbo.NomGrUtilizare	3	80	16	8	
dbo.NomJud	41	80	16	8	
dbo.NomNivAgreg	4	80	16	8	
dbo.NomProd	64	16	8	8	
dbo.NomUM	7	80	16	8	
dbo.NomUnitRap	5	80	16	8	
dbo.PreturiDB	2.347	712	688	8	
dbo.Produse	64	16	8	8	
dbo.sysdiagrams	0	0	0	0	

Figure 1. Interaction of Preturi AGRO NET web application with the IAE-MIS database developed in SQL Server 2008.

The application nomenclature system at database level is the following:

- **NomCatProd** – Nomenclature of product categories;
- **NomProd** – Nomenclature of products;
- **NomGrUtilizare** – Nomenclature of utilization groups;
- **NomCatCalit** – Nomenclature of quality levels for the products included in NomProd;
  - **NomCanCom** – Nomenclature of marketing channels;
  - **NomNivAgreg** – Nomenclature of aggregation levels of non-aggregated (farm) prices farm-locality, locality-county, county-country;
  - **NomJud** – Nomenclature of counties;
  - **NomUM** – Nomenclature of measure units;

- **NomUnitRap** – Nomenclature of reporting units (partners);
- **PretDB** is the table that stores the prices according to the partners' reporting. The data are inputted on the basis of a web application that is part of the **Preturi AGRO NET** web application system.

The application system for database editing and maintenance includes facilities for data adding, deleting, modification, both from Preturi AGRONET and from the IAE-MIS database management system.

In the case when the online editing is not possible, we provide offline editing tools. The asynchronous processing takes place at the moment when it is not possible for the application to be available on the Internet, and the solutions are of Windows type.

The reports resulting from the price database operation will be published for their dissemination on the web server through Reporting Services at SQL Server level.

The web application that enables the creation and maintenance of the IAE – Market Information System is **Preturi AGRONET**.

The application was developed in VB.NET on VS Team System for DataBase 2008, and the access to its functions is conditional on the authentication by a *username* and a *password* that the user has to ask from the application administrators. Their administration is achieved through the “**Web Site Administration Tool**” interface, whose administration window is presented in figure 2, and the authentication web form is in figure 3.

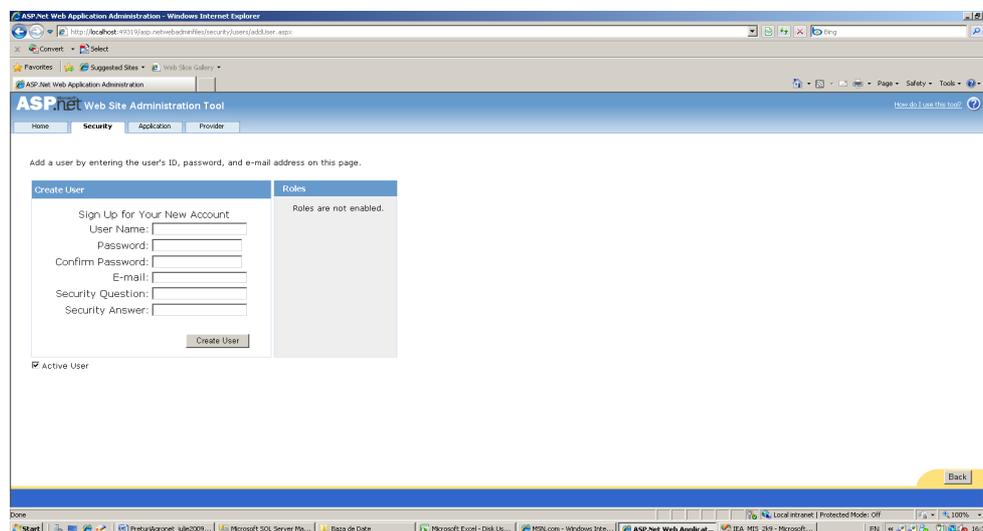


Figure 2. Data administration window based on the “Web Site Administration Tool” interference.

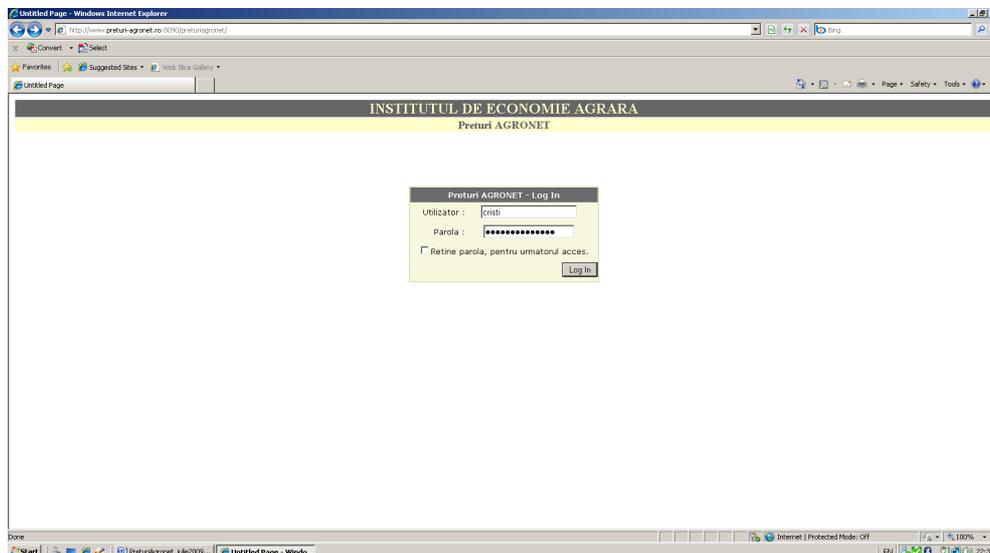


Figure 3. Database authentication web form.

After the authentication the user can perform one of the following operations: creation, updating and browsing of database, as well as the consulting/viewing a validation report published on the reporting server of the application server. Data editing is extremely simple. Except for one field “Preț” (Price), which needs effective editing, the others are selections from pre-established lists. Data editing does not require sophisticated technical knowledge, the operation being rather intuitive. All the controls participating to data editing are dynamically connected to the IAE-MIS data collections. This makes the editing system be a scalable system, so that it can be easily adapted to new processing contexts. All the designed database instances were developed according to the periodical reporting of partners based upon the market research they conducted.

The lists on the basis of which data editing is performed can be modified through the intermediary of the nomenclature system established at database level.

The database entries can be modified or deleted by means of functions implemented at the web application level.

The editing of a validation report in order to identify the eventual errors was generated with the possibility to be exported into .xls and .pdf format. The report can be accessed in web format or it can be listed on demand on the user's printer. This server structure and the consultation of a test report are available in figure 4.

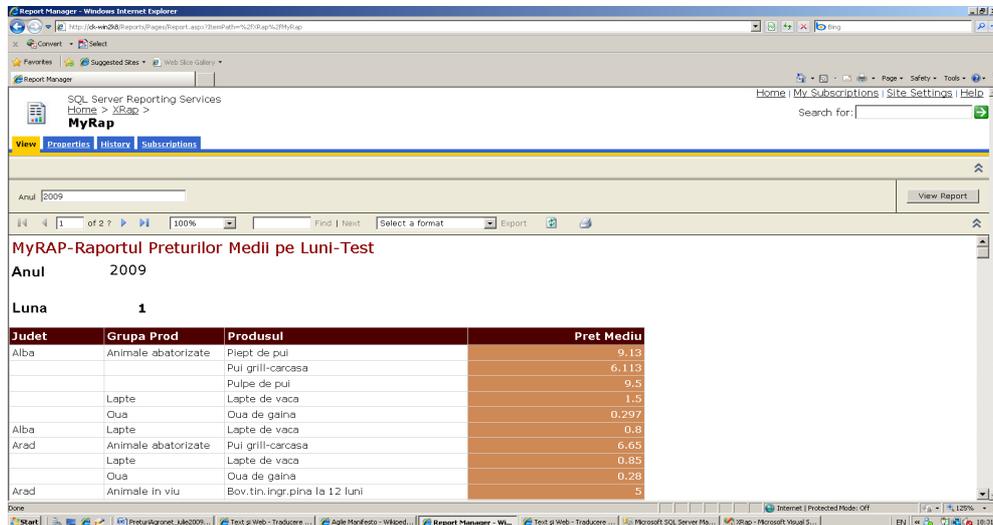


Figure 4. Structure of a SQL Server Reporting Services and test report consultation.

Regarding data presentation, the three functions can be easily found under the web form (figure 5).

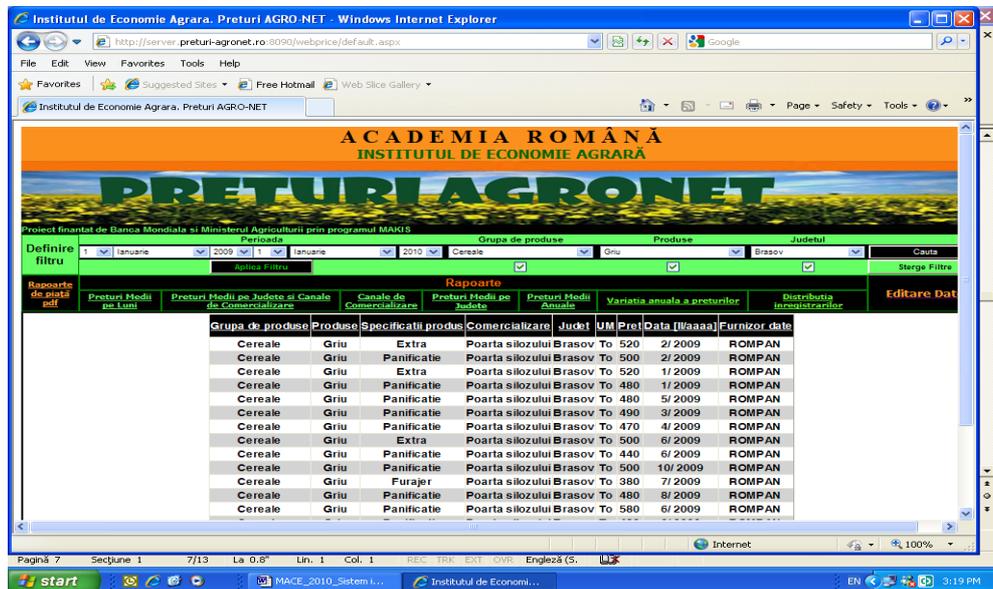


Figure 5. Web form identifying the main application functions.

From figure 5 one can notice the way in which it is defined an interrogation of the data base from the group of products: «Cereals» Product: «WHEAT» County «Braşov».

By attaching boolean controls<sup>2</sup> to certain indicators such as «Group of products», «Product» and «County» a filter can be defined as a conjunctive type of logical condition.

The above-mentioned facts can be exemplified by the situation described in figure 5. The boolean formula that defines the interrogation is the following:

$$([Group\ of\ products]=\"Cereals\") \ \& \ ([Product]=\"Wheat\") \ \& \ ([County]=\"Braşov\") \ (*)$$

The distribution of entries by groups of products is useful for those who operate the application in order to get informed on the amount of data that supports the processing.

In order to have a situation of the entries loaded in the database, we made available the report **Distribution of entries** for the users, published on the reporting server and taken over by our application, which is presented in figure 6.

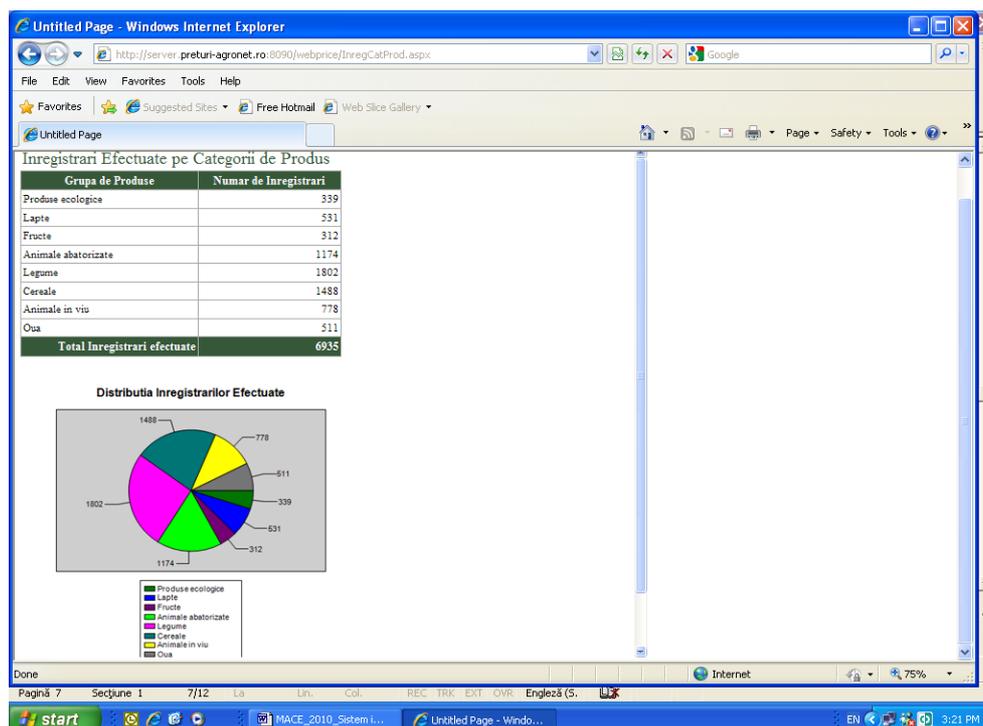


Figure 6. Number of entries in the database.

<sup>2</sup> The CheckBox and ToggleButton are boolean controls, which turn the values True and False.

A central component of the discussed application is the one devoted to reporting. The design and publication of reports on the SQL Server Reporting Services service can be achieved by using Report Builder. The reporting component of the application was developed with *SQL Server Business Intelligence Development Service* that is projects of *Report Server Project* type included in the above-mentioned service. After designing the report, this is published on the reporting server where from it can be accessed at application level (figure 7).

Thus, several reports were generated: the “Report on Average Prices by Counties” (figure 8), parameterized by «Year» and «Month», and the report “Report on Monthly Average Prices” (figure 9) with «Year» as parameter.

				2008	2009
Animale abatorizate	Piept de pui	Cal.I	Kg	8.63	9.02
	Pui grill-carcasa	Cal.I	Kg	6.01	5.91
	Pulpe de pui	Cal.I	Kg	8.04	8.11
Animale abatorizate	Bovine adulte ingrasate-carcasa	Cal.I	Kg	0	7.28
		Categoria Procesare	Kg	0	9
	Bovine adulte reformatate-carcasa	Categoria Procesare	Kg	0	7.64
		Conform	Kg	0	3.44
	Bovine tineret in crestere(carne alba)-carcasa	Cal.I	Kg	0	10.6
		Categoria Procesare	Kg	0	10.69
		Conform	Kg	0	8.75
Bovine tineret ingrasat pina la 24 luni - carcasa	Cal.I	Kg	0	9.51	
	Categoria Procesare	Kg	0	11.27	

Figure 7. “Report on Monthly Average Prices”.

Judetul	Grupa de Produse	Produsul	UM	Pretul Mediu
Alba	Animale abatorizate	Piept de pui	Kg	9.16
Alba	Animale abatorizate	Pui grill-carcasa	Kg	6.69
Alba	Animale abatorizate	Pulpe de pui	Kg	8.7
Alba	Cereale	Griu	To	500
Alba	Oua	Oua de gaina	Buc	0.31
Arad	Animale abatorizate	Bovine adulte ingrasate-carcasa	Kg	7
Arad	Animale abatorizate	Bovine tineret in crestere(carne alba)-carcasa	Kg	11
Arad	Animale abatorizate	Bovine tineret ingrasat pina la 24 luni -	Kg	7

Figure 8. “Report on Average Prices by Counties”.

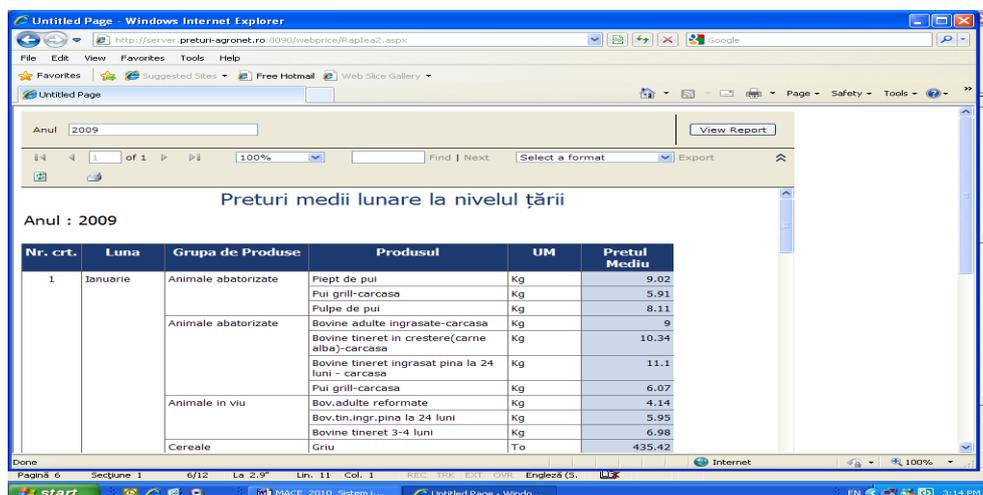


Figure 9. "Report on Monthly Average Prices at national level".

The application can be developed in the direction of applying data mining techniques so as to obtain a series of forecasts on the price dynamics of certain agricultural products. On the basis of *SQL Server Business Intelligence Development Service* analysis projects can be developed that can provide forecasts by means of performant algorithms belonging to "Microsoft Data Mining Algorithms".

#### 4. RESULTS

The modality of price data collection from the 5 professional associations participating to the project: UCPR – Union of Poultry Breeders from Romania; AGCTR –General Association of Cattle Breeders from Romania; BIO-CERT; ROMCONSERV – Employers’ Organization from the Industry of Canned Fruit and Vegetables and Mixed Cans and ROMPAN – Employers’ Organization from the Milling, Baking and Flour-based Products and the inputting in the database are presented in the next paragraphs.

a. **On the basis of the information collection mechanism for poultry meat and eggs established by common agreement**, UCPR collects the poultry and egg prices from poultry farms in 27 counties and they report them to IAE on a monthly basis by the middle of each month; these prices are in fact the prices from the previous month, without VAT, in RON/piece for eggs and RON/kg for poultry meat. At IAE the prices are inputted into the database. The products for which price reports are received are the following: griller chickens, chicken breast with bone, chicken legs with bone, consumption eggs L category and consumption eggs category M.

Table 1

Number of counties for which prices were entered into the database

Specification	2008	2009				
	December	January	February	March	April	May
Eggs category L	20	20	22	21	21	20
Eggs category M	20	20	22	21	21	20
Griller chickens	21	20	20	20	20	19
Chicken legs	12	12	12	12	12	12
Chicken breast	12	12	12	12	12	12

Source: www.preturi-agronet.ro.

The table above represents a static moment. Up to the present moment we have entered into the database the prices of the above-mentioned products in the months December 2008-October, 2009. For this period there were 1106 entries.

**b. AGCTR**, according to the information collection mechanism, collects farm gate prices from 26 counties. The products for which data are entered into database are: raw cow milk – RON/kg; beef live animals – RON/kg live weight; carcass meat – RON/kg carcass.

The following table presents the number of entries into the database, in a static manner, for the products listed above:

Table 2

Number of price entries by categories of products

Product	January 2009	February 2009	March 2009	April 2009	May 2009	Total
Cow milk	26	26	26	26	26	130
Bovine meat – live weight	78	78	78	78	78	390
Bovine meat – carcass	78	78	78	78	78	390
Total	182	182	182	182	182	910

www.preturi-agronet.ro.

The actual number of entries updated to November month can be seen on the site [www.preturi-agronet.ro:8090](http://www.preturi-agronet.ro:8090)

**c. Through the data collection mechanism for organic products Biocert provides the prices of agreed organic products to IAE on a monthly basis.** The types of organic products for which data have been provided so far are crop products and non-processed animals. The following products are from the category of crop products for which prices are reported: cereals (common wheat, durum wheat, spelta wheat, triticale, barley, two-row barley, maize), certain oilseeds (sunflower, soy bean, saffron) as well as spices, e.g. mustard and fenugreek. At the

same time, data were provided for certain species of vegetables (peppers, tomatoes, beetroot, cabbages, courgettes, etc.).

**Periodicity and covered areas.** The data have been transmitted on a monthly basis and on a differentiated basis depending on the characteristics of products available on the market each month. The coverage area from which the data were collected, transmitted and entered into the database is represented by five counties, mainly by the South region of Romania, the county Călărași respectively, mainly for the crop products and Cluj County – Apples, Maramureș – Strawberries, Maramureș -Honey, Bacău – Cow milk, Argeș – Hen eggs.

**Prices by distribution channels.** The prices that have been provided were collected from the two important chains involved in the production and processing of organic products, namely farm gate prices and processor prices. For the period January–May, over 200 entries were made, with the following distribution by products: 42% cereals, 16% oilseeds, 12% vegetables, 7% fruit, 5% spices, while 18 % are data referring to animal products (milk, eggs, honey).

**d. The data collection mechanism established by common agreement with the Employers' Organization ROMCONSERV** consists in providing farm gate prices on a weekly basis for certain vegetable products established by ROMCONSERV together with IAE. The prices for different vegetable species have been targeted so far: peppers, potatoes, cucumbers, onions, melons, vegetable roots (carrot, parsley, parsnip, celery), lettuce, tomatoes, cabbages and eggplants.

**Periodicity and covered areas.** The data coverage area is represented by the prices of eight products collected from 14 counties. The minimum number of products per county is 1 (for example, from the county Suceava, only the potatoes prices were transmitted), while the maximum number is 4 (for example the county Galați with: peppers, cucumbers, lettuce and tomatoes).

**Prices by distribution channels.** The prices for fresh products were reported for vegetables, while for fruit the prices for fresh apples and dehydrated plums were reported. For both types of products the farm gate prices and the prices on the peasant market were specified.

The more than 900 entries that have been made feature the following distribution by products: 20% root vegetables, 15% cucumbers, 13% lettuce, 12% for potatoes, onions and tomatoes each, 11% cabbages and 5% peppers.

**e. On the basis of the data collection mechanism for cereal products, ROMPAN provides the cereal prices.**

The prices entered into the database were provided by ROMPAN that has members in 39 counties at regional level. The prices are collected from the 39 counties and are representative for the 8 statistical regions.

The ROMPAN members are milling and baking units with large-sized processing capacities, which have their own grain storage facilities, with a capacity meant to ensure the factory operation for a maximum 2-month period. As a result,

the cereal prices are representative for silo gate and do not include the value added tax (VAT).

The data referring to prices are transmitted on a monthly basis and they are entered into the created database, which can be accessed by anybody who is interested in this type of information.

## 5. CONCLUSION

By the product provided by the Institute of Agricultural Economics and its partners, a partial yet functional solution was proposed, to the current agricultural market challenges; the subsequent development of the product is to contribute to solving up other issues encountered on the agricultural markets.

It is an example of cooperation between research and the agricultural stakeholders (employers' organization and professional associations), having in view to facilitate the farmers' access to the agricultural markets by using up to date technology such as databases and internet.

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