NJF Seminar 467

Economic framework conditions, productivity and competitiveness of Nordic and Baltic agriculture and food industries

12-13 February 2014, Tartu, Estonia

PROGRAMME AND ABSTRACTS

Organizing Committee

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Economic framework conditions, productivity and competitiveness of Nordic and Baltic agriculture and food industries

PROGRAMME

Tuesday, February 11, 2014

19.00-22.00 Registration, welcome party, Dorpat Convention Center hotel (Turu St. 2 Tartu)

Wednesday, February 12, 2014

9.00-10.30 Plenary session

Opening of the seminar

Keynote 1: Keynote 1: Organizational dynamics and competitiveness of European agri-food value chains - A Nordic perspective, Kostas Karantininis

Keynote 2: Csaba Jansik: Competitiveness of dairy supply chains around the Baltic Sea

10.30-11.00 Coffee break

11.00-12.30 Parallel sessions

Session 1 – Factors in agricultural productivity 1

T.Sipiläinen, M. Ryhänen & S. Ovaska: Indicators of managerial performance in dairy farming

I. Leimane, A. Krievina, A. Nipers & I. Pilvere: Productivity and Export-orientation in the Baltic Food Industries

T. Baležentis, I. Kriščiukaitienė, A. Baležentis: Dynamics of the Total Factor Productivity in Lithuanian Family Farms: A Sequential Technology Approach

A-H. Viira, H. Luik, R. Värnik: The relationship between technical efficiency, breeding values, modern technologies, and characteristics of farm managers in Estonian dairy farms

Session 2 – Product diffentiation to increase competitiveness

L. Jeroscenkova, B. Rivza, L.Melece: Local food, food craft and culinary heritage as strategies to increase competitiveness of Latvia agriculture

L. Lamprinakis: Utilizing cognitive strategies to develop competitive advantage for local foods

J. Tóth, P. Gál,: Is the New Wine World More Efficient? Factors influencing technical efficiency of wine production

E. Shchedrin: Volatility of prices for dairy products in the Leningrad region

12.30-13.30 Lunch

13.30-15.00 Parallel sessions

Session 3 – Comparative analyses of competition and productivity

X. Irz & N. Kuosmanen: The Productivity Performance of Dairy Chains – A Comparative Analysis Across the Baltic Region

O.Fabricius. Productivity, efficiency and competitiveness of the Danish farm sector, and their determinants

J. D.Jensen, M. Sepp, J. Niemi, I. Krisciukaitiene, G. Salputra: Outlook for the Competitiveness of Nordic and Baltic Livestock Sectors on the EU market

M.M,Hasan, J.Tóth: The impact of the recent economic crisis on the agricultural production efficiency of 23 European Union Member States

Session 4 – Factors in agricultural productivity 2

M. Olle: The productivity and predictable profitability of different vegetables influenced by effective microorganisms in Jogeva (Estonia) agro climatic conditions

S.M.Pedersen, M.Lund: A comparison of the Economic framework conditions among the Danish and Dutch milk producers

R.Omel, H.Luik: Total Factor Productivity Growth in Estonian Dairy Production in 2004-2011: Comparison of Total Factor Productivity Estimates

L.J.Asheim, G.E.Nagel-Alne, B.Hardaker, P.S.Valle, L.Sølverød: Improving competitiveness of Norwegian Dairy Goat Farming through disease sanitation

15.00-15.30 Coffee break

15.30-17.30 Parallel sessions

Session 5 – Competitiveness and rural development

A.Põder, A-H.Viira, R.Omel: The relation between agricultural and rural development in Estonia

A. Veidal, O.Flaten: Entrepeneurial orientation and farm business performance: The moderating role of on-farm diversification and location

A.Põder, M.Nurmet: Investment plans of Estonian rural enterprises for the next 7 years: a comparison of primary, secondary and tertiary sector

A.Barnes, H.Hansson, G.Manevska-Tasevska, S.Shrestha: The influence of diversification on long-term viability in the European Agricultural Sector

O.Niskanen, A-M. Heikkilä:The impact of parcel structure on the efficiency of Finnish dairy farms

Session 6 – Role of framework conditions

O.Flaten, L.Rønning: Factors influencing financial performance of sheep farms in Norway

M.Gylling: The economic effect of different framework conditions – a comparison of UK and DK arable crop production

R.Põldaru, J.Roots, A-H.Viira: Increasing Estonian milk production to one million tons by 2020 – necessary market preconditions and potential spill over effects to grain and meat markets

A.Hegrenes: Productivity and competitiveness in protected agriculture

19.00- Conference dinner, Restaurant of the Dorpat Hotel (Soola St. 6, Tartu)

Thursday, February 13, 2014

9.00-9.40 Keynote speech 3 – M.Lund: The production and consumption of animal welfare: Do economic incentives matter?

9.40-10.40 Session 7 – Factors in agricultural productivity 3

M.Mõtte, A-H.Viira, R.Värnik: The appraisal of competitiveness and innovation in Estonian food industry in relation to investment subsidies

K.Labajova, H.Hansson, C.J.Lagerkvist: Influence of the practical production management on the technical efficiency of pig farms in Sweden.

R.Omel, R.Värnik: Productivity Growth in Estonian Dairy Production: Comparison of Total Factor Productivity and Agricultural Terms of Trade

10.40-11.00 Coffee break

11.00-11.45 Session 8 – Methodological advances within productivity analysis

D.Wikström, G.Karagiannis, D.Collentine, Y.Surry: Accounting for inter-group productivity differences among conventional, transitional and organic farms in Sweden

G.Manevska-Tasevska, H.Hansson, E.Rabinowicz: Input-saving possibilities and practices contributing to more efficient beef production

11.45-12.00 Closing of the seminar

12.00-13.00 Lunch

13.00-18.00 Excursion

Salvest Ltd. One of the biggest food processors in Estonia, specialised in canning fruit and vegetables

Tartu Mill Lt. One of the biggest grain processors in the Baltic States; producer and wholesale of a number of grain productions and animal feed

Competitiveness of dairy supply chains around the Baltic Sea

Csaba Jansik,

MTT Agrifood Research Finland

Abstract. Competitiveness is a rather vaguely defined concept and there is no broad consensus in the literature on its measurement techniques and indicators. It is particularly hard to determine the competitiveness of countries, economic sectors or product groups and setting up a relevant benchmarking framework for such comparison may often be a great challenge.

Foodstuffs are produced and marketed in various food supply chains. Economic prosperity is a common denominator for the various segments, which often build upon each other within the national boundaries due to the special characteristics of foodstuffs and their raw materials. The fact that some countries' food chains are more successful than others' draws the attention to the determinants of the discrepancy. Quantifying the performance of a specific segment in a cross country comparison is straightforward and it has often been the subject of well-limited and defined research studies. Input suppliers, farms, food processors or retailers, however, seldom operate independently from each other, so it is essential to investigate them as part of the chain in their country.

This presentation provides an example of comparing eight countries' dairy supply chains investigating the fundamental reasons that explain differences in their performance. A large set of indicators were used to measure the differences, all classified into five contributing factors of competitiveness: (1) economic performance, (2) productivity, (3) foreign trade performance, (4) growth and (5) innovation. Although the indicators reveal several interesting reasons for competitive performance, the ultimate conclusion is that the competitiveness of a chain is also determined by a number of qualitative, such as historic, cultural and psychological factors, the operational and business environment and the relations among the segments of the chain.

Indicators of managerial performance in Finnish dairy farming

Timo Sipiläinen[1)], Matti Ryhänen[2)] and Sami Ovaska[3)]

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The aim of the article is to test how specific farm level indicators are linked to the performance of dairy farms. Recognizing the indicators of managerial quality is important in practice. These indicators are likely to be connected for example with the input-output relations, and therefore, we cannot assume that these indicators are separable from the use of inputs. Another estimation related problem may be heteroscedasticity of the error term, which affects the reliability of parametric efficiency analysis and the decomposition of error term if it is not properly taken into account. This is also a problem in our study when the data is a truncated sample of the population. Our sample consists of dairy farms, the size of which is larger than or equal to 20 cows. The third important aspect is that agricultural production typically suffers from stochastic variation especially due to weather. This would support the use of stochastic frontier methods in efficiency analysis. Therefore, at least robustness to outliers is a desirable property if stochastic frontier approach is not applied.

These starting points lead us to apply nonparametric, robust conditional efficiency approach, originally introduced by Cazals et al. (2002) and Daraio and Simar (2005, 2007). In contrast to two-stage approaches, the conditional efficiency technique avoids the assumption that 'contextual' variables would only affect efficiency scores without affecting the location of the efficient frontier. The use of partial order-m frontiers makes the approach less sensitive to outliers. In the analysis, unconditional and conditional order-m efficiencies are estimated. Thereafter, non-parametric local linear regression is used to assess the effect of managerial indicators on the conditional/unconditional efficiency ratio (De Witte and Kortelainen 2013, Badin et al. 2011). The statistical inference is derived from the wild bootstrapping.

We apply a one output and three input efficiency model because of the relatively small sample size of 173 farms from Southern Ostrobothnia, Finland.

The results show that the average milk yield and the rate of calf mortality affect significantly on technical efficiency in multiple non-parametric regression. There are also indications that the linkages can be non-linear between management related indicators and efficiency. The size of the farm is also an important contributor to efficiency according to our analysis. The size seems to be a background variable which may be linked to the above mentioned interrelations.

Keywords: efficiency, managerial indicators, order-m, non-parametric regression

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Productivity and Export-orientation in the Baltic Food Industries

Ieva Leimane[1,2], Agnese Krieviņa[2], Aleksejs Nipers[3], Irina Pilvere[1]

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This paper deals with the evaluation of the relation between export intensity and productivity as the basis for the future growth of food industry, resulting in the acquisition of new markets and the total production growth. To develop the study, the data on capital and labour productivity as well as export intensity of industry of Baltic food sector were analysed.

There have been various studies on the relation between firm's export intensity and growth of productivity (e.g., Bernard et al., 2003; Helpman et al., 2004; Greenaway and Kneller, 2007) and empirical studies at the firm's level in many cases show positive relation (e.g. Bernard and Jensen, 1999; Delgado et al., 2002; Fariñas and Martín-Marcos, 2007). There is view stating that only high productivity firms will find it profitable to enter international markets (Roberts and Tybout, 1997); another opinion is that technologies and knowledge's from foreign markets helps exporters to improve production and have higher rate of productivity growth than those selling in domestic market (Clerides et.al., 1998). This paper complements to the previous studies with empirical evaluation of the link between productivity growth and export intensity at industry level in the Baltic food sectors. As well as it contributes to the development of knowledge in this field, answering whether productivity growth and export orientation of the industry is a prerequisite and a basis for more successful development of the industry in the future.

We have chosen food sector because of its importance in the economy of the Baltic States. The food sector is the largest manufacturing industry in Latvia, Lithuania and Estonia. One of the most important problems of the development of the food sector in the Baltic States is relatively low productivity in the sector, especially in Latvia and Lithuania. In conditions when inputs become more expensive, low productivity is important food industry development problem. Low productivity is closely linked with the food enterprises basic orientation to the local markets – relatively small production volumes (more than 95% of the enterprises are small or medium) and high level of costs per production unit as a result.

The aim of the paper is to evaluate weather industries of Baltic State food sector with higher export-orientation shows higher productivity and have better basis for successful development in the future.

To achieve the objective, in the first step the export-oriented industries are defined within the food sector (the export sales ratio for the six main food industry sectors in each country is used and sector are divided in three groups); in the second step the productivity growth indicators of export-oriented sectors are analysed in comparison with domestic-oriented sectors (the capital input and labour input to produce one mill. of value added is used); as well as the link between export-orientation and productivity in the Baltic food sector is established.

The obtained results show positive impact of the exporting to the food sector's productivity and vice versa.

Keywords: productivity, export, food industries, Baltic States

Dynamics of the Total Factor Productivity in Lithuanian Family Farms: A Sequential Technology Approach

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Abstract

The sequential Malmquist–Luenberger productivity index was employed to assess the dynamics of the total factor productivity in Lithuanian family farms. The research sample encompasses 200 family farms reporting to the Farm Accountancy data Network. The sequential Malmquist–Luenberger index was decomposed by taking into account scale efficiency change and variable returns to scale technology. The obtained efficiency scores suggest that years 2006 and 2009 were those of the most inefficient farming activity. Analysis of the scale efficiency scores suggested that the mixed farming should expand its operation scale in order to maintain the economic viability and competitiveness. The sequential Malmquist–Luenberger productivity index suggested that the TFP had decreased by some 2.9% throughout 2004–2009. The technical change component, stagnated in 2009, yet remained the most important factor of TFP growth accounting for increase of some 14% during 2004–2009. The decreasing pure technical efficiency, however, reduced the TFP by 16%. The scale efficiency change did not play an important role. Innovative decision making units—family farms—were identified in terms of distance function and productivity index values.

Keywords: Total factor productivity, efficiency, sequential Malmquist–Luenberger index, data envelopment analysis, family farms.

JEL classification: C43, C44, C61, Q10, Q12

The relationship between technical efficiency, breeding values, modern technologies, and characteristics of farm managers in Estonian dairy farms

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Since the accession to the EU, the value of fixed assets of Estonian agricultural enterprises have increased by 385% (from 2005 to 2011) (Statistics Estonia, 2013). Significant share of these investments has been directed to milk production. It has been estimated that more than 50% of Estonian dairy cows are kept in modern loose housing cowsheds that are built in last 10 years (EMU, 2012). Therefore, it is relevant to research the effects of modernisation of dairy production on the technical efficiency of dairy farms.

The technical efficiency in agriculture is usually measured by comparing the value of agricultural production relative to the value of inputs used in the production. However, the technical efficiency can be influenced by several other factors about which the data is often unavailable. Therefore, this paper aims to investigate the relations between the technical efficiency of Estonian dairy farms in 2012 and average breeding values of the herds in the dairy farms, the technologies used in the cowsheds (type of the shed, building year of the shed, milking technology), and the characteristics of farm and farm operator (farm size, age, education, experience, attitudes etc.). For that the data from various sources are combined: Estonian FADN farm-level data about 2012 is used and combined with the data about breeding values from Estonian Animal Recording Centre. In addition, the data from farm survey, conducted in 2013 is merged with the two datasets. The farm survey was concentrated in gathering information about the technologies used in farms, about the farm management of and farm operator. We plan to apply a two-stage analysis: in the first stage Data Envelopment Analysis is used to estimate technical efficiency scores for each farm in the sample; in the second stage we apply Tobit regression to analyse the relations between technical efficiency, breeding values, technologies, and farm and farm manager characteristics.

We expect that higher average breeding values contribute to higher technical efficiency. The effects of modern technologies (e.g. modern cowsheds, automated milking) could be two-fold. From one hand modern technologies should be more productive and increase farms' technical efficiency; however, modern technologies imply large investments and high capital costs that could deteriorate technical efficiency measure in short and/or medium term. We also expect that farms with better educated managers are more efficient, and farms, which managers are more profit than lifestyle oriented are more efficient.

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Local food, food craft and culinary heritage as strategies to increase competitiveness of Latvia agriculture

Laura Jeroscenkova[1)], Baiba Rivza[2)], Ligita Melece[3)]

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The issues related to local food systems and its wider social, cultural, economic and environmental implications have flourished amongst scholars and policymakers over the last decades. The factors, which lay on bottom of idea of local or alternative food systems, are following: the concept of sustainable development; the concerns of greenhouse gas (GHG) emissions from agrifood chain and climate change; human health problems caused by unhealthy, mainly industrial, food, earnings of farmers and rural inhabitants trough value-added (Maxey, 2007; Hinrichs, 2010; Martinez et al., 2010; Nicholson et al., 2011).

Nicholson C. et al. (2011) describe the ability of supply chains to meet consumer demands for increased localization. Moreover, the potential outcomes of a vibrant, community-based food system, *inter alia* culinary, have positive influence on all community, particularly rural community in all aspects: health of inhabitants, wealth of farmers and rural citizens, connection of different groups of community and society, and capacity of different improvements on local or region level (Mac Leod and Scott, 2007; Bendfeldt et al., 2011; Brenson et al., 2011).

The development of local food systems is the tool for further rural development via strengthening of small farms' viability and rural population's busyness and employment diversification (e.g. Sonne, 2010; Pearson et al., 2011; Diamond and Barham, 2012; Aubry and Kebir, 2013). Local food systems or chains are closely connected with culinary heritage (Bessiere and Tibere, 2013; Hall and Gossling, 2013; Sbai, 2013), particularly, on regional level, taking into account cultural heritage.

Latvian regions of Kurzeme, Zemgale, Vidzeme and Latgale have a different history, ethnography, traditions and also regions are with a different culinary heritage and cultural heritage. The companies of richest culinary heritage are in Kurzeme and Latgale, respectively, 39% and 23% of the total surveyed 86 companies. Kurzeme region is the richest in fish products. Supply of fish products is also one of the largest (15%) compared to the other types of culinary heritage. As the next most popular are the bakers (14%). Wine production is popular in Kurzeme (33%) and Zemgale (32%). The smoked fish have produced in Kurzeme and Vidzeme, but freshly baked bread mostly in Latgale, where also honey mostly is produced (57%). The exploration and development of culinary heritage is very important as for Latvian entrepreneurs, *inter alia* farmers, as well as for the local communities' and authorities.

Keywords: local food, cultural heritage, food craft, competitiveness.

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Utilizing cognitive strategies to develop competitive advantage for local foods

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The Nordic and Baltic agri-food industries are facing increasing and diverse challenges in the global food and agriculture markets. These challenges are primarily related to issues of relative competitiveness – namely cost structures, taxation, infrastructure and system development. The paper proposes cognitive strategies that can be utilized by the agri-food firms in order to address such challenges. Cognitive strategies, and in particular those related to cognitive dissonance and consumer perceptions, can help to establish a competitive advantage for local Nordic/Baltic firms and thus help them to remain profitable in spite of the higher costs. Utilizing such cognitive strategies essentially creates sticky demands by increasing consumers' switching costs; however, special care must be taken when applying such strategies since their success is sensitive both to the initial state and the overall firms' behaviour. Exploring the factors behind the successful application of such strategies would allow local firms to remain fairly protected from competition of foreign firms.

Keywords: cognitive dissonance, cultural heritage, local foods, competitiveness, local markets.

Is the New Wine World More Efficient? Factors influencing technical efficiency of wine production

József Tóth, Péter Gál,

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We have experienced the emerge of New Wine World wine producing countries in the recent 15-20 years as they successfully increased their market share in European markets. The New Wine World consists of countries where wine production was not present before the arrival of Europeans, i.e. the Americas, South Africa and Oceania.

In this paper we show that there is a significant difference between main Old and New Wine World states in terms of technical efficiency, hence it can be one of the drives of their success described above.

We used a panel of 16 countries over the period of 1995-2007, including 11 countries of the Old and 5 of the New Wine World. We have considered a country to be main wine producing one if the average annual wine production was more than 1 million hectolitres during the first decade of the new Millennium. Due to lack of data, six countries were excluded from the sample.

We used a two stage investigation to estimate the technical inefficiency and to reveal its relation to certain instrumental factors. In the first stage we applied panel data stochastic frontier analysis based on a Cobb-Douglas production function by regressing wine production against three inputs: land (area of vineyards), capital (agricultural capital stock) and labour force (employment in agriculture). The sources of data were statistics of the FAO, the OIV (International Organisation of Vine and Wine) and the World Bank. We used agricultural capital stock and agricultural employment as proxies for capital stock and employment in the wine sector as more detailed data were not available.

Assuming a half normal distribution for the inefficiency term, our stochastic frontier model showed robust results. The estimation of the inefficiency terms verified our assumption on the nature of half normal scattering.

The results show that the quantity of wine production is in significant and positive relation with the surface of vineyards. However, the relation between the production and the two other inputs (capital stock and employment) is negative. We think that these inputs were probably not used in an efficient way.

In the second stage, we regressed the estimated inefficiency term against some instrumental variables describing macro-economic factors that we assumed to affect it.

These factors are:

1. The openness to international trade. One can assume that countries that are open to international trade are more competitive and thus more efficient from technical point of view as well. The openness is measured as the sum of exports and imports compared to the GDP.
2. Financial development. The more developed the financial system is, the more efficient the allocation and use of capital will be. This factor is measured by the amount of deposits held in the financial system compared to the GDP.
3. The quality of human capital. The quality of human capital has a positive effect on technical efficiency: the more educated people are, the better performance they will show up in terms of work efficiency, innovation, managerial decisions (e.g. on the use of inputs). The quality of human capital is measured by the average years of education of the population that is at least 25 years old.

4. The tradition of wine. We assume that the permanent presence of wine in a country's culture increases the technical efficiency. If the consumption of wine is high, so is the supply. This results in low marginal costs which presume higher efficiency. The tradition of wine is measured by the per capita consumption of wine.
5. Belonging to group of the Old Wine World or the New Wine World countries. We assume that New Wine World countries are more efficient than Old Wine World countries.

The results proved that the estimated inefficiency term is in significant relation with these factors (except the openness to international trade) and the direction of the relation was the same as expected. All in all, we have found a significant difference between the technical efficiency of Old and New Wine World countries, which in turn supports our hypothesis that the emergence of New Wine Word might be due to their higher production efficiency.

Key words: production efficiency, stochastic panel frontier analysis, institutions, New Wine World

Volatility of prices for dairy products in the Leningrad region

Evgeny Shchedrin

Price volatility is one of the most important problems in modern commodity markets. The urgency of this problem is caused by the following factors:

- High volatility in food markets will remain
- Because of the price volatility increases the risk of bankruptcy agricultural businesses and consumer's pauperization
- Significant short-term price fluctuations can have a lasting impact on the development of industries
- Fluctuation in food prices can have a serious impact on food security

Of particular importance, these factors become in the light of the entry of the Russian Federation to the WTO, as the reduced barriers to entry of foreign food products on the domestic market and increasing the impact of fluctuations in world market prices for the change in prices in the domestic market.

Abrupt changes in food prices have a direct impact on food security in the world. In a globalized economy, the impact of price volatility on world markets to local markets increases. Therefore, the high relevance are studies the effects of volatility on the real economy, in particular agriculture and its major industry - dairy farming.

To study the volatility forecasting of socio -economic impact of price fluctuations and the development of measures to neutralize the adverse effects must identify the factors that have a direct or indirect impact on the volatility of prices.

The volatility of agricultural prices affects three groups of factors:

1) Intra- specific agricultural production;
2) Climate change and the globalization of agricultural markets and resources;
3) Population growth, urbanization, changing consumer preferences.

Price volatility depends on a combination of factors that, in the context of globalization, under certain conditions, can neutralize them when the factors are mixed. However, the possible effect of resonance and, as a result of interference factors on each other, volatility can rise sharply, as occurs, for example, at the moment both globally and in the Russian market of milk and milk products.

High volatility in agricultural prices threatens the food security could lead to a shortage of certain types of food in some regions of Russia.

Price volatility increases all kinds of economic risks, the most important of which are:

- Investment risks;
- Reducing the level of intensity of production;
- The destruction of economic relations, resulting in excessive growth of speculative mood of the global market;
- Reduction of production capacity, reducing the volume of production, loss of food sovereignty.

In the researching was to determine the effect of volatility factors for the development of agriculture in the Leningrad region and Russia. Approaches to the study of volatility in Russia and recommendations on compensation price volatility in global markets for agricultural producers.

The Productivity Performance of Dairy Chains – A Comparative Analysis Across the Baltic Sea Region

Xavier Irz* & Natalia Kuosmanen

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To explore the competitiveness of the Finnish dairy chain, we analysed its productivity performance relative to that of other countries of the Baltic Sea region: Sweden, Denmark, Germany, Poland, and the three Baltic states. We used partial productivity indicators and indices of total factor productivity (TFP) to investigate productivity growth and productivity levels in both dairy farming and dairy manufacturing, using data from the Farm Accountancy Data Network as well as national industrial statistics.

At farm level, there are enormous differences in the level of labour productivity across the eight countries: a dairy farmer in Denmark produces 13 times more milk than one in Latvia or Lithuania. Labour productivity in Finland is also significantly lower than in the other old EU countries – not only Denmark, the clear leader, but also Germany and Sweden. Further, there is evidence that Estonia is catching up with Finland in terms of labour productivity. A decomposition analysis then shows that the cross-country differences in labour productivity on farms are driven primarily by differences in labour requirements per cow, while differences in milk yields account for a much smaller share of the difference. Thus, the key to high labour productivity in dairy is the farm structure and the adoption of mechanical innovations, while differences in adoption of biological innovations (e.g., genetic improvement, feeds) are relatively less important.

In a second step, a growth accounting exercise indicates that growth in farm-level production in the four older EU members has occurred through different channels, but that TFP growth rates have been roughly comparable from 1995 to 2010. Thus, the competitive position of Finnish dairy farms relative to those in Sweden, Germany and Denmark has not changed greatly over the last two decades. More positively, we find that in recent years (i.e., since 2004), TFP on Finnish farms has grown much faster than on German and Swedish farms. Altogether, Finnish farms appear in the process of raising their productivity to the level achieved by German and Swedish farms, while Danish farms are probably out of reach. Extending the comparison to include the new EU members reveals that dairy farms in those countries are lagging behind Finnish ones in terms of productivity and are not catching up. Although Estonian farms, which are on average relatively large, have recorded impressive increases in yields and labour productivity, this has been achieved more by substitutions of other production factors for labour than real efficiency gains.

The processing level of the Finnish dairy supply chain appears more competitive when benchmarked against the processing sectors of the old EU members, although TFP growth has been slow in absolute terms. However, the productivity of dairy manufacturing in Poland and Lithuania is increasing rapidly and converging towards the levels observed in the older EU countries. Overall, the evolution documented in the paper is consistent with the view that transferring technologies and organisational forms from the productivity leaders to the productivity "laggards" is easier in the manufacturing sector than in primary production, due to the typical difference in the size of firms as well as the more pronounced reliance of the primary sector on country-specific agro-ecological conditions.

Key words: TFP; Productivity; Dairy; Milk; Farm; Competitiveness

Productivity, Efficiency, and Competitiveness of the Danish Farm Sector and their Determinants

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The Danish agricultural sector is highly export-oriented: a very large proportion of Danish agricultural production is exported and the proportion of agricultural commodities in Danish exports is much larger than in other industrialized countries. Hence, the international competitiveness of the Danish farm sector is of high importance not only for Danish farmers but also for the entire economy. However, in recent years, serious doubts about the international competitiveness of the Danish farm arose. Therefore, we will scrutinize the productivity and competitiveness of the Danish agricultural sector and compare it to six neighboring countries. For this, we use Data Envelopment Analysis (DEA) and a comprehensive farm-level dataset from EU's Farm Accountancy Data Network (FADN). The efficiencies of Danish farms are considerably lower than in Germany due to high wages and financing costs in Denmark.

Outlook for the Competitiveness of Nordic and Baltic Livestock Sectors on the EU market

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Several studies suggest that international competitiveness of the agri-food sectors in the Nordic countries is challenged by high production costs as well as restrictions imposed by environmental regulations (e.g. Lind & Zobbe, 2012, Kriščiukaitienė et al., 2012b).

AGMEMOD is an economic data and modeling tool enabling projections of supply balances (production, domestic use, exports, imports and stock changes) for most agricultural products for the EU member states, for the EU as a whole, as well as for a number of potential candidate countries and important trade partners to the EU. The model has been developed by a consortium comprising researchers from 24 of the 28 member states since 2001, and the development project has obtained funding from EU's 5th and 6th Framework Programmes (Bartova et al., 2007, Kriščiukaitienė et al., 2009, 2012a, Sepp & Jedik, 2010, Sepp, 2011). The AGMEMOD is a dynamic, partial equilibrium model consisting of econometrically estimated behavioural equations for land use, crop yield, livestock dynamics, production output, domestic (industrial and final) use, exports, imports, stock changes and commodity prices for a broad range of crop, livestock and dairy products for each of the EU member states. National markets within the EU are linked together through price linkages, with one of the most important member state markets (in most cases Germany or France) working as a 'key market', where a 'key price' is determined in an EU-level equilibrium between supply and demand, and with prices in the member states being linked to this 'key price'. Exogenous drivers of the model include world market prices of agricultural commodities, macroeconomic trends and a large number of agricultural policy variables.

We focus on meat and dairy production in the Nordic (Denmark, Finland, Sweden) and Baltic (Estonia, Latvia, Lithuania) EU member states. In all these countries, livestock - and especially dairy - production constitutes a considerable share of the countries' agricultural sectors, in terms of production and in terms of exports. We use projected production trends as an indicator of the international competitiveness of the different countries' respective agricultural sub-sectors. As these model projections are based on historical data prior to the projection period, not taking e.g. new technological breakthroughs specifically into account, the projections should be considered as "business-as-usual" scenarios, rather than forecasts.

A decreasing trend in the production of milk was projected in Estonia, Latvia, Finland and Sweden, whereas milk production is projected to increase in Lithuania and Denmark, as well as in the European Union as a whole. With regard to pig meat production, Estonia and Lithuania were projected to increase production more than the EU average, and Latvia and Finland were even projected to exhibit negative growth in pig production.

seems to be a general feature across the Nordic and Baltic countries – and this decrease is relatively stronger than in the EU-27 as a whole. Hence, competitiveness of beef from these countries seems to be under increasing pressure in the future. Another general trend is the positive growth rate in the production of cheese in all countries, except Sweden, with

Denmark and Lithuania growing more than the EU-27 average. For other livestock commodities (pigs, cow milk and butter), the picture is more mixed, with apparently increasing trends in Lithuania, Estonia and Denmark, and decreasing trends in Finland and Latvia. For grain production, the three Baltic states were projected to exhibit above-EU average growth, which might reflect that model parameters have been estimated on data from a period with significant technological progress in grain production in these three countries.

Sector-level market projections, such as those in the AGMEMOD model, can provide insights in the overall trends in the competitiveness of different commodity sectors in different countries. Such information can be useful for assessment of the potential needs for adjustments in e.g. agricultural or environmental policies in the different countries. On the other hand, it should also be noted that such aggregated models provide only a limited level of detail, for example in the course of explaining inter-country differences in the trends or heterogeneity in competitiveness across farms.

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The impact of the recent economic crisis on the agricultural production efficiency of 23 European Union Member States

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Abstract

This paper examines the impact of the recent economic crisis on agricultural production efficiency of 23 European Union Member States. Production efficiency, measured in terms of technical efficiency, is the effectiveness of a given set of inputs that is used to produce an output. Owing to climate and geographical location agriculture in European member states is diverse. The economic downturn led by the financial crisis which started in mid-2007, is still prevailing across European member states. Economic crisis along with the existing control of corruption and government effectiveness of the member states are affecting agriculture production efficiency. This study of national level production data for the period 2003-2009 shows that the technical efficiency of all 23 Member States has declined over the years and that it was significantly lower in 2007-09 than 2003-06 for all countries. It is also found that the declining trend in technical efficiency is significantly lower in central and eastern European member states than in the western European member states. The *control of corruption* and *government effectiveness* variables are used to test whether the technical efficiency changes over time with respect to corruption and government effectiveness. The control of corruption shows a declining trend in technical efficiency especially for the western European member states. In this study the expected change in the assumed time period was shown to be significant.

The random effect model in the strongly balanced panel data depicts that in the period of 2007-09 the technical efficiency of the member states declined with 5% level of significance. In the regional dummies it is found that the technical efficiency of the central and eastern European member states declined significantly (1% level) in all years whereas the decline in the western European member states was not statistically significant. That means that the former group of states is being less efficient than the latter day by day, although there is an overall declining trend of technical efficiency across Europe in the period 2007 to 2009. We can claim that this decline may be due to the economic crisis in the whole of Europe.

Although *government effectiveness* is not significant, the *control of corruption* is highly significant at the 1% level. This implies that if control of corruption increases by 1 per cent then the technical efficiency is likely to decline by 0.12 per cent. This in a sense supports the 'grease the wheel' hypothesis which is, if a country increases the control of corruption with high government effectiveness, the technical efficiency of agricultural production is likely to decrease.

Keywords: production efficiency, technical efficiency, control of corruption, government effectiveness, impact of economic crisis, regional disparity, European agriculture

The productivity and predictable profitability of different vegetables influenced by effective microorganisms in Jogeva (Estonia) agro climatic conditions.

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The aim of present investigation was to evaluate the influence of effective microorganisms (EM) on yield of different head and root vegetables crops and to calculate the possible economic profit using this method. Two variants were used: 1 – with activated EM (watered with 1:2000 activated EM solution 4 times during growth season), 2 – without EM (watered with pure water 4 times during growth season), and control. The yield of Chinese cabbage was not influenced by the variant watered with EM solution. White cabbage yield in EM treatment was not statistically different from control. The yield of red beet was higher in EM treatment compared with control. Swede yield in EM treatment exceeded the yield in control variant. Head crops did not give a possible profit in EM treatment, but root crops possible profit was higher in EM treatment. Main conclusions: The yield of head crops was not influenced by EM variant. The yield of root crops was higher in EM variant. The root crops gave also higher predictable economic profit in EM treatment than head crops in the same treatment.

Keywords: economic profit, effective microorganisms, vegetables, yield

A comparison of the Economic framework conditions among the Danish and Dutch milk producers

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In recent years the economic conditions for the Danish dairy farmers have become more challenging due to lower prices of milk products and lower profitability from feeding up calves. At the same time, milk producers have to comply with a comprehensive set of environmental standards and regulation on animal welfare. To better understand the underlying conditions, the Ministry of Food Agriculture and Fisheries initiated a broad study on the economic framework conditions for the Danish agricultural sector compared with other EU member states. In 2011 IFRO, University of Copenhagen finalized a report on the findings from this study.

This paper highlights the findings from a comparative study between the Economic framework conditions among the Danish and Dutch Dairy sector. In principle, the study compares an ongoing modern dairy farm in Denmark with a similar Dutch case farm.

It is based on a partial budgeting approach in the sense that the economic impact of applying the Dutch rules and regulation are imposed to the Danish Dairy farm to see the economic impact of this change. By doing so we compared the potential marginal profit (either positive or negative) from the new rules.

In this study we have specifically compared three framework conditions:

- N application rules
- Fuel and electricity prices/levies and
- Veterinary practice

Findings from this study indicate, that the milk producers to a large extent face the same regulations on fuel and electricity prices in Denmark and Holland although the impact of the regulation may depends on the size of the farm and on farm consumption of fuel and electricity - with large scale farmers being in favor of the Dutch systems and vice versa. The regulation of nitrogen and N-norms are based on the fact that both countries are classified as nitrate vulnerable areas and the rules appear to have the same economic impact on both the Danish and Dutch farms. However, the Dutch rules may be in favor to the farmer on clay soils compared to sandy soils. Finally, the regulation on the use of veterinary medicine and routines with veterinary inspection seems to be more costly among Danish farmers compared to Dutch farmers, which is partly because of a more liberate market of veterinary medicine in The Netherlands.

The adopted method has an advantage in the sense that a direct comparison of the framework conditions are made at a very detailed level on a real farm. However, the results from adapted method will be difficult to generalize to other milk producers in Denmark.

Total Factor Productivity Growth in Estonian Dairy Production in 2004-2011: Comparison of Total Factor Productivity Estimates

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Dairy production has been an important line of production in Estonian agriculture. The value of milk production comprises of 50.70% of the value of livestock production and 23.30% of the value of overall agricultural production. Thou, the share of dairy production in the overall value of agricultural production has been stable during the past two decades, the volume of production has changed considerably. During the end of 1980s production was 1.29 million tonnes of milk, but in 2012 only 0.72 million tonnes of milk was produced. Number of dairy cows has decreased 68.79% over the same period, mainly due to the liquidation of small households. Positive changes have occurred in productivity. In 2012 the average milk production was 7377 kg, which is 103.71% higher compared to the year 1982 when average milk production was 3621 kg.

Productivity has increased mainly due to technology advances, supported by investment subsidies, which accompanied the Estonia's accession to the EU in 2004. Support schemas have mostly favoured larger producers, making them more capital intensive compared to smaller producers. Productivity growth of smaller producers can be explained via the improvement in the level of knowledge and management of production processes. Sipiläinen et al (2009) pointed out that increase in the size and capital intensity of the farm will lead to significant increase in labour productivity. The same trend can also be observed in Estonian dairy farms.

Productivity growth is essential for improved competitiveness. Due to the variations in the efficiency of input use, and productivity levels according to the farm size, there are numerous analysis explaining the phenomena. (Rasmussen, 2010; Coelli ja Prasada Rao, 2005; Headey et al., 2010; Hansson, 2007). Several authors have focused on an issue of farm competitiveness paying attention to efficiency issues of Estonian agricultural producers. (Luik et al., 2011; Vasiliev et al., 2011; Luik et al., 2009; Vasiliev et al., 2008).

Widely used methods in frontier analysis are stochastic frontier analysis and data envelopment analysis. Data envelopment analysis does not assume neither specific functional form of technology nor perfectly competitive markets. Stochastic frontier analysis makes like data envelopment analysis the same assumption that firms cannot produce using the most efficient possible way, saying that there are random shocks beyond the control of producer that affect output level and cause differences from potential output level.

The purpose of proposed paper is to analyse productivity levels and productivity change of Estonian dairy farms during the period 2004-2011 by applying stochastic frontier production model (SFA) and Data Envelopment Analysis (DEA) to estimate efficiencies over time and the Total Factor Productivity (TFP) level and the rate of growth. TFP levels and change are estimated for dairy farms in Estonian FADN database. Balanced panel from 2004-2011 is used. The monetary values have been deflated, using input price indices according to national statistics. Approach used in current study is making use of various methods for total factor productivity estimation. Both data envelopment analysis (e.g. Färe-Primont and Malmquist productivity indices) and stochastic frontier analysis approach are applied for TFP estimation.

Proposed paper has been divided into four parts. The first part deals with the methodological issues, presenting the DEA and SFA methods for total factor productivity estimation. Second part deals with the data and the structure Estonian dairy sector. Third part of the paper presents the evaluation of total factor productivity with DEA and SFA methods with the same

panel data set of Estonian dairy producers. Fourth part of the paper gives discussion on total factor productivity and efficiency issues of Estonian dairy production.

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Improving competitiveness of Norwegian Dairy Goat Farming through disease sanitation

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In 2001 the Norwegian Goat Health Services initiated a program (geithelse.tine.no) to sanitize caprine arthritis encephalitis (CAE), caseous lymphadenitis (CLA) and paratuberculosis (Johne´s disease). The program was justified by the losses due to the diseases. CAE is a virus disease causing a considerable reduction in milk yield, especially in later lactations (Greenwood, 1995; Nord et al., 1998). CLA is a chronic and infectious disease reported in 19 out of 36 herds in Northern Norway (Holstad, 1986). Johne´s disease is caused by Mycobacterium avium ssp. Paratuberculosis (MAP) and has been endemic in goats in southern Norway. From 1967 to 1982, its infection rate was reduced from 53% to 1% due to vaccination (Saxegaard and Fodstad, 1985); however, asymptomatic goats still shed MAP in their faeces (Djønne, 2003). Johne´s disease induces reduced milk yields (Juste and Perez, 2011; Cho et al., 2012) and has been suggested to have a possible association to Crohn's disease in humans. About 14% of the herds were diagnosed free of CLA and Johne´s disease and with less than 10% CAE test positive goats. They were allowed to cull the CAE test-positive goats. Other herds have to sanitize by "snatching" the kids at delivery and raise them under controlled conditions. The herd is slaughtered and hygienic measures are implemented before reintroducing the sanitized kids.

Participating farmers undertake investments and extensive work but have some of their costs recovered. The profitability of participation was calculated as net present value (NPV) of the net cash flow in a stochastic simulation model using Excel and @RISK. Data on costs and revenues were collected from 24 sanitized and 21 control herds. Changes in milk yields and quality were based on studies by Hardeng et al., (2009a; 2009b). Uncertain parameters were mostly modeled as PERT distributions based on information from the farmers or expert opinions. An inflation-adjusted discount rate of 2.8% was applied. The results indicate that participation was profitable over 10 years for quota of 50 000 L (average in 2009) and above, though not without risk of a negative NPV. For smaller quotas or if farmers were to be required to pay all costs, participation was profitable over 20 years. A sensitivity analysis revealed that a key factor was work time in the sanitation year. Anticipating the lower milk price for non-participating herds introduced in 2012, the expected NPV was clearly positive over 5 years for quota above 50 000 L. By August 2012 all farmers had decided to join the program.

The premise for the program is that the sanitation may contribute to more robust and competitive dairy goat farming in Norway. Sanitized goats also have more long lasting lactations; typically peak production comes after 50-60 days compared to 6 days for the control, as well as a better longevity. This enables more stable production of goat cheeses with short shelf life such as "Snøfrisk" (i.e. Snowfresh) and may create a strong basis for industry development. The benefits may be utilized in strategies for competitive food concepts, e.g. New Nordic Cuisine, New Nordic Diet. They can also be utilized in the positioning and promoting of Norwegian dairy goat farming as an industry with particularly good infectious disease status and high animal welfare standards on national as well as international markets.

Keywords: caprine arthritis encephalitis; caseous lymphadenitis; Johne's disease; dairy goats; stochastic simulation; eradication; cost-benefit analysis; strategies; competitiveness

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The relation between agricultural and rural development in Estonia

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The transition to market economy in the 1990s had a severe effect on Estonian rural areas that struggled to adjust to open market economy. While in 1990 there were 130.4 thousand workers employed in agriculture, by 2001 this figure decreased to 28.8 thousand, and by 2010 to 17.2 thousand (Statistics Estonia, 2013). Not all of the lost jobs were replaced by new jobs in rural areas. It has been estimated that the jobs created by secondary and tertiary sector compensated for less than 1/3rd of rural jobs that had disappeared (EMA, 2008). After accession to EU in 2004, Estonian agricultural producers have received increasing amounts of agricultural subsidies. One of the classical justifications for maintaining farm subsidies, have been the argument that farms are the core economic entities in rural areas, and supporting farms entails supporting rural development at large. However, with the changing role of agriculture in rural economy the topic of how do agricultural development and farm subsidies actually affect the overall rural economic development requires attention.

Margarian (2012) has shown that agricultural development can have varying effects on the economic development in rural areas – it may positively affect other economic sectors in rural areas via multiplier and income effects; and also have competition effects for production factors in some regions. In the last case, agricultural support may distort market signals. The level of development of Estonian rural regions has previously been estimated by Omel et al. (2011) who introduced a rural development index as the respective measure. This index was static, represented the situation of 2010, and was composed of five sub-indices: location, population, welfare, economic and land use, on the basis of which the development of local municipalities and their economy were assessed.

In this paper we aim to analyse the relations between agricultural development of Estonian rural municipalities and the development of population, welfare, and economic sub-indices. For this we use the data about agricultural subsidies, land use, and agricultural animals from the registries of Estonian paying agency. Based on this the standard output, agricultural area eligible for agricultural payments and total amount of received payments for each rural municipality are calculated for 2005 and 2012. This gives proxies for the growth of agricultural (standard) output, agricultural subsidies and agricultural land at the rural municipality level. On the other end, the values of population, welfare and economic development sub-indices are calculated for 2005 and 2012. This dataset is used to analyse the relations between agricultural growth (or decline) and rural development.

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Entrepreneurial orientation and farm business performance: The moderating role of on-farm diversification and location

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This study advances research on entrepreneurial orientation (EO) in the farming sector by examining how the configuration of on-farm diversification and location shapes the relationship between EO and farm business performance (archival financial performance and self-reported non-financial performance). The empirical study was developed using a sample of 400 farms included in the Norwegian Farm Business Survey. The proposed hypotheses were tested using hierarchical moderated regression analysis. As hypothesised, we found a positive relationship of EO with non-financial performance. Other hypotheses were not confirmed. Surprisingly, EO showed a negative relationship with financial performance. The interactive effect of EO and on-farm diversification on financial performance was negative, while other two-ways effects were insignificant. Configurations of EO, diversification and location did not account for performance differences among farms. Overall, these findings suggest that rather than having an orientation of innovation, risk taking, and proactiveness (a high EO), farm business performance might be improved by a more inwardly focused orientation towards efficient production by increasing managerial ability.

Investment plans of Estonian rural enterprises for the next 7 years: a comparison of primary, secondary and tertiary sector

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One of the characteristic of on-going change in rural areas is the diminishing weight of agriculture in rural economy and as the provider of jobs (OECD, 2006). In Estonia the changes have been especially rapid as after the re-establishment of private farms in the 1990ies after the collectivised agriculture of Soviet era a considerable number of agricultural jobs were shedded fast as most of farms lacking financial and human capital had difficulties in adjusting in new economic conditions (Viira et al., 2009). In the 1990ies Estonia implemented free market philosophy, rapid privatisation and reforms (Smallbone, Welter, 2009). However, with virtually no subsidies available for the farms before the EU accession, this resulted in a considerable lag in agricultural investments, especially as the agricultural producers had hard time in attracting external capital because of the on-going decline of agricultural production and problems. After the EU accession the subsidies that became available have been an important source for financing investments in agriculture. The effect of the availability of large-scale investment subsidies could be clearly observed in the growth of fixed assets of agricultural enterprises (Nurmet, 2011). At the same time there is little support available for Estonian non-agricultural rural enterprises that have been also struggling after the onset of the economic recession in 2008. Tertiary sector has become the main provider of jobs in rural areas and in Estonia tertiary sector accounts for half of the rural enterprises as the share of primary sector enterprises has diminished to a third of rural enterprises (SOE, 2013). As the rural economy has changed, the investments plans and problems of the secondary and tertiary sector in comparison with primary hold much importance as they affect the economic development of rural areas more than ever.

For enterprises the investments are necessary factors for modernization, development, and increasing the competitive position on the market (Zawadzka et al 2012). The decisions on financing those investments using external funding or internal funds are affected by the availability of those funds, the risk aversion of managers etc. Increase in financial leverage means greater vulnerability to bankruptcy and larger expected bankruptcy costs would in turn imply lower financial leverage (Ozkan, 2001). The theory of financial hierarchy (Myers, Majluf,1984) predicts that managers will follow a pecking order, where the internal funds are most preferable for the enterprises, then the use of loan capital, and finally the equity (Baker, Wurgler, 2002).

The aim of the present paper is to study the investment plans of Estonian rural enterprises for the next 7 years and the sources of financing the investments. The data used in the analysis was collected with the questionnaire survey "The Rural Enterprises' Situation, Development Trends and Need for Support" (2012) among Estonian enterprises registered in rural municipalities and in towns with less than 4000 inhabitants. 1825 enterprises responded to the survey: 32,5% were primary sector enterprises by their main activity, 34,6% secondary sector and 32,9% tertiary sector enterprises. In the survey the enterprises were asked about their investment plans for the next 7 years: which kind of objects they need to invest in and which sources they plan to use for those investments (equity, loan, supports, investors etc). In the analysis enterprises investment plans and preferences in using financial leverage for specific investments are compared in order to study the needs and challenges faced by different sectors.

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The influence of diversification on long-term viability in the European Agricultural Sector

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Diversification of farm businesses outside of what may be viewed as conventional agriculture is strongly promoted in the European Union's rural development policy, and therefore various policy measures related to this has been developed (Council Regulation (EC) No. 1698/2005). Indeed, supporting farmers to use their under-exploited or sometimes even idle agricultural resources in new ways in order to obtain revenue is seen as a strategy to encourage diversification of rural economies and thereby a means to accomplish goals concerning economic growth in rural areas, create job-openings and encourage in-migration. Farmers seem to have largely responded to the calls of policy makers; for instance in a 2000 – 2007 longitudinal study of a sample drawn from about the 40% largest farms in Sweden 68-75% of the sample reported revenue originating from activities such as renting out of equipment and buildings; and contract work (Hansson et al. 2010). These activities constituted between 12.3-15.2% of total revenue of the reporting firms, and are thus considerable share of total revenue. There is some evidence to suggest that this high uptake has been replicated in other European countries (ref).

A review of the scientific literature related to farm diversification shows that there has been a considerable interest in the phenomenon, especially during the last two decades (e.g. Ilbery 1991; McNally 2001; Chaplin et al. 2004; Gorton et al. 2008; Barbieri & Mahoney 2009; Maye et al. 2009; Vik & McElwee 2011; Hansson et al. 2012; Hansson et al. 2013). In particular, researchers have been interested in its determinants; and farmers' underlying motives for diversifying their farm businesses outside conventional agriculture. There has also been a significant interest in the different types of incomes (off-farm employment and other business-holdings) of the farm family, i.e. the so called pluriactivity of the farmers and his/her family (e.g. Alsos et al. 2003; Serra et al. 2004; McNamara & Weiss 2005; Lagerkvist et al. 2007).

While the knowledge produced by previous is truly essential for the formulation of successful policy, the underlying logic of the policy seems hereto have been largely taken for granted. This means that the hypothesized positive relationship between farm diversification and the favorable economic situation of the farm business, has, to the best of our knowledge, not received attention in the scientific literature. There has been some interest in how the degree of specialization in the major farm enterprise affects the technical efficiency of farms (e.g. Brümmer et al. 2001; Hadley 2006; Hansson 2007, Barnes et al., 2011), where findings have consistently shown a negative impact of specialization on technical efficiency, lending some support also for a negative relationship between specialization and the economic results of the farm. Although this lends support in favor of the economic development associated with farm diversification, its existence cannot be taken for granted.

Accordingly, the aim of this study is to assess the impact of farm diversification on the economic outcome of the farm business. This is considered in terms of the financial viability of the farm (Vrolijk et al., 2010) which relates the farm cash income to the minimal agricultural wage and thereby considers how well the farm business can generate income,

something that should be a pre-requisite for rural economic growth. Furthermore, since the definition of farm diversification is based on what is considered conventional farming, and is thus by large empirically, rather than theoretically driven, we also assess how diversification of conventional agricultural enterprises of the farm business affects the viability of the farm. Diversification in this sense may also contribute to the positive economic development of rural areas, for instance through its obvious positive effects of risk reduction. However, the strong policy interest in farm diversification outside conventional agriculture motivates us to keep two separate definitions of diversification in this article. The study is based on empirical evidence from two longitudinal datasets (2001-2011) of farms registered in the in Farm Accounting Data Base in Scotland and in Sweden, and thereby also contributes a valuable bilateral analysis of farm diversification and its effect on farm viability.

Keywords: diversification, FADN Scotland, Sweden, viability

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The impact of parcel structure on the efficiency of Finnish dairy farms

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In northern Europe, milk production is concentrating on larger, more capital-intensive units to improve the competitiveness of the sector. Enlarging dairy farms often face the problem of additional fields being located far from the farm compound and only small parcels are available on the market. Milk production has a twin tied relationship to arable farming as fields produce feed to the animals and serve as a manure spreading area. In this study, a stochastic production frontier model was developed to estimate the technical efficiency of dairy farms focusing in particular on the impact of parcel structure. In the analysis, FADN data of Finnish dairy farms complemented with information on parcel structure over the years 2000–2009 were used. The mode interval of technical efficiency was 80–89%. The overall average technical efficiency score was 79% with a standard deviation of 12%. During the research period, a small improvement in efficiency was detectable. Moreover, the effect of parcel distance and parcel size on the efficiency of an average farm was simulated. We found that increasing distances and smaller parcel sizes explained inefficiency significantly. Therefore, efforts which are made to improve parcel structure are justified. The tightening of environmental restrictions, such as increasing slurry spreading area requirements, increases these efficiency losses and might restrict the productivity development of dairy farms.

Keywords: Milk production, Structural development, Parcel structure, Technical efficiency

Factors influencing financial performance of sheep farms in Norway

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In an increasingly competitive environment there are great demands on sheep farmers to operate more efficiently. The wide variation in farm profits has been well established. Less is known about what characterises those sheep farmers who fare well and what a farmer actually can do to improve farm practises and financial performance. This study examined the following research questions: Which factors contribute to the diversity in financial performance among sheep operations, and to what extent are those factors under the control of farmers?

Farms were grouped into high-, middle-, and low-one-third profit to identify factors that characterises top performing farmers. Regression analysis was further used to examine the relationship between performance and farm(er) characteristics. Data were drawn from the Norwegian Farm Business Survey (FBS). Average figures of the three years 2007-2009 for 72 specialised sheep farms were analysed. A mail survey to the FBS farmers in the spring of 2009 supplemented the records (60% response rate).

Average output of meat was 27.3 kg/ewe, from a herd size of 135 ewes that used 0.16 ha/ewe of farmland and 18.1 labour h/ewe. Average gross revenue was NOK 3746/ewe, of which various government farming payments contributed two third. Total costs (excluded unpaid labour) were on average NOK 3152/ewe, of which variable costs accounted for a quarter. This left a return to unpaid labour of NOK 593/ewe or NOK 51/hour.

There was wide variation in performance, with the top third (ranked by profit per unpaid hour worked as well as per ewe) of farmers returning am average profit of NOK 119/hour (NOK 1322/ewe) compared to a loss of NOK 9/hour (NOK 180/ewe) for the bottom third. The top third (as measured by hourly return) operated larger herds (+72 ewes), achieved higher meat output (+4.5 kg/ewe), kept fixed costs at a lower level (NOK -1130/ewe) and used less labour input (-8 h/ewe) than the bottom third. Machinery costs represented the largest share of the fixed cost difference. Forage yields, variable costs and socio-economic factors such as non-financial farming goals, education and background were similar across the groups. The bottom third was however more prone than others to trust advice from farm machinery and building merchants. Those who managed to achieve high yield/ewe, but reported a relatively high labour input/ewe, performed better when farms were grouped by economic return/ewe.

Regression analyses indicated that economic returns increased as herd size increased, but herd size only explained a small part of the variation in the profitability measures. Larger herds were more profitable when measured per hour than per ewe because labour input decreased as herd size increased. Cost items favouring larger herds most were administration, insurance and electricity. Government farm payments that benefit smaller herds most were largely offset by higher revenues/ewe of meat and livestock sales in the larger herds. No significant relationship was found between output of meat and the hourly return to unpaid labour, due to the higher labour input required to produce more meat/ewe. Farmers with a long ownership period achieved higher hourly returns, whereas married/cohabiting farmers achieved higher returns/ewe than single farmers. The study suggests that tight control of fixed costs and efficient use of labour are more important than top animal performance to achieve high farm profitability.

The economic effect of different framework conditions – a comparison of UK and DK arable crop production.

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The presented study was conducted as part of a reference study on the economic framework conditions for the Danish agricultural sector compared with other EU member states , initiated by the Danish Ministry of Food Agriculture and Fisheries. The study was finalized and reported by IFRO in 2011.

Based on an international benchmark analysis it was found that the increase total factor productivity in DK agriculture is lacking behind the EU average since year 2000. It was found that the arable crop production sector had a high technical productivity, but due to factors like high labor and capital cost the overall economic efficiency is only at medium level.

This is illustrated by further national comparative analysis of arable crop production in DK and UK (group 1 north), IT (group 2 south) and BL (group 3 east) .

Finally GB was selected as the "farm level" case study due as the similarities between UK and DK.

The presented study aims to assess the economic effects of different framework conditions at farm level for DK and UK. The method used was to compare two "similar" UK and DK arable farms with the same crop rotation and farmed area , (approx. 770 hectares).

As a first step the DK arable farm were described in detail regarding technical and economic performance. In the next step selected relevant UK regulations were imposed on the DK farm and the economic effect were assessed.

The following regulatory issues were selected for the further analysis based on their expected economic effect at farm level:

- Nitrogen regulation
- Pesticide regulation (taxes and available products)
- Catch crops
- Regulations for application of animal manure
- General environmental regulation

The differences in Nitrogen regulation and Pesticide regulation were found to have the major economic effects.

Increasing Estonian milk production to one million tons by 2020 – necessary market preconditions and potential spill over effects to grain and meat markets

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Dairy has historically been an important sector in Estonian agriculture and food industry. One of the strategic goals of Estonian Milk Strategy 2012-2020 is to increase milk production by 1/3 in 2012-2020. The aim to significantly increase milk production is in line with the abolition of the EU milk quotas in 2015. However, liquidation of milk quotas is a further step in the process of milk market liberalisation in the EU. Therefore, it is obvious that favourable market situation is a precondition for significant increase in Estonian milk supply. Another issue that arises with increasing milk production by 1/3 is related to potential spill over effects on other agricultural sectors. Increasing milk production increases demand for forage and feed grains, therefore potentially having effects on the demand for agricultural land. In order to increase milk supply by 1/3 in eight years, milk herd should be increased. Increasing dairy herd has a positive effect on beef supply (increasing number of culled cows and young bulls), which could potentially have effects on Estonian beef market.

Therefore, in this paper we aim to: 1) analyse the necessary market conditions that would imply increase in Estonian milk supply by 1/3 by 2020; 2) the potential spill over effects of increasing milk supply on crop production and beef market. Two models are employed in the analysis: 1) a FAPRI-GOLD type partial equilibrium market model of Estonian dairy, grain, oilseeds and meat market; 2) a mathematical programming model of Estonian food self-sufficiency.

Partial equilibrium market model of Estonian agriculture is used to make baseline projection of Estonian milk production in 2014-2020. Based on the difference of baseline projection and aimed one million tons in 2020, a scenario is developed that drives Estonian milk production to one million tons in 2020. This scenario represents necessary market conditions for increasing milk supply. The projections of scenario also provide projections for cereal and beef production, therefore providing for information about the spill over effects.

Mathematical programming model of Estonian food self-sufficiency is used in analysing the spill over effects of increasing milk production of the feed demand and beef supply.

Productivity and competitiveness in a protected agriculture

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Aggregate data shows that total factor productivity (TFP) in Norwegian agriculture increased by approximately 1.6% per year from 1990 to 2009 (Hegrenes 2011). This seems to at the same level as TFP growth in Norwegian manufacturing industries (Statistics Norway 2013) and agriculture in other countries (se e.g. Ball et al. 2013).

Large parts of Norwegian agriculture are protected from import competition by relatively high import tariffs and are also supported via relatively high direct subsidies. Output prices and support are to a large extent settled in annual negotiations between farmers unions and the government. The agreed output prices are called "target prices" (målpriser). Roughly speaking, a target price on a commodity is the maximum average price the relevant agricultural marketing cooperative, in its role as market regulator, can obtain from the market. Import tariffs are not a part of the annual negotiations, but it is a precondition for the agreement that the government sets tariffs in a way that makes it possible to obtain the agreed prices.

In the presentation I will discuss how productivity growth can be expected to be distributed between farmers and the rest of society under some market conditions. This will include a discussion of how productivity growth has been taken into account in the annual negotiations on prices and support, and I will show that the agreed prices and support are means of distributing the gains from productivity growth.

In the presentation I will also discuss how competitiveness towards import competition is influenced by productivity growth under a system of subsidies and tariffs.

Keywords: productivity, subsidies, import protection, competitiveness

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The production and consumption of animal welfare: Do economic incentives matter?

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Using animal welfare as an example we discuss how the economic incentives of producers and consumers are affected by intangible factors imposed by the food and other forms of legislation. We have chosen to focus on animal welfare attributes although many other intangible attributes such as food safety, minimum quality standards and traceability are embedded in the legislation. Our discussion concerns especially the following questions: Do animal welfare standards relate to producers economic performance? Do animal welfare standards influence consumers' willingness to pay for such attributes? Do producers and consumers have any common economic incentives to increase or decrease animal welfare standards?

The impact of animal welfare on producers economic incentives have been investigated in a recent study focusing on the empirical relationship between animal welfare and economics among pig producers in Denmark. We apply data from the inspection of the animal welfare legislation at Danish pig farms. The economic analyses consist of three parts. The first part presents results of descriptive analyses where possible correlations between economic variables and the constructed indicators of animal welfare are investigated. The results show that farm size and experience are uncorrelated with animal welfare. Good animal welfare on integrated pig farms is correlated with having higher gross margins per pig unit, despite also having significantly higher medicine and veterinary costs per pig unit. Good animal welfare on specialized slaughter pig farms is correlated with having low medicine and veterinary costs per pig unit.

The second part provides results of regression analyses which generally confirm the relationships found in the descriptive analyses; however the number of identified significant correlations is smaller in the regression analysis than in the descriptive analyses. In the third part method of econometric analysis of technical efficiency is used to investigate the relationship between animal welfare and technical efficiency of Danish pig producers. Results show that farms with good animal welfare management are on average more technically efficient.

The appraisal of competitiveness and innovation in Estonian food industry in relation to investment subsidies

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The food industry, which is based on processing of agricultural production is an important economic sector in Estonia. Since 2004, food industry has given 16-19% of the total output of processing industry (Statistics Estonia, 2013). The secondary sector plays an important role in the Estonia national economy and employment.The most important branches of Estonian food industry are dairy, meat and fish processing. Due to the link with the primary production, food industry is also important for the employment in rural and peripheral areas.

Toming (2007) has shown that in general, the competitiveness of the Estonian food industry has increased as a result of accession to the EU. The impacts are first related to the trade policy, especally from the point of view of the Estonian dairy industry.

Second set of impacts is related to structural modification and modernisation of the food industry. Since accession to the EU in 2004, Estonian food industry has gained access to investment subsidies. Large investments had to be made into modernisation of processing in 2001-2006 in order to bring food industry into compliance with food safety requirements (EMA, 2008).

Since 2007 food industry investments have been subsidised from the measure "Adding value to agricultural and non-wood forestry products" of the Estonian Rural Development Plan (RDP) (EMA, 2010). The overall objective of the measure is to enhance the competitiveness of the food industry. As of 31 December 2012, the aid has been approved for 109 companies and their 156 applications in the total amount of 51.1 million euros (Mõtte, 2013). The aimed result of these subsidies is competitive enterprises, where food safety, low level of negative environmental externalities, good level of animal welfare, a well trained workforce and good working environment are the main factors in its development.

Numerous studies affirm that investment in new technology affect structural and economic performance through effects on capital and variable input use (Latruffe, 2010). During the ongoing evaluation of the RDP 2007-2013, in 2009 and 2011 we have carried through socio-economic surveys in the sample of subsidised companies focusing on evaluation of their competitive strength.

The aim of this study is to provide an empirical analysis of competitive factors and innovation substance in the sample of food industry companies that have received investment subsidies under RDP 2007-2013. The dataset necessary for the study has been collected from the 2007-2012 annual financial reports of Estonian Business Register. Second dataset is based on the socio-economic surveys of food industry companies in 2009 and 2011. Comparing the evaluations given by the managers of food industry companies in 2009 and 2011, and the economic results of 2007-2012, we aim to analyse, what were the consequences of the latest economic crisis (2009) from the food industry's competitiveness and investments aspects, and assess the role of investment subsidies in the innovation and investments in the food industry.

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Influence of the practical production management on the technical efficiency of pig farms in Sweden.

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Swedish pig industry is undergoing a structural reorganization, where emergence of bigger but fewer farms occurs (SCB 2010). It should be essential for the pig industry to understand why some farms are more efficient than others. By undertaking a cost analysis of the individual pig farms we could identify opportunities for farmers to increase their profits and be more efficient in their business operations.

We have carried out an interdisciplinary study with the objective of determining how production parameters affect the efficiency of pig farms in Sweden. Using the non-parametric data envelopment analysis (DEA) technique on data obtained from the Farm Economic Survey (JEU years 2002 – 2010) we have found that profitability of pig farms is varied across the sector. We have established rankings of farms, identifying the more efficient ones and estimating the efficiency coefficients for the others. Farms were divided in three categories based on their main production to slaughter pig, small pig or integrated production. Preliminary results of average technical efficiency indices in a DEA model are 79,50%, 77,96% and 71,83% respectively. To make our study complete, we will perform a multidirectional efficiency analysis in order to establish which production factor is more problematic as well as regression analyses to identify which of the practical managerial practices have effect on efficiency of pig farms. More specifically, we will concentrate on production variables in the area of 1) animal care management practices and their compliance, 2) animal health and hygiene practices and their compliance, 3) use of box and housing systems and 4) use of the expert advisors in practical production questions. We have obtained the data for the second step partly from JEU and mostly from a questionnaire distributed to 138 farmers (response rate 63%) that participated in Farm survey in year 2010 and had income from pig production.

Productivity Growth in Estonian Dairy Production: Comparison of Total Factor Productivity and Agricultural Terms of Trade

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The purpose of proposed paper is to analyse aspects of competitiveness of Estonian dairy production during the period 2004-2011. Analysis provides an insight to competitiveness through the productivity, making use of comparison of total factor productivity and agricultural terms of trade. Index numbers approach is used to estimate total factor productivity. For describing the structure of producers, data from EU database FADN is used. Färe-Primont (2003) productivity index is estimated for dairy farms in Estonian FADN database. Balanced panel from 2004-2011 is used. Distinction between the sizes of the farms is made. The monetary values have been deflated, using input price indices according to national statistics. The agricultural terms of trade is defined in two ways: (i) as the ratio of the agricultural wholesale price index to the industrial wholesale price index, and (ii) as the ratio of output and input prices in dairy sector.

Agricultural terms of trade are an important issue not only in developing countries, but also in developed countries. There is a special case to be noted about transition economies where the role of agriculture has declined considerably since the start of transition. According to Timmer (1988) agricultural terms of trade plays a major role in capital accumulation, intersectoral resource / labour mobility and economic growth and has implications for equity and welfare of the rural people at various stages of transformation of an economy from a predominantly agricultural to an industrial one.

In the period from 2004 to 2011 there are only minor changes in TFP levels. There is slight increase in TFP in 2009 following by the decrease in the next year. But the level of TFP increases towards the large farms. When input prices are increasing, the technology choice will greatly influence the competitiveness. Farms with higher levels of productivity should be less vulnerable to input shocks. Small farms with lower productivity levels have their terms of trade deteriorating.

Agricultural and industrial prices have shown rising trend during the period of investigation. There have been considerable fluctuations in agricultural prices compared to industrial prices. Due to fluctuations in food prices there have been considerable fluctuations in agricultural terms of trade as well. Despite of short period of investigation one can conclude high degree of volatility in agricultural terms of trade. Proposed paper concentrates to the competitiveness issues of dairy farms and defines terms of trade at farm level as the ratio of output and input prices. Costs in agricultural production tend to appreciate at a faster rate compared to the agricultural prices. To cover this, farmers have increased their output for every unit of input. Declining terms of trade have to be offset with productivity gains.

Proposed paper has been divided into four parts. The first part deals with the methodological issues, presenting the Färe-Primont productivity index as a tool for describing productivity levels and productivity change. Second part deals with the data and the structure of production factors. Third part of the paper presents the evaluation of total factor productivity in Estonian dairy production according the size of the far.. Fourth part of the paper gives discussion on competitiveness issues of Estonian dairy production. Trends in total factor productivity and terms of trade will be discussed.

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Accounting for inter-group productivity differences among conventional, transitional and organic farms in Sweden

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A multilateral panel data index approach is used to account for productivity differences between conventional, transitional and organic farms in Sweden. To do this, three alternative productivity measures (land, labor and total factor productivity) are considered, which explicitly accounts for inter-group productivity differences. The resulting farm-level productivity consists of three components: the first one reflects intra-group productivity differences; the second one concerns productivity differences between the average farm of the group that the farm belongs to and the average farm in the sample; and the third component captures productivity growth of the average farm in the sample. These three mutually exclusive components provide a natural decomposition of a farm-level productivity index and provide the basis for our empirical analysis as we examine if and to what extent the contribution of each of these components differs among the three groups of farms (i.e., conventional, transitional and organic). The empirical results are based on growth accounting and detailed farm-level data on inputs and outputs from the Swedish Farm Accounting Data Network (FADN) for the period 2001-2011.

Input-saving possibilities and practices contributing to more efficient beef production

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The beef sector in Sweden is facing challenges to develop. Compared to the other agricultural specializations, Swedish beef production is the most heterogeneous in the economic benefit obtained by the farmers (Manevska-Tasevska et al., 2013). Although the demand for beef meat in Sweden is constantly increasing (the average increase of the beef consumption during the last five years is around 5% per year (SCB, 2013)), Swedish beef production tends to decrease on average by 1% per year (SCB, 2013). An important reason is the low profitability in the sector; average gross margins of the Swedish beef producers are among the lowest in EU, both with and without considering the coupled payments (European Commission, 2013). The decrease of grazing livestock may cause market, social and environmental changes, resulting in lower employment in the sector, and difficulties for preservation of biodiversity in Sweden, aspects which could both be positive side effects of beef production in Sweden.

The necessity for finding economically sustainable systems (Salevid and Kumm, 2011) and technological improvements (Salevid and Kumm, 2011; Manevska-Tasevska et al., 2013) have been emphasized to be crucial for further development of the sector. In the literature, farm efficiency of the beef producers is generally rarely explained, with a focus on the utilization of labour (Bostad et al., 2011) or the influence of the Common Agricultural Policy (CAP) (e.g. O'Neill et al., 2002; Gaspar et al., 2009; Latruffe et al., 2009; Manevska-Tasevska et al., 2013).

This study provided details on the relative possibilities for costs savings and improvements in the use of production inputs, at Swedish farms specialized in beef production. Furthermore, the study explored how factors such as farm structure, capital use and geographical conditions can lead to more efficient utilization of the production inputs and consequently to higher production and environmental benefits of the Swedish beef producers. The efficiency in the use of production inputs was measured with a multi-output multi-input function, employing the non-parametric distance function analysis, in an input orientation. For a comparison the radial distance function (RDF) approach (Shephard, 1953) and the generalized directional distance function (GDDF) (Cheng and Qian, 2010; Cheng and Zervopoulos, 2012) were employed. This study provided evidence for differences in the results, and discussed benefits of specific model choice (RDF vs. GDF). The study utilized data from the Swedish Farm Accounting Data Network (FADN) (2008-2011).

The premise in this study is that efficiency analyses of farms specialized in beef production would contribute to our understanding of how beef production can be encouraged from a policy point of view to contribute to improved production and therefore to societal goals about rural employment, biodiversity and reduced environmental impacts.

Keywords: beef farms, distance functions, efficiency, FADN, Sweden.

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