Topic 9

“Socio-Economic Aspects and Welfare”

Oral Presentation

Migrant workers in Swedish agriculture and horticulture Part 1: perspectives of employers

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Keywords: seasonal workers, working conditions, labour market

Aim

Finding competent work force is a challenge for many farmers and owners of companies within agriculture and horticulture. This is even more a great issue when it´s a matter of finding seasonal workers. During a number of years there has been an increasing share of the work force with a non-Swedish background. But they are not immigrants which are becoming integrated in rural areas – they are migrant workers from other countries. The working conditions for these migrant workers are not well documented and their own experiences and attitudes and not yet studied. There is also lacking knowledge about the perspectives of the Swedish co-workers and the owners / managers on farms with migrant workers.With economical support from the Swedish Farmers Foundation for Agricultural Research (SLF) these issues are studied during 2012-2013.

Methodology

The project has started with a short up-date on other relevant studies, published reports and papers as well as connections with other researchers in this area – both national and international. A web-based survey among employers has been done in the first part of this project.In the following part there will be work-place studies with in-depth interviews involving migrant workers as well as Swedish co-workers and employers in order to get a base-line of knowledge for further actions.

Results

The initial web-based survey to employers was responded by almost 4000 farm employers. About 20% of the responders said that they used migrant workers during 2011, the majority from a country within the European Union (EU). The main reason for using migrant workers was lack of Swedish workers and financial reasons. The migrant workers were used for in many different work operations such as: animal production, weeding, planting and harvesting of field crops, forestry work, construction and maintenance of farm buildings. The major problems were related to language issues, such as: communication, information, misunderstandings etc. The employers wanted further support with information about regulations, information material on different languages and other issues on a web-page or as a practical "hand-book".

Conclusion and Perspectives

The final results will be presented and discussed at a work-shop with involved stakeholders, organizations, authorities, researchers and other in order to create an action plan, a webpage or a "hand-book" for employers and managers as well as a research plan for further research. Further international collaboration including EU-funded projects is important to establish a sustainable labor market.

Recent changes in agriculture practices, an acceptability conditions survey

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Introduction

In France, the "Grenelle Environment" forum and "Ecophyto 2018" plan marked a turning point in the implementation to more environmentally friendly farming practices. They suppose drastic evolutions in professional expertise and social values for the practitioners which in turn, already adopt various attitudes towards the expected changes.
The aim of the research project **SOPHY is to identify and analyze the social and technical dynamics that come with recent changes in agricultural practices** like Integrated Pest Management of major vegetale productions in Région Centre of France, a place with a strong economic position (photo 1). The expected results are a list of social and technical bottlenecks that may restrain the extent of changes in agricultural practices and the conditions for a better acceptability of these changes.

Photo 1. Typical landscape of arable crops in Région Centre

Materials and methods

The zone of the surveys: the study (2011-2013) is conducted in the Région Centre (Orléans administrative center) composed by 5 departments very diversified in agricultural productions. Arable lands represents 51 % of the total surface vs 34 % for the national territory. Figure 1 shows the relative proportions of agricultural area occupied by the major crops cultivated in Région Centre.

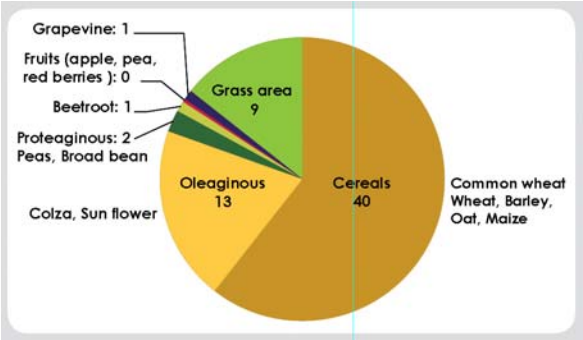

Figure 1. % of surface by major crops in Région Centre.

The core of the agricultural activity in Région Centre notably relies on two important areas. The Beauce area is European leader in cereal production whereas the Val-of-Loire gathers diversified productions including arboriculture, ornamental horticulture, truck farming and an internationally acknowledged grapevine production (figure 2).

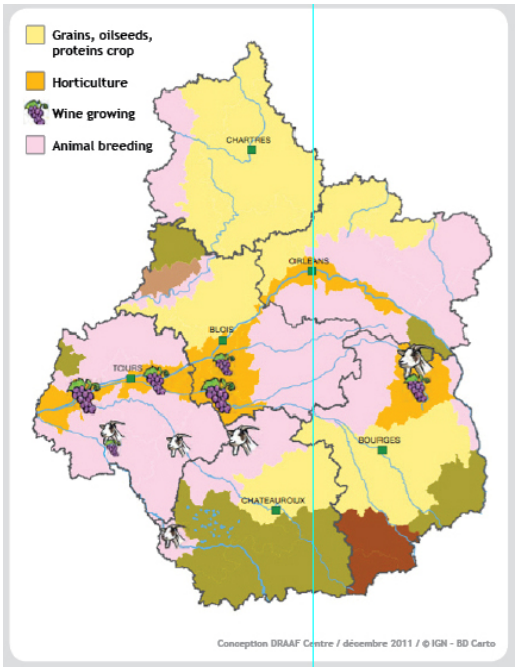

Figure 2. Agricultural crops in Région Centre.

The Methodology: the methodology used is based mainly on field survey researches implicating interviews and ethnographic observations using video records. The sociologists group led their analysis with the expertise of biologists. Four different actions are led:
• Exploratory interviews and semi-directive interviews with near hundred farmers belonging to different agricultural sectors
• Interviews will be explored by SONAL, a software allowing to accelerate and to facilitate the retranscription and the thematic encoding of the conversations, in order to improve their analysis.
• Direct observations on farms: agricultural techniques, organization, professional equipment, know how…
• Filmic investigations to explore speech and gestures (photo 2).

The analysis of the professional behaviors will be essentially based on the data modeling from behavioral observations and analyses of records.
The results obtained will be considered by biologists to establish a prospectus for the future research needs on biological control.

Results
Thanks to the methodology used, important items influencing the conditions of acceptance of agricultural changes should be addressed during the course of the SOPHY project such as: farm history and major sociological evolutions, professional education, training and career history, organization of work, professional practices and techniques, the use of inputs, the impact of practices, behaviors and perception in a situation of change, the nature of professional and social network.
Some specific questions about the management of biodiversity in agrosystems might also be raised by determining the level of knowledge that practitioners have on natural enemies and by exploring the practices implemented to improve wildlife conservation or biological control of crop pests in conventional and alternative cultural systems (organic farming, agro forestry).

Understanding farmers' willingness to produce healthy and safe products

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Abstract
The aim of this investigation is to gain an understanding of the factors that might influence farmers' decision to adopt practices that could help them to produce healthy and safe products. The study was based on a research branch that has been developed with the purpose of identifying economic and social-psychological drivers that affect farmers' behaviour. The aim was to determine whether farmers' willingness to produce healthy and safe products not only depend on economic incentives, but also on psychological considerations. In order to achieve this objective, a questionnaire was applied to a sample of ex-sugar beet farmers of the West Midlands region of the UK. The information collected was processed using an econometric approach. The results revealed that farmers' willingness to produce healthy and safe products was indeed influenced by non-economic drivers.

Keywords: Healthy and safe products; Farmers; Behavioural Model

1. Introduction
According to McCluskey (2000), increasing health conscientious by consumers has led to an increase in demand for healthy and safe food products. In response to this higher demand, the food industry has responded by increasing the offer of quality-differentiated products such as organic food and food that were produced with environmental and animal welfare practices, among others. In addition, policy-makers and researchers have recognised the positive effects of healthy and safe food products on the population. This has led to a number of recommendations to establish regulations to ensure the adoption of beneficial practices in rural and even in urban areas (Brown and Jameton, 2000; and Bast, et al. 2002).
A main concern regarding the production of healthy and safe agricultural products is that governments' regulations in some countries are not well defined or are difficult to monitor. As a consequence, there is a problem of asymmetric information between producers who know whether they have used appropriate methods to guarantee food quality, and consumers who only know producers' quality claims of their products (McCluskey, 2000). Considering this informational asymmetric problem, an understanding of farmers' motivations regarding their willingness to produce healthy and safe products is needed. This knowledge could be used to assist policy makers in the design of policy programmes adopted to encourage farmers to be involved with practices that increase food quality.
The aim of this article is to investigate these motivations by adopting a behavioural approach (i.e. an approach that considers economic and non-economic drivers that influence farmers' strategic decisions). The reason for adopting this approach is because researchers in other contexts have identified the influence of non-economic variables on farmers' behaviour and decision making (Edwards-Jones, 2006). For example, the behavioural approach has been applied to study the way in which farmers have adapted in response to policy reforms such as the CAP reforms of the EU (Carr and Tait, 1991; Beedell and Rehman, 1996; Austin *et al*., 1998a,b; Burton, 2004; and Zubair and Garforth, 2006). It has also been adopted to identify farmers' incentives to innovate and to form collaborative alliances (see for example May and Tate, 2011; May et al., 2011; and May 2012). These examples reinforce the idea that an understanding of farmers' motivations to adopt healthy and safe products requires an analysis based on a behavioural approach.
This article is organised as follows. Section Two explain the behavioural model adopted in

this research. Section Three describes the methods used in the investigation. Section Four discusses the results. Finally, Section Five concludes the article.

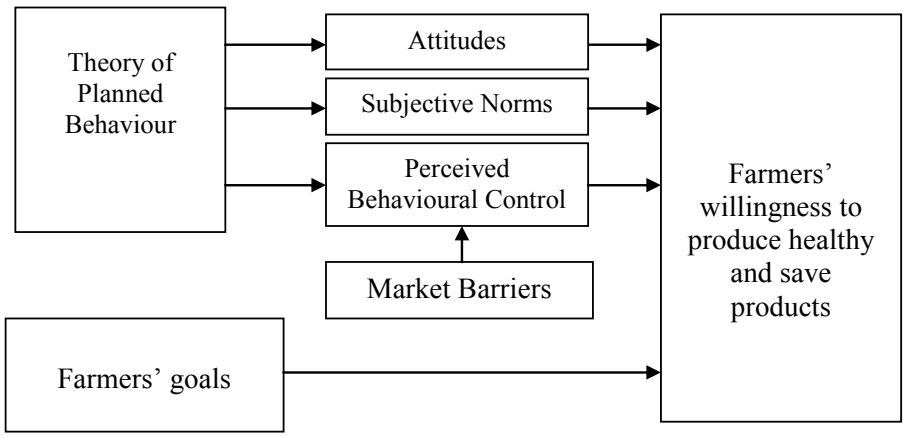
2. The Proposed Behavioural Approach

In order to identify economic and social-psychological factors that might influence farmers' willingness to produce healthy and safe products, a behavioural framework was designed. The proposed framework is based on the contributions of Bergevoet *et al*. (2004) and Willock *et al*. (1999). These researchers developed a model that integrates two different approaches with the objective to including a large range of valid variables that can explain farmers' decision making. One of the approaches considered by this model is the multiple goals approach which postulates that farmers do not only consider economic variables when making their optimal decisions, but also non-economic targets that can affect their behaviour. The pioneer researcher in this area was Gasson (1973) who explained that the orthodox economic theory has treated other non-economic variables as minor deviations from regularity which cancel one another when aggregating. The other approach corresponds to the theory of planned behaviour (Ajzen, 1985). This theory establishes that intention is a good predictor of behaviour, and that intention is determined by attitudes (i.e. positive or negative attitude towards a behaviour), subjective norms (i.e. the influence of important referent individuals or institutions when approving or disapproving a particular behaviour) and perceived behavioural control (i.e. individual's conviction that she/he will successfully execute a behaviour leading to a particular outcome).

The original multivariate model of Bergevoet *et al*. (2004) was developed with the objective of determining whether the size of the farm of Dutch dairy farmers in terms of milk quota was determined by farmers' goals, farmers' attitudes toward farming, perceived control, and subjective norms. The present investigation extends this model to determine farmers' willingness to produce healthy and safe products. This model is shown in Figure 1.

Figure 1

Behavioural model



3. Methods

The methodology used in this research is closely related to that developed by Bergeovet *et al.* (2004).

3.1 The questionnaire.

A questionnaire was used to collect the relevant data on: (*i*) statements on their willingness to produce healthy and save products; (*ii*) different social and geographical variables; and (*iii*) statements on farmers' goals, attitudes toward farming, perceived behavioural control, subjective norms, and market barriers. A five point Likert scale was used for questions regarding statements.

3.2 The sample.

According to DEFRA statistics, the number of sugar beet growers in the West Midlands region in 2005 was 592. The sample of the ESBF considered in the study consisted of 48 farmers which correspond to 8.1 per cent of this total, and this sample was visited in a period of six months.

3.3 Statistical analysis.

The statistical analysis was based on two steps:

a) Step 1: Factor analysis. A factor analysis with varimax orthogonal rotation was employed with the objective of reducing the data concerning farmers' goals (Bergeovet *et al.*, 2004). Only Factors having an eigenvalue larger than one were considered (Bergeovet *et al.*, 2004, and Kobrich *et al.*, 2003). According to Stevens (1992), for a sample of 50 observations a loading of 0.722 can be considered significant. In line with Stevens' recommendation, the present research considered a loading of 0.73 because the sample used in this study had 48 farmers. Finally, in order to carry out regression analysis, goals that resulted to be related were replaced by variables created from the factor scores (Bergeovet *et al.*, 2004). The SPSS 16 package was used to carry out this multivariate analysis.

b) Step 2: Identifying non-economic drivers. In order to identify non-economic drivers that might influence farmers' willingness to produce healthy and save products, stepwise linear regression models were employed. Let G_i, A_j, P_k, N_l,and B_n be the Likert scale variables obtained from the statements on farmers' goals, farmers' attitudes toward farming, perceived control, subjective norm, and market barriers, respectively. The regression model used to test these hypotheses is defined as follows:

$$WHS = \beta_0 + \sum_i \beta_i G_i + \sum_j \beta_j A_j + \sum_k \beta_k P_k + \sum_l \beta_l N_l + \sum_m \beta_m B_m \qquad (1)$$

Where *WHS* is a Likert scale variable describing farmers' willigness to produce healthy and save products.

4. Results and discussion

4.1 Results of Factor Analysis

The factor analysis identified six factors with eigenvalues greater than 1. The total variance explained by them was 71.92% which is considered satisfactory (Bergevoet *et al.*, 2004). The factors loadings for each of the six factors are presented in Table 1.

Table 1: Factorial analysis on farmers' goals

Goals	**Average**	**SD**	**Factors**					
			F1	**F2**	**F3**	**F4**	**F5**	**F6**
Ga	4.36	0.76	-0.05	0.02	-0.21	**0.80**	0.15	0.13
Gb	4.43	0.50	-0.05	-0.03	**0.79**	0.20	0.04	0.10
Gc	4.02	0.79	0.56	-0.25	-0.26	0.15	0.15	0.55
Gd	3.89	0.87	0.02	0.21	0.20	**0.75**	-0.21	-0.00
Ge	4.02	0.79	0.27	0.19	0.32	0.57	0.15	-0.18
Gf	4.45	0.58	-0.17	0.10	0.25	0.37	0.43	0.02
Gg	3.51	0.91	0.08	0.15	-0.11	-0.03	**0.87**	0.07
Gh	3.89	0.73	0.53	0.36	0.06	-0.31	0.50	-0.06
Gi	3.26	0.99	**0.87**	0.23	-0.05	0.14	-0.05	0.02
Gj	3.51	1.10	**0.87**	-0.10	0.08	-0.07	-0.03	0.02
Gk	4.06	0.70	-0.09	-0.18	0.18	0.12	0.60	0.41
Gl	4.06	0.53	0.02	-0.01	**0.84**	-0.06	0.03	0.04
Gm	4.49	0.59	0.11	0.19	0.50	-0.05	-0.03	0.66
Gn	4.26	0.64	-0.03	0.32	0.04	0.00	0.20	**0.82**
Go	4.32	0.78	0.04	**0.91**	0.01	0.08	0.01	0.12
Gp	4.21	0.78	0.05	**0.79**	0.00	0.26	0.14	0.14
Factor analysis results								
Initial eigenvalues			3.25	2.24	1.78	1.66	1.43	1.15
Rotation sums squared loadings			2.22	1.99	1.95	1.95	1.73	1.68
% of variance explained			13.86	12.42	12.18	12.16	10.82	10.48
Cumulative % of variance explained			13.86	26.28	38.46	50.62	61.44	71.92

These factors identified in the factorial analysis are described as follows:

Family farm: The variables "Maintaining the family tradition" and "Working with other members of the family" were statistically significant.

Farm control: The variables "Have independence and freedom from supervision" and "Have the control in a variety of situations" were statistically significant.

Farming as a way of life: The variables "Enjoyment of work tasks" and "Enjoy my work" were statistically significant.

Quality of life and income: The variables "Achieve an income as high as possible" and "Have sufficient time for leisure" were statistically significant.

Status: Only the variable "Gaining recognition and prestige as a farmer" was statistically significant.

Self realization: Only the variable "I enjoy having a purpose and value hard work" was statistically significant.

4.2 Results of the Regression Analysis

The results of the regression analysis are presented in Table 2.

Table 2: Results of the regression analysis

Variables	**Coefficient**
Constant	5.43***(6.28)
Family farm	-0.15**(-2.33)
Status	0.32***(4.71)
Achieve low debts on my farm	-0.26***(-3.04)
Farming is still fun and satisfying	0.18**(2.40)
Before I take important decisions I thoroughly inform myself	-0.30**(-2.33)
Administrative obligations consume a lot of time on my farm	0.50***(3.52)
Age	-0.02**(-2.51)
Agricultural training	-0.62***(-3.13)
R-squared	0.54
Adjusted R-squared	0.45
S.E. of regression	0.43

*$P < 0.05$, **$P < 0.01$, *** $P < 0.001$, *t*–ratios in parenthesis.

According to this table, eight non-economic variables were statistically significant in explaining farmers' willingness to produce healthy and save products: the factor goals "Family farm" and "Status"; the attitudes "Achieve low debts on my farm" and "Farming is still fun and satisfying"; the perceived behavioural controls "Before I take important decisions I thoroughly inform myself" and "Administrative obligations consume a lot of time on my farm"; and the personal characteristics "Age" and "Agricultural training". The coefficient of determination was 54% which is considered acceptable given the fact that the research was based on cross-sectional data. A discussion of the significant variables identified in the regression analysis is provided as follows.

a) *Family farm*: The negative coefficient of this variable (-0.15) means that farmers who assigned higher value to this factor goal were less willing to produce healthy and safe products. A possible explanation to this result is that farmers who cared about family tradition had incentives to maintain their traditional production systems. Consequently, they were less motivated to introduce innovative agricultural practices in order to produce healthy and safe products.

b) *Status*: The positive coefficient of this variable (0.32) means that farmers who assigned higher value to this factor goal were more willing to produce healthy and safe products. This result reveals that producing healthy and safe products can help farmers to gain prestige and recognition among their reference group. Consequently, the adoption of alternative practices might be seen as a way of gaining status within their rural communities.

c) *Achieve low debts on my farm*: The negative coefficient of this variable (-0.26) means that farmers who assigned higher value to this attitude were less willing to produce healthy and safe products. This result might indicate that the adoption of practices that allow farmers to produce healthy and safe products was perceived by them as a type of innovation that requires high levels of debts in order to be implemented. This suggests, therefore, that farmers are less motivated to adopt these practices when their aim is to achieve low debts.

d) *Farming is still fun and satisfying*: The positive coefficient of this variable (0.18) means that farmers who assigned higher value to this attitude were more willing to produce healthy and safe products. This is an interesting result because it suggests that the adoption of alternative practices associated with healthy and save products is influenced by farmers' satisfaction at work. Consequently, enjoyment and satisfaction can be considered as key drivers for the adoption of these practices.

e) *Before I take important decisions I thoroughly inform myself*: The negative coefficient of this variable (-0.30) means that farmers who assigned higher value to this perceived behavioural control were less willing to produce healthy and safe products. This result might indicate that farmers who are less risk averse (i.e. farmers who need to inform themselves when making decisions) are less willing to produce healthy and safe products. This suggests, therefore, that the adoption of alternative practices could be considered as risky.

f) *Administrative obligations consume a lot of time on my farm*: The positive coefficient of this variable (0.50) means that farmers who assigned higher value to this perceived behavioural control were more willing to produce healthy and safe products. Apparently farmers who were working with highly demanding and time consuming activities were willing to adopt alternative practices because they probable perceived them as involving less administrative obligations. Unfortunately it was not possible to confirm this possibility. But this could be explored in future research.

g) *Age*: The negative coefficient of this variable (-0.02) means that older farmers were less willing to produce healthy and safe products. This result is surprising because is not consistent with the results obtained by other researchers. For example, Ondersteijn *et al.* (2003) found that older farmers were more concerned about expressive goals (i.e. farming is seen as a means of self-expression) such as feed the world and care for a clean environment, and less concerned about instrumental objectives (i.e. farming is viewed as a means of obtaining income) than younger farmers. Perhaps this contradictory result is associated with the factor goal "family farm" discussed above. That is, older farmers are probably more interested to maintain their traditional productive systems and to enjoy their current activities rather than adopt innovative practices that could be considered as riskier.

h) *Agricultural training*: The negative coefficient of this variable (-0.62) means that farmers who received agricultural training were less willing to produce healthy and safe products. A

possible explanation to this result is that farmers who had formal agricultural training received training associated with traditional productive techniques. Consequently, they already had a knowledge that prevented them to some extent from exploring less traditional practices that escaped from their domain.

5. Conclusions

The aim of this article was to gain an understanding of the drivers that influence farmers' willingness to produce healthy and save products. Using a behavioural approach, it was found that farmers' willingness is influenced by a number of economic and non-economic drivers such as farming tradition, status within the rural community, levels of debts, satisfaction at work, level of risk aversion, amount of administrative obligations, age, and the type of agricultural training they received.

This finding suggests that farmers could be encouraged to produce healthy and save products by considering these set of variables rather than using pure economic incentives. The design of policy programmes involving these variables escapes from the scope of the present investigation. However, this is a topic that is left for future research.

References

Ajzen, I. 1985. From intentions to actions: a theory of planned behavior. In J. Kuhl and J. Beckman (Eds.), Action-control: from cognition to behavior. Heldelberg: Springer. Pp.11-39.

Austin, E.J., Willock, J. Deary, I.J., Gibson, G.J., Dent, J.B., Edwards-Jones, G., Morgan, O., Grieve, R., and Sutherland, A. 1998a. "Empirical models of farmer behaviour using psychological, social and economic variables. Part I: lineal modelling", *Agricultural Systems* 58(2): 203-224.

Austin, E.J., Willock, J. Deary, I.J., Gibson, G.J., Dent, J.B., Edwards-Jones, G., Morgan, O., Grieve, R., and Sutherland, A. 1998b. "Empirical models of farmer behaviour using psychological, social and economic variables. Part II: nonlinear and expert modelling", *Agricultural Systems* 58(2): 203-224.

Bast, A., Chandler, R.F., Choy, P.C., Delmulle, L.M., Gruenwald, J., Bart, D., Halkes, A., Keller, K., Koeman, J.H., Peters, P., Przyrembel, H., de Ree, E.M., Renwick, A.G., and Vermeer, I.T.M. 2002. "Botanical health products, positioning and requeriments for effective and safe use", *Environmental Toxicology and Pharmacology* 12: 195-211.

Beedell, J., and Rehman, T. 1996. "A meeting of minds for farmers and conservationists? some initial evidence on attitudes towards conservation from Bedfordshire", *Farm Management* 9(6): 305-313.

Bergevoet, R.H.M., Ondersteijn, C.J.M., Saatkamp, H.W., van Woerkum, C.M.J., and Huirne, R.B.M. 2004. "Entrepreneurial behaviour of dutch dairy farmers under a milk quota system: goals, objectives and attitudes", *Agricultural Systems* 80: 1-21.

Brown, K.H., and Jameton, A.L. 2000. "Public health implications of urban agriculture", *Journal of Public Health Policy* 21(1): 20-39.

Burton, R.J. 2004. "Reconceptualising the behavioural approach in agricultural studies: a socio-psychological perspective", *Journal of Rural Studies* 20: 359-371.

Carr, S., and Tait, J. 1991. "Differences in the attitudes of farmers and conservationist and their implications", *Journal of Environmental Management* 32: 281-294.

Edwards-Jones, G. 2006. "Modelling farmer decision-making: concepts, progress and challenges", *Animal Science* 82: 783-790.

Gasson, R. 1973. "Goals and values of farmers", *Journal of Agricultural Economics* 24: 521-537.

Kobrich, C., Rehman, T., and Khan, M. 2003. "Typification of farming systems for constructing representative farm models: two illustrations of the application of multivariate analyses in Chile and Pakistan", *Agricultural Systems* 76: 141-157.

May, D.E. 2012. "Do non-economic drivers explaining farmers' incentives to cooperate remain robust through policy and market changes?". Second eRNAC (Electronic Research Network for Agricultural Cooperatives) conference on Cooperative values in internationalized operations. Helsinki, Finland.

May, D.E., and G.J. Tate. 2011. "Exploring economic and social-psychological factors in explaining farmers' willingness to participate in cooperative alliances", *International Journal of Strategic Business Alliances* 2(4): 329-346.

May, D.E., Tate, G.J., and L. Worrall. 2011. "Understanding innovation in a dynamic agricultural business environment: a multivariate approach", *International Journal of Agricultural Management* 1(1):7-15.

McCluskey, J.J. 2000. "A game theoretic approach to organif foods: an analysis of asymmetric information and policy", *Agricultural and Resource Economics* 29(1): 1-9.

Ondersteijn, C.J.M., Giesen, G.W.J., and Huirne, R.B.M. 2003. "Identification of farmer characteristics and farm strategies explaining changes in environmental management and environmental and economic performance of dairy farms", *Agricultural Systems* 78: 31-55.

Stevens, J.P. 1992. *Applied multivariate statistics for social science*. Second edition. Hillsdale, NJ: Erlabaum.

Willock, J., McGregor, M.M., Sutherland, A., Edwards-Jones, G., Morgan, O., Dent, B., Grieve, R., Gibson, G., and Austin, E. 1999. "Farmers' attitudes, objectives, behaviours, and personality traits: the Edinburgh study of decision making on farms", *Journal of Vocational Behaviour* 54: 5-36.

Zubair, M., and Garforth,C. 2006. "Farm level tree planting in Pakistan: the role of farmers' perceptions and attitudes", *Agroforestry System* 66: 217-229.

Topic 9

“Socio-Economic Aspects and Welfare”

Poster Presentation

Village of XXI century in the risk society

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Aim

In recent years there has been a sharp increase of urban population in Russian Federation. Urbanization is accompanied by the growth of large cities, abuse of environment near the industrial centers, the deterioration of living conditions and quality of life of rural population, the decline of general security. The purpose of this work is to reduce as environmental risk so social risk.

Methodology

The way to decide the problem is the elaboration of a new paradigm of development country areas with the formation of a new way of life, based on a simple and healthy rural life. A new paradigm consists of:

a. organization ecological families and cooperative agrocomplexes in the rural areas, using modern technology and mechanization,
b. creation of a favorable social environment for the attitude development of the foster families, fatherless children and children in difficult life situations,
c. social and environmental rehabilitation for persons suffering from alcohol to their full rehabilitation and social integration in society,
d. creating an enabling environment for rural development and the influx of active population in the country.

Awaited results

1. Solving problems of development of rural areas and up-coming transition all villages to the next level of development.
2. Reducing the cost of agricultural production, leading to the figures self-regulatory organizations with production, processing and sale of agricultural products.
3. Modernization of the Russian village, transformation it into a highly social environment based on the needs of people in the community lifestyle.
4. Organization of favorable socio-economic environment for large families and families with the adopted children (it is the key to the future generations of middle class in Russian villages).
5. Involvement people in agricultural production; people, who decided to give up alcohol use and start a full active life, significantly reduce the number of alcohol addicts Russian citizens and enable them to more effectively adapt and get integrated into the rural society.
6. Up-coming transition the level of ecological safety populated centers by reducing the population density and reducing the risks of social character by improving the living standards of the village.

Strengthening technical control for providing safety and health in agriculture and rural areas

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Keywords: oil pollution, environmental safety, health

Objectives

Recurrent small leakages and spillages account for about 85% of the total volume of ground water pollution and as a consequence of soil water pollution. At that waste oils that on the whole account for at least 50% of the total pollution with oil products is the most environmentally hazardous in the sphere of agricultural production. Waste oils carbohydrates having low extent of biodegradability (10-30%) and accumulating in the environment, disturb ecological balance. Waste oils toxic components get to human food chains through foodstuff, deposit in adipose tissues, causing cancerous diseases and immune system disorders. The aim is strengthening technical control for providing safety and health in agriculture and rural areas.

Methods

One of the directions of settling of this problem is increase in awareness and efficiency of engineering personnel and improvement of technical facilities of the enterprises and organizations in combination with detailed legislative regulations.
Technical ecology is one more problem of engineering service. In this connection tightening of control over waste recycling shall be accompanied by their efficient processing.

Expected Results

Acquiring of necessary additional skills and knowledge is feasible through completing of periodic postgraduate advanced training or retraining for the corresponding courses on the basis of Institutions of Higher education, Institutes of advanced training and for retraining for agro-industrial managers and specialists as well as for specialized enterprises. It is worth mentioning that some of such programmes can be provided to the interested organizations by St. Petersburg State Agrarian University department "Motor vehicles and tractors", which, if required, can be adjusted and added for the further joint implementation with the Russian and foreign partners. Waste oils are energy feedstock, secondary use of which after proper treatment will allow to extend their life cycle. Different technologies of waste oils regeneration are available, relevant small-size movable plants for waste oils treatment or regeneration, including those at SPbSAU department "Motor vehicles and tractors".
Oils regeneration, carried out taking into account environmental requirements, is justifiably becoming one of the best ways of their recycling. Ensuring increase in local resources of oils production, regeneration protects environment from pollution.

Innovative and legislative components of the safety and health in agriculture and rural areas the north-western region of Russia

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Abstract
It has been analyzed the environmental status of the countryside, associated with the development of agricultural production; it has been provided innovative solutions, which in conjunction with legislative regulations and the development of international cooperation in this sphere allow to minimize the results of anthropogenic impact on the environment.

Keywords: Environmental safety, health, countryside

Introduction

The countryside has special value in life of each country. It is important in respect of supplying the population with foodstuff and forest products, saving the maintenance and ensuring the health of its inhabitants. In the Kyoto Protocol the countryside is considered as well as the important source/stock of green-house gases. For successful performance of all these functions of countryside it is extremely important to protection and preservation of the environment, natural ecosystems and a natural biodiversity.

Materials and methods

Active development of anthropogenic activity resulted in contamination of soil, water, and atmosphere. This caused sharp deterioration of the habitat of all living organisms and with irreversible effects in many cases. The volume of l be admissible human impact on the environment is exceeded 8-10 times. The development of the technosphere is closely connected with intensified application of fuels, lubricants and special liquids obtained from natural and synthetic crude. Environmentally hazardous components of both commercial and waste lubricants are aromatic polycyclic hydrocarbons (APH) initially present in petroleum. They spread the atmosphere, water, soil and upset the environmental balance (intensive reproduction and mutation of microorganisms assimilating oil products).

Recurrent small leakages and spillages account for about 85% of the total volume of ground water pollution and as a consequence of soil water pollution. At that waste oils that on the whole account for at least 50% of the total pollution with oil products is the most environmentally hazardous in the sphere of agricultural production (A.Evdokimov, I.Fux, I.Oblaschikova, 2001). Waste oils carbohydrates having low extent of biodegradability (10-30%) and accumulating in the environment, disturb ecological balance. Waste oils toxic components get to human food chains through foodstuff, deposit in adipose tissues, causing cancerous diseases and immune system disorders. The aim of the work is to analyze the problem and to identify the existing legislative measures, innovative solutions and

opportunities to enhance the technical control in order to ensure the safety and health in agriculture and rural areas of the North-Western region of Russia.

Results

Russian agriculture has now become sufficiently effective. Agricultural enterprises use modern technologies, purchase new power-saturated agricultural equipment, including imported one. Therefore, the complex of measures of transition to environmentally safe agriculture must take account of the problems of technical ecology in the agribusiness industry.

Application of agricultural equipment presupposes professional use of operation materials, including lubricants. The most environmentally hazardous materials as applied to agriculture are lubricants, especially waste oils (WO).

Due to liquidation of the Russian system of waste oils collection and processing small and medium consumers have to solve the problem of WO management themselves. Small consumers confine themselves to WO disposal in landfills, sewer or by discharge in stowaways in violation of environmental standards. As already noted ecologists have found out that WO make at least 50% of total contamination with oil products. Having a low bio-degrad-ability rate (10-30%) and accumulating in the environment WO hydrocarbons appear in food products, get into human foodchains, deposit in fat tissues causing cancerous diseases and failures of the immune system (figures).

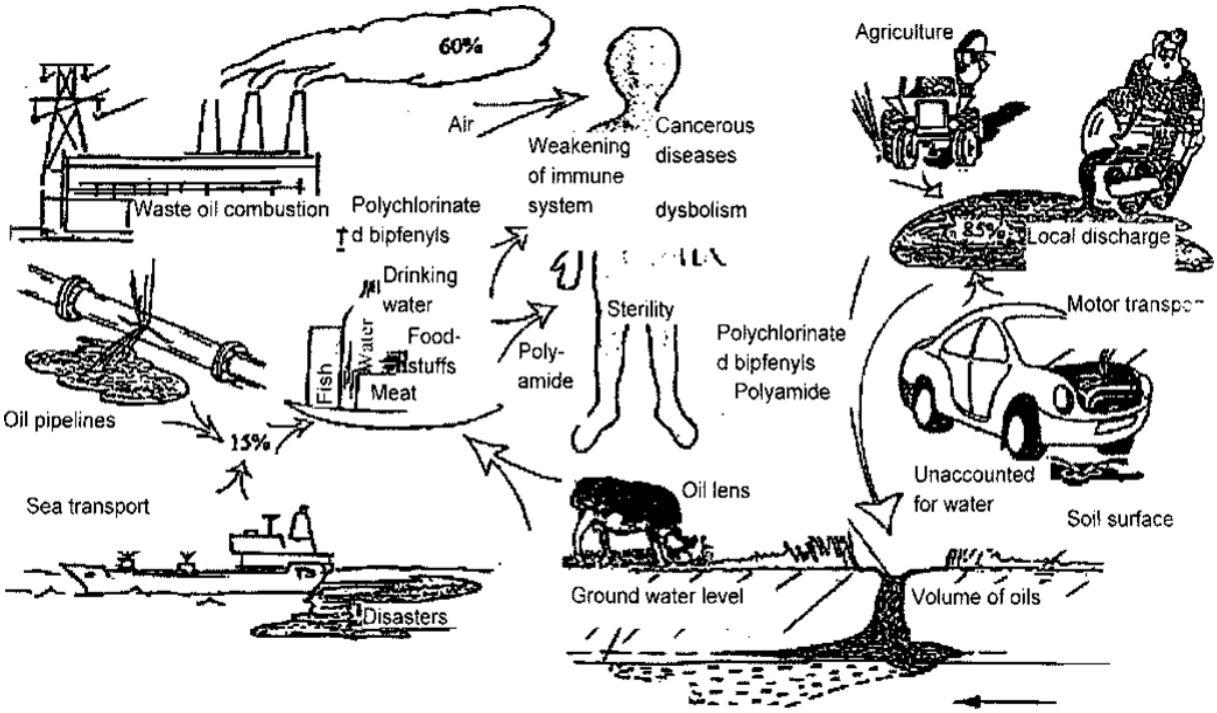

Fig. Ecological problems of environmental pollution with waste oils

Atmosphere pollution results from evaporation and combustion of WO in boiler houses. Toxic components (sulphur dioxide, organic compounds of chlorine and heavy metals) are carried by clouds all over the planet, which results in its global pollution. Biospheric pollution with WO in the conditions of agriculture mostly occurs, through infiltration ill the ground and getting in surface and ground water during spillage and leakage. When waste oils get into soil

(especially on the territory of engine yards), oil lenses form. The character of distribution of WO components from these lenses is determined by the structure of the soil and availability of ground water. Oils get into soil under the action of the force of gravity and surface-active phenomena. In soil they are partially exposed I to oxidation and biodeteriorafion by oxygen and microorganisms. The soil pollution with WO depends on the character of the surface layer, hydrological conditions as well as composition, density, viscosity, wetting ability of WO, content and type of additives in them. The velocitv of infiltration and lateral distribution of petroleum oil in soil is 10,2...10,5 m/s-. Contacting ground wider a number of oil components dissolve and migrate with water. Pollution of ground water is one of the major sources of soil water pollution. About 85% of the total pollution volume accounts for "chronic small, leakages and spillages and only - 15% account for large disasters. Getting into the environment aromatic hydrocarbons dissolve well in water and are slowlv removed from the organism accumulating them. About 7g of polychlorinated biphenyl (PCB) and other hydrocarbons annually gel into the Northern sea-. According to forecasts, by 2008 their concentration in the Pacific ocean water will reach (1.5...0.7 mg/1 and 0.5..,0.8 mg kg in bodies of sea animals (the maximum permissible concentration is 0.1 mg/l).

It has been established that the total amount of oil products getting into the Baltic Sea makes from 21 to 66thous, tons per year (Backlund, B, Holmbom, E. Leppyakoski, Uppsa university, Sweden).). Fourteen countries, including Russia, fully or partially located within the Baltic catchment, are potential polluters The pollution of soil, water and air basin of the Northwest region (A.Kartoshkin, V.Belyakov, 2009) produces a considerable negative impact on the ecological situation of the entire Baltic Sea and northern countries of Europe. In St.-Petersburg and the region there have been identified pollutants that are dominant ones for the water system of the Baltic basin: chloroform, benzpyrene. oil products. heavy metals. The most hazardous compound in the Neva bed within the city boundaries is PCB = 10 mg/l. Proceeding from the aforesaid, it possible just to bury or burn WO during dispotal. This problem and the issues of collecting and disposal of other wastes of agricultural production should he considered not just as a technical and economic problem but rather as a significant environmental problem (A.Kartoshkin, 2007; V.Minin, H.Hunta, V.Belyakov, 2011; A.Kartoshkin, V.Belyakov, 2011).

Waste oils are energy feedstock, secondary use of which after proper treatment will allow to extend their life cycle. Different technologies of waste oils regeneration are available, relevant small-size movable plants for waste oils treatment or regeneration, including those at SPbSAU department "Motor vehicles and tractors"*.

Oils regeneration, carried out taking into account environmental requirements, is justifiably becoming one of the best ways of their recycling. Ensuring increase in local resources of oils production, regeneration protects environment from pollution.

* Note. Key engineering solutions used in collecting, purifying and regenerating WO are protected by the patents of Russian Federation: № 2051954 "Installation for regenerating waste engine oil", № 2055863 "The method of regenerating waste mineral oils and a device for its implementation", № 2072052 "Regenerator lube oil" and a number of others issued by the specialists of the Department "Cars and tractors" SPbSAU and their colleagues. The activity of the Department in the sphere of innovation (including the issue covered in this publication) was awarded with the Honorary Diploma of the International Agro-Industrial Exhibition-Fair "AGRORUS-2009" (LENEXPO, Saint-Petersburg, Russia).

Conclusion

1. One of the ways to settle this problem is to raise the awareness and qualification of engineering personnel, create innovative thinking, provide enterprises and organizations with technical equipment alongside with detailed legislative regulations. In this connection tightening the control over the waste recycling shall be accompanied with its efficient processing.
2. Acquiring of necessary additional skills and knowledge is feasible through completing of periodic postgraduate advanced training or retraining for the corresponding courses on the basis of Institutions of Higher education, Institutes of advanced training and for retraining for agro-industrial managers and specialists as well as for specialized enterprises. The Department "Cars and tractors" SpbSAU is ready to provide a number of such programmes to the organizations in concern. If necessary, they can be further adjusted and complemented by joint implementation with Russian and foreign partners.
3. The use of innovative solutions and strengthening the measures of technical control can fruitfully be combined with effective implementation of existing legislative measures. So, from the January, 1, 2006 the Federal law №131 "About the common principles of the organization of local self-management in the Russian Federation "which essentially expands eights of citizens on local self-management has came into a force. Also from January 1, 2006, Article 681 "Rights and duties of the municipal public inspectors on environmental protection" of the Federal law "On environmental protection" of January 10, 2002 came into force. On the basis of this and other Federal laws, the budget of municipal formations will be established as well as the municipal environmental control will be implemented at the expense of the profit tax, land tax, payments for negative impact on the environment and other taxes from the enterprises located on the territory of municipal formations.
4. New legislative and normative documents are opening up wide prospects for the development of rural areas in the Russian Federation and they are being actively put into practice. However, neither the population, nor the representatives of the elected local authorities have any sufficient experience and knowledge to implement them as efficiently as possible. But in the European countries significant experience of successful activities of administrations and the public of rural municipalities as in questions of development of these formations, and preservations of the natural environment is collected up to now. In connection with this, in the framework of international conferences and initiated projects there may be carried out the exchange of experience and knowledge as well as started direct promising contacts between the representatives of the municipalities, educational, scientific, public and other organizations, including businessmen from European countries and Russia, aimed to join efforts in order to maintain security in agriculture and many-sided development of the rural areas of our countries.

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References

1. A.Evdokimov, I.Fux, I.Oblaschikova, 2001. "Environmental aspects himmotology lubricants. Tutorial.
2. A.Kartoshkin, V.Belyakov, 2009. Local technical monitoring of the environmental state of the Baltic Sea /Book of abstracts of the X International environmental forum "Baltic Sea Day".
3. A.Kartoshkin, 2007. The environmental danger discharge of spent motor oils /Collection of scientific papers of the International conference "Motor-2007".
4. V.Minin, H.Hunta, V.Belyakov, 2011. Towards Environmentally Friendly Industrial Farms in the North-West Region of Russia: Problems and Perspectives. Efficient and safe processes in sustainable agriculture and forestry. XXXIV CIOSTA CIGR V conference 2011, Vienna-Austria.
5. A.Kartoshkin, V.Belyakov, 2011. Technical aspects of ecological safety farm industry/ Efficient and safe processes in sustainable agriculture and forestry. XXXIV CIOSTA CIGR V conference 2011, Vienna-Austria.

Factors that impact the financial performance of broiler chicken production in Brazil

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Keywords: costs, economic efficiency, social-economic status

Objectives

This study aimed on identifying the factors that affect the financial performance of broiler chicken production in Southwest of Paraná state in Brazil, as well as to study the relationship of these factors with the social-economic situation of the poultry producers.

Methods

Data for this work were obtained from questionnaires, which were implemented to broiler chicken producers during the months of February and March, 2011. These 39 question questionnaires provided information about the producer's age, family size, land possession, capital in broiler farming, gross income per flock, training exposure and broiler farming experience, production magnitude, credit needs, technical assistance, labor, production problems and bird weight at slaughter. These data were submitted to descriptive statistical analysis. The relationship between the described production data and its financial performance was obtained through the Pearson coefficient, at 95% confidence level, using Excel.

Expected Results

A group of the interviewed broiler producers in Paraná state present medium to low financial performance. Some evaluated factors probably will have a positive impact on the production financial performance. The production problems that can affect the broiler production are the environmental challenges in the facilities, bad feed conversion, as well as management problems and low quality chicks.

Influence of precise managing on the competitiveness of firms

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Abstract
Precise agriculture is the trend of 21st century. It enables effective and economic management in agricultural enterprises. This modern system of farming is based on the principles known and realized by the generation of farmers and smallholders for hundreds of years - from perfect knowledge of their land to single fields with their different characteristics. The development of precise systems is considered an innovative dividing line in the resort of agriculture in the whole world. Precise agriculture is oriented to the maximum usage of the potential of land, crops, machines and a human factor. Modern technologies usage fully respects the sources of nutrients in land, usage of machines within the whole life cycle of plants (from sowing to harvesting). It is possible to use the data from data warehouses for the selection of a proper variety, proper fertilization, plant protection and yield measuring. Nowadays, in connection to the GPS Agro system, there are created special modules. For instance the module of land blocks – registration of land areas, on which the enterprise is run, is directly connected to the Portal of a farmer and it is possible to import all the data.

Keywords: precise agriculture, data and information, enterprise information systems

Introduction

Precise farming is a way of farming, which is based on the possibility of using existing spatial non-uniformity of soil properties and fertility management to improve efficiency.
The basic principle of precision farming is directing the operations of individual work to a maximum equivalent to the conditions of specific sites on the plot. Precision agriculture is based on the knowledge of soil variability and allows access to specific parts of the hunting ground separately according to the level of observed factors.
To obtain data on the land there is used the sampling of soil, plants, the mapping by means of sensors or methods of aerial and satellite imaging. To assess the variability of factors related to plant nutrition (agrochemical properties of soil, especially available nutrient supply of P, K, Mg and soil reaction) there is still the most widely used method of taking soil samples.
The current assessments of variability are mostly based on the analysis of samples taken in the network points. The choice of sampling scheme is individual, based on the monitored plot of land, and must respect the spatial variability of measured parameters, technical, economic and analytical possibilities and the method of final evaluation of the data obtained.
The amount of data obtained with regular monitoring of individual parcels and activities on these parcels increases rapidly, and it is important to work with them and use them to increase the efficient use of single sources. Data obtained on the basis of the principles of precision farming activities also affect the competitiveness of the company.

Material and methods

The objective of the contribution is to propose the module of further data usage on the basis of realized analysis. The principles of precise agriculture improve the quality of the access to natural factors. Another shift to improve the quality of the environment protection is the proposal to use integrated solution of data warehouses created on the basis of precise agriculture principles. Connection and other usage of data in enterprise information systems, for instance for creating seed procedures, for calculation used in trading with single commodities, for internal accounting, improve the management of the whole agricultural enterprise.
In the Czech Republic, the principles of precise agriculture are used by 15% of agricultural enterprises. On the basis of realized examination in selected agricultural enterprises there will be proposed methodology of data warehouses usage for other managing. Farmers need to find if the methods of management were successful and how to continue next year for annual planning. The result will be the complex tool for the management and control of agricultural enterprises.

Result

However, the economic benefit of precision agriculture is still unknown. Positive effects can be caused by the fact that we will specify the exact cost of the entire production process. Figure 1 shows that precise agriculture requires accurate information, highly skilled human capital and local applications - factors that create an ideal source of data for further processing and evaluation of economic efficiency.
This means a guarantee that the quantity of inputs corresponds exactly to the costs. Seeds, fertilizers and pesticides are applied according to the soil quality. In the same way, the soil can be modified in dependence on the exact spatial conditions. With using GPS localization system it is possible to map the field imbalance accurately and to use the application technique so that it would react to the variability of fields and enable the most efficient use of all resources.

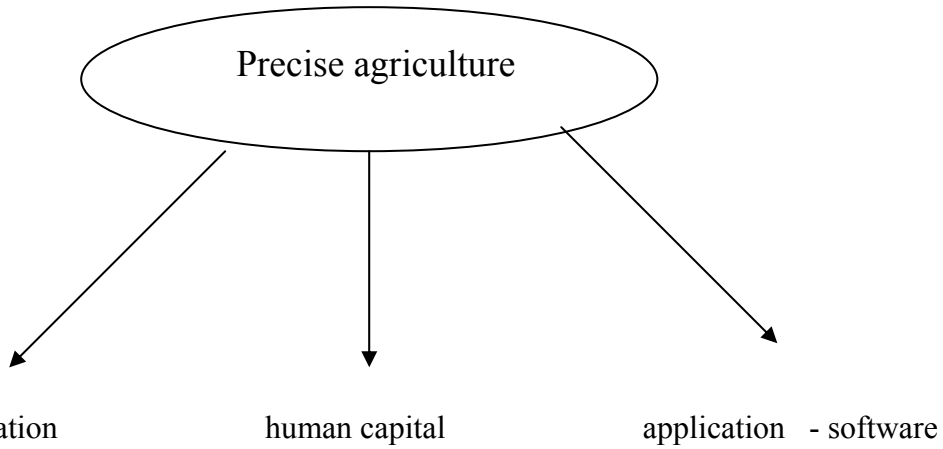

Figure 1

Stored data are the most valuable of the mentioned process. Farmers can work with data related exactly to each plot, to each plant species, to each tractor, to each worker. Based on the available technology it is almost possible to watch those data online. A management

worker can monitor the movement of machinery and the equipment effectiveness. These are the data obtained directly from the activities associated with work on individual plots - soil tillage, sowing, plant protection, harvesting. It is therefore possible to calculate very precisely and accurately the cost per unit.
The principles of precise agriculture are already very well developed for the use of single parcels potential. The obtained data are stored in data warehouses, they are the source of further qualitative shift in land use - these data can be used directly in the design of crop rotation and find out how the principle of precision agriculture usage affected the efficiency of the enterprise. Growing interventions are proper to be converted into a graphic form for better comparison, and harmonize them with the proposed silvicultural measures.
In the Czech Republic the principle of precise agriculture is used by about 15% of agriculture companies. The situation is particularly influenced by the amount of expenses that are associated with the acquisition of technologies needed to implement the principles of precise agriculture.
If a farmer collects a large amount of information about all parcels, it does not mean that he/she is practicing precise farming. He/she must be able to work with this amount of information that is stored throughout the year. Stored data must make sense and must be transferred to a specific operational solution. Nowadays only those are successful who can not only produce economically, but also sell very effectively. It is therefore important to work with the data in the agricultural enterprise.
It is also possible to use quality software to monitor financial flows in the company and compare them with the prices of products. The use of well-processed business data has the impact on quality managerial decisions. Currently, means for working with stored data can be used - the type of Business Intelligence software.
Business Intelligence Software type helps to make better use of corporate resources. While using Business Intelligence (BI) applications it is possible to get our own data, quickly and easily find out the results of business activities - production, sales, circulation of materials. Simplified outputs from existing systems and better support for decision making and planning can be understood as the biggest advantage and benefits of BI.
Nowadays, it is common to have an immediate access to single reports and on-line access to the required surveys. The accuracy and quality of outputs is stressed to a greater extent, and BI tools are no longer just the prerogative of senior management, but increasingly they are used by everyday and ordinary users.
Agriculture is the production area where a set of producers and consumers is relatively stable and not too big. Farmers often sell their produce before sowing, the year ahead. In 2011 in the Czech Republic, approximately 30% of farmers had sold the production of certain commodities of the year 2012. The amount of profit can then be affected only by the quality of management. Here the important role is played by the principle of the precise agriculture usage, which leads to lowering costs and thus to the possibility of profit increasing and the quality of work with data that are monitored in the agriculture enterprise.
Based on the survey (April 2012) on farms implementing the principles of precise agriculture the following results can be stated:The survey was conducted in 84 farms, the method of direct questioning was used. In the previous year there was realized the same inquiry, but a questionnaire survey was used - the questionnaire was placed on the Internet and was available to respondents for one month. One month after inquiring there was web presentation available for the respondents. The same set of respondents was approached, i. e. 84. The return of questionnaires was 11% - only 10 respondents completed a questionnaire. Results based on such investigations are not very objective. Therefore, in 2012 there was used direct

questioning. Respondents, who answered in 2011, use data recorded in their databases also to other activities than tillage, sowing, fertilizing and harvesting.

	yes	no
Use for other activities	45%	55%
Use for crop rotation	15%	85%
Connection with economy	4%	96%

Table 1 – Working with date

Respondents who answered the question for further use positively, i. e. that they use the data for other activities, use them to implement the principles of precise agriculture and they work with data when creating model situations. They use very often only the data stored in the database and they process these data by hand on paper. All 45% of respondents use the data to further improve the quality of soil cultivation, fertilization, seeding and harvesting.
In general, all of them use the connection to the GPS, and based on the data on the state of property other activities already mentioned are carried out. Only 15% of respondents in relation to the data modify crop rotations. Data on the supply of nutrients in the soil, knowledge of the requirements of individual crops and the market price of crops may affect the crop rotation. In the Czech Republic in response to the increasing market price of grain, their sown area already exceeds 60% of the total sown area of agricultural land. In such cases, using the principles of precise agriculture has a great influence on the amount of yield and opportunities for economic monitoring of individual plots.
Only 4% of respondents continue to work with data that can be obtained when using applications associated with precise agriculture. They form on the basis of data on the quality of individual parcels, the economic situation in the company and the expected development of prices of individual commodity analysis of the current situation and predictions for the coming years, what crops will be most economical and in particular in relation to the quality of land to grow. Unfortunately, software that would allow to carry out these activities is not available for the companies. In many cases they use the possibility of available table processor (Excel), and they often acquire data again, they do not have the possibility to use the stored data. This leads to multiple data redundancy.
Current information and communication technologies make it possible to process large volumes of data. However, data are often stored in different places - in companies there are atomized databases and their interconnection is difficult and often impractical. In particular, there are applications in agriculture, which are often used by only one worker, and he/she currently works with the data of a particular application, and it is not possible to carry out the analysis with making use of all data in the company. It is necessary to design integrated databases and then to work with the data for the entire enterprise. It is important to link data from crop husbandry, animal husbandry with other data in the enterprise - sale, economic data, data from human resources. Appropriate data sharing leads to a qualitatively higher utilization of all resources, the effect of it is reducing costs, increasing yields, and with precise agriculture also improving the quality of the environment.

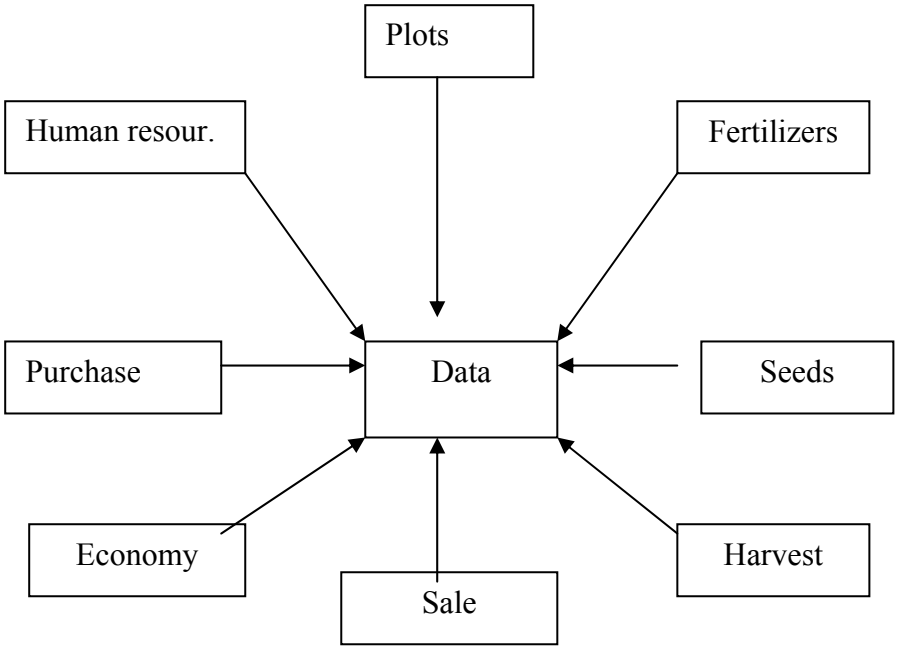

Figure 2 – Create of Database

Figure 2 is the design of an integrated database. Into a single database or different interconnected databases there are stored the data from individual processes in the enterprise. Stored data can be further used by appropriate tools - for example through Business Intelligence Software. Knowledge of the management in the field (in our case agriculture) as well as their ability to work with stored data will create a long-term competitive advantage. The software that is designed to work directly with the proposed data can be used - this option will be more expensive, but for many users easier. Inquiries made of company data are already created. The user only learns how to use these questions (functions).
The second option is a software solution using the type of database environment, or a table processor. Workers create queries directly in the selected software according to current requirements. Selecting the appropriate option will be affected by:

1. financial sources of the company
2. human factor - knowledge of the field and the ability to control and use ICT

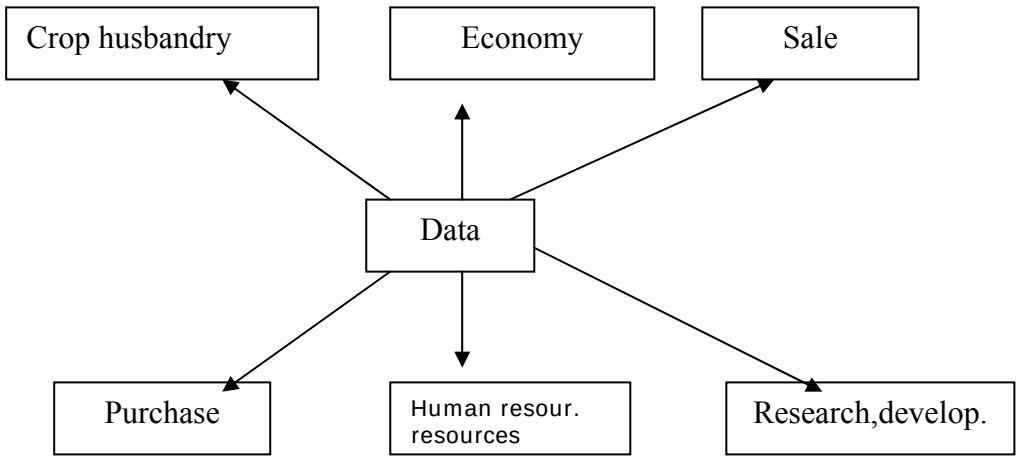

Figure 3 – Use of the Database

The advantage of the created database is the possibility of the access according to the requirements of users and their access rights to the selected data. Models can be formed (Figure 3) when we create predictions in crop husbandry - we use corporate data (internal) and modeling efficiency is best processed with external data (such as the expected market prices, sales volumes, etc.). In the current economic environment, an important element to enhance competitiveness is not only to use the latest scientific knowledge, but also to be joined into this activity.

Conclusion

Creating a business strategy must be closely associated with the creation of an information strategy. Data and information have become one of the most valuable corporate resources. Their use, importance, influence on the further development of the company are fully influenced by the ability of the management to use all data and information (internal and external). The quality of the information strategy is given by the team ability to define information needs. When creating a database that the individual modules of the information system will use, its individual elements must be clearly defined. When creating a database there must be team representative of each business unit in order to create a quality database, which becomes a fundamental starting point for the creation of reports for further decisions.
In this environment of rapid technological changes, agricultural development and changes in economic situation, a strategy should be based on the variant with the best ratio of price-performance (creating the best option according to the current reporting requirement). Agriculture is becoming a knowledge-intensive sector, where what employees will know (what data and information source) is a key factor in profitability. Ownership of tools of precise agriculture has its place in business and information strategy, but it is not the only possibility for increasing competitiveness. More important element is the involvement of precision farming tools into the corporate chain of production - sale - employees - economy. Precise agriculture will fully support the development of the company if the interconnection of all parts of the enterprise occurs, and it is only possible in that situation when we model the stored data of all ongoing activities of the enterprise.

References

Fiez, Timothy E., Baird C. Miller, and William L. Pan. "Assessment of Spatially Variable Nitrogen Fertilizer Management in Winter Wheat." Journal of Production Agriculture. 7(January-March 1994): 17- 18, 86- 93.

Brukner, T., Voříšek., J.: Outsourcing informačních systémů. Praha:Ekopress, 1998 ISBN 80-86119-07-6

Dohnal, J., Pour, J.: Řízení podniku a řízení IS/IT v informační společnosti. Praha: VŠE, 1999 118 s. ISBN 80-7079-023-7

Drucker, P.F.: To nejdůležitější z Druckera v jednom svazku. Praha: Management Press, 2002. ISBN 80-7261-066-X