Farmer strategies to manage market uncertainty: commodity-level analysis and critique

Damian Maye.,[a] James Kirwan.,[a] Hannah Chiswell.,[a] Mauro Vigani.,[a] José Muñoz-Rojas, J.,[b] Erik Mathijs.,[c] Isabelle Bonjean.,[c] Martin Hvarregaard Thorsøe Thorsoe.,[d] Egon Noe.,[e] Susanne Von Münchausen.,[f] Mikelis Grivins.,[g] Pierre-Marie Aubert.,[h] Piotr Nowak.,[I] Francesca Minarelli, F.[j]

[a] CCRI-University of Gloucestershire, UK (dmaye@glos.ac.uk; jkirwan@glos.ac.uk; hchiswell1@glos.ac.uk; mvigani@glos.ac.uk)
[b] ICAAM-Universidade de Évora, Portugal 'jmrojas@uevora.pt)
[c] KU Leuven - University of Leuven, Belgium erik.mathijs@kuleuven.be; isabelle.bonjean@kuleuven.be)
[d] Agroecology-University of Aarhus, Denmark (martinh.thorsoe@agro.au.dk)
[e] Centre for Rural Research, South Denmark University (enoe@sam.sdu.dk)
[f] HNEE-Eberswalde, Germany (Susanne.vonMuenchhausen@hnee.de)
[g] Baltic Studies Centre, Latvia ('mikelis.grivins@gmail.com)
[h] IDDRI, France (pierremarie.aubert@iddri.org)
[i] Jagiellonian University, Poland (piotr.nowak@uj.edu.pl)
[j] University of Bologna, Italy (francesca.minarelli@unibo.it)

Abstract. *There is growing recognition that agri-food commodity markets are moving increasingly towards market-focused arrangements. In some sectors (e.g. dairy) we have already seen the development of new contracts (e.g. between farmer groups and processors) and various risk management-type strategies. Agricultural markets have always been characterised by uncertainty and contracts are by no means new forms of market practice. Nevertheless, proposed changes to CAP support post-2020 and national-level policy support strategies suggest that agricultural sectors are likely to become more market-orientated in the future, with much less state intervention. There is a need then to understand contracts and other tools and strategies that can enable producers in different sectors to manage market uncertainty and price volatility. Against this context, this paper draws on case study data from three commodities (dairy, arable and fruits) in different European regions to examine and compare strategies emerging to manage uncertainty and other business risks. The analysis adopts a farmer perspective and shows how forms of contractualisation, collective action, the use of market data, futures and other risk management schemes are perceived and in some cases actions at the food chain level. The paper problematises what is meant by 'strategy', especially at a farm level, given the multi-level nature of institutional arrangements, which includes complex arrangements between banks and supply chain actors. Understanding strategies as dynamic socio-material properties is therefore essential.*

Keywords: *market and regulatory conditions; farmer strategies; institutional arrangements; dairy farming; cereals farming; fruit orchards; SUFISA*

Context

Analysis of the regulatory space governing agricultural commodities is prominent in agricultural economics and new institutional economics but it has not featured much within agricultural geography and rural sociology since the late 1990s (e.g. Banks and Marsden, 1997). This is a significant lacuna in agri-food systems research, especially if we consider the rapid processes of restructuring that agricultural sectors now face. A cursory analysis of agricultural census data quickly reveals, for example, patterns of socio-spatial change at farm level that for most sectors (e.g. pigs, poultry, dairy, cereals, horticulture) indicate greater concentration and specialisation of production, although not to undermine that farming can also be ordered in different and often contrasting 'sytles' (van der Ploeg and Ventura, 2014). Moreover, processes of agricultural restructuring are connected increasingly to wider market and policy ruptures that farmers and other primary producers face. In short, we are moving increasingly towards more market-focused agricultural policy; risk management is central to this too (Veerman et al., 2016). The 'Milk Package', for example, was introduced in 2012 to provide a long-term future for the dairy sector after milk quota was abolished; this has encouraged the development of a 'contractual economy' e.g. written contracts between farmer groups and processors (Derville and Allaire, 2014).

Knowledge of how farmers perceive market and regulatory issues and respond to them is not so well understood, beyond general assumptions and behavioural modelling work. In response, this paper presents qualitative analysis of farmer strategies and their capacity to respond to and manage market and regulatory issues. It examines strategies at a farm-level and related modes of food chain governance and emerging institutional arrangements (cf. Martino et al., 2017). Agricultural policy – at European and national levels – is aware of new market regulatory dynamics and their potential impact, especially recognition that less intervention increases agricultural sectors susceptibility to changes in international markets. This awareness is partly a consequence of farmer protests and increasing lobbying pressure from farmers' unions and other farming representatives who are keen to improve contract arrangements to enable farmers to achieve a fairer price for their product.

The *Improving Market Outcomes* report (Veerman et al., 2016), which was written by the Agricultural Markets Taskforce, is a useful reference point in this regard. It recognises that agriculture is fraught with uncertainty, that agricultural production has limited flexibility, and that the CAP has become more market-orientated (i.e. less management of markets, as epitomised by the phasing out of milk quota). With less policy intervention farmers are more exposed to market instability and increased price volatility. The report makes a series of useful recommendations for the food chain in terms of the types of market-orientated agricultural policy tools that should be developed as mechanisms to help farmers manage market uncertainty. The recommendations can be summarised as follows (ibid., 13-47).

- *Increase market transparency* (limited price information downstream – i.e. information asymmetry – creates mistrust, especially in relation to price transmission and the distribution of added value; there is a need for better market data that farmers can understand).
- *Risk management tools* (e.g. insurance schemes, futures markets; uptake of such tools by farmers has been modest to date; recommends their mandatory inclusion as measures in RDPs).
- *Futures markets* (potentially important risk management tool; used as a means for hedging, price discovery; futures contracts; recommends more awareness-raising and training measures).
- *Unfair trading practices* (voluntary measures have been useful but they still don't address the 'fear factor'; recommends that EU level framework legislation be introduced).

- *Contractualisation* (to rebalance bargaining power; absence of written contracts can be a disadvantage so recommends farmers should request this under EU rules, complimenting the CMO regulation; also ex ante value sharing mechanisms via collective negotiations).
- *Producer co-operation* (collective action via Producer Organisations (POs), inter-branch organisations; regulatory confusion regarding collective action by producers with clarification needed regarding competition law).
- *Access to finance* (agriculture is risky in the world of financing, with entry barriers for non-specialised banks/institutional lenders; young farmers, small farmers and producer groups are the most affected; need more measures to facilitate access to finance, including targeted financial instruments).

This is a European-level debate – designed to inform considerations for the CAP after 2020 (see EC DG Agriculture and Rural Development, 2017, for example) – but the general themes highlighted (e.g. contractualisation, futures markets) are highly relevant to all market-orientated agricultural markets and researchers interested in organisational forms emerging in the European agri-food sector (Martino et al., 2017) and more widely, including the emergence of horizontal structures and associational contracts (Grandori, 2015).

Against this policy and academic context, this paper examined emerging farm-level strategies that respond to market and regulatory issues across three key European agriculture commodity sectors: dairy, wheat and fruits. These data, collected for the SUIFSA project, examine and compare strategies within sectors and across regions to manage uncertainty and other business risks. The analysis presents a farmer perspective of the issues and 'ground truths' the recommendations set out in the 'Market Outcomes' report (Veerman et al., 2016), albeit in a general sense and not addressing the more specific regulatory aspects of the recommendations. In short, what strategies do producers themselves employ to manage market and regulatory uncertainty and what do they view as the key market and regulatory risks? Such analysis is designed to inform future debate about risk management options / governance modes (Martino et al., 2017) by accounting for farmer-orientated sector-level regional political economy differences.

The rest of the paper is structured as followed. First, we summarise the way the SUFISA project has conceptualised market and regulatory relationships as 'institutional arrangements' and outline the qualitative methods applied to examine these dynamics from a farmer perspective. Second, we present a summary of the key regulatory and market conditions and emerging strategies identified by producers across dairy, arable and fruits respectively. Finally, we identify common themes that emerge from the commodity-level analysis of emerging arrangements and strategies, especially in terms of their potential to enhance the position of farmers in the food chain (cf. Grandoir, 2015; Veerman et al., 2016).

Approach and methods

This paper emerges out of work undertaken as part of the SUFISA project. SUFISA examines the impacts of market and regulatory conditions across a range of commodities (including arable, dairy, various fruits, meat, wine, fisheries and aquaculture), at a regional, national and international level. The project covers 11 European countries: Poland, Serbia, Latvia, France, Belgium, Germany, the UK, Denmark, Greece, Italy and Portugal. In total, 22 case studies have been conducted, with each of the 11 partner countries covering two case study regions and two commodity sectors for in-depth analysis. The case studies examine different primary producers, including young farmers and fishers, new entrants, small/family enterprises, and producers with high capital requirements. For the purposes of this paper we focus on three commodity groups: dairy, arable and fruits. These three commodities are the main commodity clusters studied in the project and they represent key sectors in terms of

European agriculture. The commodity cluster, including the countries and regions studied, are introduced in more detail in the next section of the paper.

The analysis of market and producer conditions and producer strategies emerging to respond to them is conceptualised in terms of 'institutional arrangements' (IAs) (Bonjean and Mathijs, 2016). IAs can be formal (contract, written agreement, law, etc.) or informal (norms, trust, reputation, etc.) arrangements; they incorporate the network of relationships leading to the production and delivery of agricultural products and combine market arrangements (which may involve vertical and/or horizontal coordination between actors) with public requirements and incentives (e.g. subsidy requirements, cross-compliance, food safety laws). Horizontal co-ordination involves collaboration among farmers at the same level of the supply chain. In other words, farmers take the initiative, such as through producer co-operatives, in which case co-op members must not deviate from the ex-ante agreement. Vertical co-ordination involves collaboration between farmers and other supply chain actors up or downstream of the farm (in such arrangements farmers do not usually lead and arrangements can be diverse. Gereffi et al. (2005), for example, identified five different arrangements: markets (e.g. spot markets); modular (the producer makes products to a customer's specification); relational (transactions are complex and knowledge must be exchanged between buyers and sellers with mutual dependence); captive (switching costs are high so suppliers are 'captive'); and hierarchy (i.e. vertical integration). Vertical coordination then is how products move through the supply chain and they can be characterised by contracting, product differentiation and supply chain relationships. There can also be informal arrangements.

To understand farmer strategies, including the nature and complexity of IAs, the following approach was developed and applied to the three commodity sectors/regions studied in this paper. First, a review of market and regulatory conditions was conducted. This involved two elements – a desk-based review of academic, industry and policy literature in each country; and 10-15 semi-structured interviews in each region with stakeholders involved with the sector, including farmers' unions, banks and finance providers and relevant NGOs. The interviews focussed on regulatory and policy conditions in relation to the sector concerned, including access to markets, standards and finance, succession and labour markets. Second, up to three focus groups/group interviews were conducted with farmers in each region from different backgrounds (e.g. organic and conventional focus groups were held with dairy farmers in Denmark). The purpose of the focus groups was to allow farmers to describe the market and regulatory conditions facing their business in their terms and to understand how they were managing the issues. In each study region a workshop was then held with farmers and other key stakeholders to discuss the main findings, including the key strategies and IAs in each region. The focus groups and workshops were recorded and transcribed and each national team prepared a national report summarising the key findings. A commodity report was then drafted for each of the three sectors which summarised the issues for each commodity, comparing the findings from across the regions in terms of market and regulatory conditions and farm-level strategies.

Commodity-level analysis of regulatory and market conditions and strategies

This section summarises the key regulatory and market conditions and farm-level strategies for dairy, arable and fruits commodity sectors respectively. Each commodity–level analysis starts by introducing the regions studied and the key structural and supply chain issues; it then summarises the regulatory and market conditions identified; the third section then examines farmer strategies. The strategies were not designed to accord exactly with those highlighted by Veerman et al (2016), but to reflect instead those identified by farmers, but some findings do speak directly to the Veerman et al recommendations.

Dairy farming

Context

Table 1 summarises the key contextual issues for the four dairy case studies. In Latvia dairy farms are highly fragmented and the sector is dominated by small farms (avg. herd size of 8.4 cows). Producers have a weak position in the value chain. Danish dairy production is undergoing significant structural development that has resulted in a general increase in the number of cows per farm, from a national average of 52 in 1982 to 126 in 2014. The value chain is comprised of 28 dairies, of which Arla is by far the largest. Danish farming is in a significant financial crisis, which is evidenced by an unusually high rate of bankruptcies among farmers. Dairy farming in France has also experienced significant restructuring. In the Finistère district, the total number of farms has decreased by 2.9% per year from 2000 to 2010 (-32 % in 10 years). Farm size has increased as well as capital intensity. Dairy production systems in the region still rely largely on grass for their feeding strategy, but there are important disparities between more 'intensive' (70% of farms in Brittany) and 'autonomous' production systems. The pattern of structural change on UK dairy farms is also towards fewer, larger farms. The number of dairy farms has declined at an average rate of 4% per year and the average farm size increased from 75 cows in 1996 to 133 in 2014. The milk market, particularly for liquid milk, is dominated by supermarkets through which as much as 80% of milk produced is sold.

In summary, there is a high level of farm-level and value chain structural change evident across the four regions, with a trend towards concentration and intensification in Denmark, France and the UK; the structure is more fragmented in Latvia. The context for all four case studies is a period of 'crisis', in some cases specific to milk but also, especially in Denmark and the UK, linked to wider financial and political issues. Nevertheless, there are also important contextual differences in terms of the initial structure, the underlying ownership structure and the way this is supported in the value chain.

Table 1. Contextual factors

Country	Study region	Farm structural change	Value chain org.	Context
Latvia	Latvia (NUTS2)	Fragmentation and polarisation; some consolidation	Small dairy processors who are fragmented and large processors; duality / polarisation.	Post-Soviet transition; milk crisis
Denmark	Southern Denmark	Concentration and intensification Organic dairy	Major structural development; Arla dominates	Financial crisis in Danish farming
France	Finistère	Concentration and intensification; 'alternative' models have developed.	Dominated by major industrial players Organic value chain emerging and niche markets (local and regional)	Milk crisis
The UK	Somerset	Concentration and intensification	Dominated by supermarkets / large processors	Milk crisis; Brexit

Regulatory and market conditions

Table 2 summarises policy/regulatory conditions. Two themes are prominent: milk quota and environmental regulations. The abolition of milk quotas was a significant policy change for European milk markets. Danish producers, for example, are no longer limited in their production by a quota system but by the capacity of their farms, thereby effectively liberalising production. However, the quota system only limits production in a few countries. The abolition of milk quota was not an issue for dairy farming in the UK, because reaching quota has not been an issue for several years due to the significant decline in dairy farm numbers. Nevertheless, the removal of quota impacts the wider milk pool and opens up the

market at a European level. Various environmental regulations and legislation are of importance, especially nitrogen reduction measures within the Nitrates Directive (91/676) and the Water Framework Directive (Dir. 2000/60/EC).

Table 2. Regulatory factors

Country	Policy/regulation	Farmer perspectives
Latvia	Abolition of milk quota CAP subsidy/competitive advantage	Concern re how milk quota changes will impact small dairy farmers
Denmark	Transferable milk quota system Abolition of milk quota Environmental issues Changes to agricultural law	Farmer ambivalence towards agricultural law allowing new financial capital into the sector; distrust of the regulatory process
France	Abolition of milk quota Milk Package, 2012 Environmental regulations	Quota impacts re land organisation Despite the Milk Package farmers are still isolated in their negotiation with buyers
UK	Abolition of milk quota Milk Package, 2012 Environmental regulations	Milk quota has not been an issue due to structural changes (i.e. not near the quota limit) but their abolition opens the market

The common market conditions are low milk prices, which are often below the cost of production, and price volatility (Table 3). In Latvia, the Russian embargo on EU products has been particularly significant (Russia was an important export market). A decreasing and more volatile world market milk price is highly constraining for Danish dairy producers because of their reliance on exports. Dairy farmers in France deliver their production through two main channels: cooperative dairies or private dairies. Here the main concern is that cooperatives are becoming bigger, with farmers feeling they have no control anymore on their governance. About 65% of dairy production in the UK is sold as liquid milk. Since liquid milk cannot be easily stored in the same way as milk powder or cheese or butter, UK dairy farmers are more affected by volatility and global market changes.

Table 3. Market factors

Country	Market conditions	Farmer perspectives
Latvia	Milk price crisis/price volatility Russian embargo on EU products Fragmented milk chain, with low market power and weak cooperatives	The milk price crisis is not the first crisis to hit the sector but it has been the most challenging to manage; price volatility poses financial and operational difficulties
Denmark	Decreasing world market milk price More volatile market situation Inefficient liquidity/farm bankruptcy Organic and conventional milk	The unpredictability of the market is challenging because of high debts; vulnerability to value chain dynamics; yet farmers maintain a liberal worldview
France	Milk price volatility/market exposure Milk is sold undifferentiated Progressive concentration of co-ops Production contracts with private dairies but minor changes in power asymmetries Organic and conventional milk Emergence of niche markets	Value added capture is downstream; no inter-branch organisation there to protect milk prices; concern over co-ops power
UK	Milk price crisis/price volatility Asymmetric price transmission Production contracts Organic and conventional milk	Low milk price is an existential concern but price stability (stable market) is also essential; farmers receive different prices based on the nature of their contract

Low milk price is the common existential threat from a farmers' perspective but market conditions are context-specific. Milk price and low milk price strategies dominate farmer thinking. Dairy farmers were also concerned by market changes that had meant markets had become much more volatile. Since 2015 the price for dairy has fluctuated significantly - there was strong consensus for greater stability and predictability of milk prices to enable businesses to properly budget and manage their farms. The structure of the retail sector and the asymmetric power relations between dairy farmers and downstream actors is also problematic, with vulnerability now linked to development in the retail sector and the world market, especially in Denmark.

Strategies

The milk crisis and the abolition of milk quota and liberalisation of milk markets has triggered significant changes in the dairy supply chain, including the emergence of new forms of contract and the development of co-operative models. It is possible to distinguish between strategies at two main levels: the farm level (individual) and the collective level (targeting policy-makers or other value chain actors) (Table 4).

Table 4. Farm and collective-level strategies for dairy

Country	Farm-level	Collective
All	Reducing production costs Internal re-organisation De-intensification Exit farming Succession planning Diversification of income sources Adding value Organic production Contractualisation	Farmer co-operatives Producer organisations Machinery partnerships Collective learning Political mobilisation/lobbying Contractualisation (fair practices) Market data/futures Training/advice/support
Latvia	'Lone ranger' Survival via subsidy Diversification Exit farming	Farmer co-operatives
Denmark	Reducing production costs Internal organisation Exit farming Adding value/organic milk Succession	Farmer co-operatives
France	Reducing production costs De-intensification Market segmentation Organic milk Contractualisation	Political mobilisation/lobbying Producer organisations Machinery partnerships Collective learning
UK	Reducing production costs Contractualisation/pricing Diversification of income sources Adding value; organic milk	Farmer co-operative Producer organisation Contractualisation Contracts legislation Market data/futures

Farmers described various coping strategies that they implemented to help manage poor milk prices, particularly *costs of production-related strategies*. In Denmark, for example, farmers aimed to "dilute" the costs of production by increasing efficiency, increasing the scale of operation and cutting costs/cancelling reinvestments. This makes sense at an individual farm-level; however, it is problematic for the wider dairy sector because it further increases production and thereby puts pressure on prices. There are important differences in the configuration of the farm economy to account for too, particularly in terms of the turnover/fixed cost ratio, which is important to understand farmers' strategic response to low milk prices. The very intensive and industrialised systems have a high share of fixed costs which implies only one strategic response to the milk crisis, which is to increase production/reduce costs. Farmers in other systems have more strategic options available e.g. reducing production price by reducing expensive concentrate feed, accepting a lower yield/income, abandoning farming.

The analysis has identified different *market arrangements* for selling milk. In general terms, it is possible to distinguish between individual and collective sales, as follows:

- Individual sales
  (i) Supermarket-aligned contracts
  (ii) Direct to processor/milk buyer
  (iii) Informal arrangements (direct to the consumer)
- Collective organisational sales
  (i) Co-operatives (e.g. Arla)

(ii) Dairy Producer Organisations (e.g. Dairy Crest Direct in the UK; POs to date have not been very effective)

The nature of the processing industry influences farmer strategies. In Denmark, for example, there is a high proportion of co-operative dairies but other countries have different value chain structuration – Latvia has private dairies and the UK has a range of different actors that are market agents. Some arrangements have been in place for some time but there are developments within them (e.g. new pricing mechanisms in contracts) in response to volatility. *Production contracts* are important. They are a key instrument for farmers and processors to adopt to market conditions. Different contracts are emerging: Arla farmers in Denmark (and the UK) can produce as much as they want, but other contract arrangements in the UK use A&B pricing and in France some dairy farms are encouraged to decrease production. Processor strategies directly influence how farmer decision making is done. The other strategic issue is the use of *market data and futures (contracts)*. This was evident in the UK. Some argued farmers can, and should, use market information to their advantage.

There was discussion about *farmer co-operation* and strategies to improve farmers' bargaining power through co-operative governance or the development of producer organisations (POs). In Latvia co-operation was identified as one of the main solutions to the crisis. Participants argued that solutions should be approached at a sectoral level, giving preference to collective strategies. There was a commitment to co-operative models, even though farmers recognised that some had now become quite large. However, in France dairy farmers tended to feel "trapped" in their commercial relationship with dairies, be they cooperatives or private dairies. They felt they had weak bargaining power. Some farmers selling to private dairies have put a lot of effort into the development of POs but most are unable to influence dairies and to improve the situation of their farmer members.

Three other collective strategies were noted. First, *co-operative arrangements to share machinery and labour*. A key farm-level strategy for all forms of dairy system is the minimisation of production costs, especially in terms of machinery and labour costs. Second, *collaborative learning* was also important, particularly to improve the efficiency of the dairy system as well as to generate new ideas to rethink how they do things. Third, political mobilisation and lobbying.

Arable farming

Context

The arable commodity case studies include sugar beet production in Belgium, cereal farming in Il-de-France, oilseed rape in the Wetteraukreis region of Germany and wheat in Latvia, Poland and Serbia. The commodities are well-established across the countries. They face many of the same challenges, including pest resistance, climatic conditions, and the increasing cost of inputs. Increasingly, the trend towards market liberalisation has exposed arable commodities to the global market which is, in many cases, intensifying existing patterns of restructuring. Innovation and collaboration, e.g. increasing yields, farmer machinery rings etc. are identifiable across the different commodities.

The patterns of restructuring per case are as follows. In Belgium, the number of sugar beet producers has declined steadily over the last decade. Following the abolition of quota, Belgium farmers have been under pressure to compete on the global market. Cereal farming dominates Il-de-France. Characterised by large homogenous farms it has been particularly vulnerable to recent climatic events, which have exacerbated pest resistance issues. Cereal farming in the region has faced increasing competition from Black Sea countries, and have also faced increasing price of nitrogen inputs. Farmers grow oilseed rape in many regions throughout Germany. Oilseed rape has long been the dominant in crop rotation (compared to sugar beet) in Wetterau, owing to renewable energy policy and the limiting nature of the sugar beet quota. In the Wetterau region, arable farms currently cultivate rape on around 10-15% of their fields. Wheat production is significant in Latvian, Polish and Serbian agriculture

in terms of number of farms, cultivated area, export volume and total farm income. In Serbia, however, there have been significant fluctuations in wheat yields per ha, as a result of the weak implementation of the agro-technical measures and a low irrigation rate.

Regulatory and market conditions

The arable case study countries face a range of policy and regulatory conditions. Market liberalisation and exposure to the global market, and the increase in input costs are consistent themes running through the 6 cases and 4 different commodities.

The abolition of sugar beet quota and the resulting exposure to the global market is significant in the Belgian sugar beet case. This is putting further pressure on farmers, who are already suffering the impact of an increase in input prices. The role of the sugar beet quota (and its abolition) has also played an active role in oilseed rape in the Wetterau region of Germany. Owing to the quota, oilseed rape dominated production in the region until the abolition of quota in 2017. Since the removal of sugar beet quota, it is unclear as to how rotation systems and production volumes will develop.

In the Il-de-France, a national decrease in direct aid available for arable cropping, as well as the varying cost of production is proving hard for farmers. It has also led to a complete disconnect between selling prices and production costs. Competition from Black Sea and Eastern European countries – who are able to provide higher protein levels at lower prices – are forcing French wheat producers to increase the quality. Although the Latvian wheat market has successfully orientated towards the global market, it is now hindered by insufficient capacity of pre-processing, storage and logistics of grain and limited availability of land. Despite an increased opportunity to access subsidy, farmers have experienced practical difficulties in meeting the requirements.

Polish wheat producers feel threatened by the import of grains to Poland from other European countries such as the Czech Republic, and from outside the European Union. The position of wheat producers is strongly linked to the uncertainty of global markets. At the broader industry level, there is significant dissatisfaction with the EU/CAP amongst Polish farmers. Reflecting its relatively recent entry to the EU, Serbia's agriculture has made a clear shift towards accepting EU/CAP practice and regulatory frameworks. With this shift has come an emphasis on new technologies, e.g. GIS. Small holders are ambivalent about this. Serbia has a high demand for arable products from countries with whom it has longstanding political relations with e.g. Macedonia.

Strategies

In order to overcome these challenging conditions, arable farmers across the case study areas have developed a range of strategies aiming to ensure economic viability of their farm. In the case of Belgian sugar beet a range of strategies were identified. Farmers buying more shares of the refinery was identified as a key strategy to improve farmers' position. There was also evidence of upscaling/intensification. This is a controversial option – it is argued that farmers should abstain from producing more, as this can lower prices. Generating additional income is also a common strategy – although farmers felt this should not be necessary to keep the farm going. Strengthening the sugar beet syndicate, i.e. via the Farmers' Union, was seen as an effective response. Belgian sugar beet farmers were unable to change refineries; farmers are bound to the closest of two refineries due to transport costs. There were a number of 'untapped' strategies, e.g. branding/marketing and alternative crops/end products but these were not seen as viable or practical.

Most cereal farmers in the Île-de-France feel they are limited in their responses by the contemporary regulatory framework. At the farm level strategies including specialising and enlarging, as well as minimising production costs. The French report suggests collective level amongst French cereal farmers is well established. They identify three main forms of collective action, including collaborative learning processes, upstream market segmentation and lobbying policy makers in order to defend collective interests. The 'protein plan' is a

good example of collective level action; by incentivising increased protein content, French farmers are able to compete with Black Sea and Eastern European producers.

In the case of oilseed rape in Germany, farmers' strategies were less associated with either the farm or collective level but transcended both levels. Farmers have adopted many strategies for the financial compensation of sustainability/environmentally friendly performances, e.g. cooperation with a local water supplier who compensated farmers for applying reduced nitrogen levels. Another strategy focuses on better ways to communicate with the public, including ways of self-marketing. Linked to this is the vision of marketing of a high-value rape oil from the region – emphasising aspects such as quality of the rape seed and the products that come from it.

As previously recognised, the amount and the quality of grain produced in Latvia has risen significantly during the last decades. Latvian grain producers have adopted a number of strategies to do so. The most significant of which is the emergence of farm cooperatives; during this time frame grain prices have become more transparent, and farmers have managed to get into a position where their voice is louder and better heard. In the case of Polish wheat, producer groups provided farmers with a better bargaining position in relation to both the retailers and the purchasers of their product. Whilst operating collectively within a producer group was commonplace in Polish arable farming, the future of producer groups is unknown, owing to the strength of individualistic values. Farmers had also resorted to direct marketing, involving the direct selling of wheat to a grain elevator. This allowed farmers to be responsive to price and was considered an ideal channel for medium farms who were not big enough to create own channels to directly sell to market but were too big to concentrate on niche sales. Serbian strategies for sustainability were largely long-term and focussed on both the regional and international levels; specifically, 'The Black Sea Economic Cooperation' includes 12 countries in the region. This region is very important in the context of wheat sector development in Serbia. One of the organization's major, strategic development projects is the joint transportation system.

Fruit farming

Context

The three fruit case studies examined include pears in Italy, apples and pears in Belgium, and apples in Poland.

Italy is the main producer of pears in Europe; specifically, the Italian case study is based on the Emilia-Romagna region, which is predominantly rural and where pear orchards have been grown since 1600. 82% of the farms are individual enterprises, with 15% being run by companies. The market for pears produced in this region is somewhat old-fashioned in terms of the varieties grown, and has been declining of late.

Apple and pear production are treated jointly in the case study of Belgium, particularly in Flanders where the research took place. In reality, the production process is considered to be nearly identical, with 61% of farms producing both apples and pears. Over the period 2001-2012, the number of Flemish top fruit / orchard production farms decreased by 43%, while the total acreage of apples and pears combined remained relatively stable, thereby indicating an increase in concentration and scale.

Poland has the highest agricultural population in the EU 28 and is characterised by the highly fragmented nature of farms. The specific focus of this case study was the Malopolska region, where 83% of farms are smaller than 5 ha and only 3.1% occupy more than 15 ha. Almost all of them can be defined as individual/family units. In the context of the EU, apples

are the number one export product for Poland and it is worth noting that the production of Polish apples is 10 times that of Belgium.

An important characteristic of orchard fruit production in terms of its flexibility and ability to adapt, is the long rotation period of trees. In the case of apple trees this is 10-14 years, and 25 years or longer for pears. In other words, there is considerable lock in, not simply in terms of financial investment, but also of time until the trees produce marketable quantities of fruit.

Regulatory / market conditions

In order to ease the free trade of agricultural goods within the EU common market, the European commission has outlined marketing standards for fruit and vegetables. Since the establishment of the Common Market Organisation (CMO) in 1972, producer organisations (PO) in the sector have been very important. The main purpose of the CMO, as implemented through POs, has been to market the output from primary producers, to match production with demand, to optimise production costs and to stabilise prices. The majority of Italian POs specialise in apples and pears, representing 89% of market production, by value; similarly, in Belgium, where the marketing of both fruit and vegetables is traditionally dominated by cooperatives, the majority of which are recognised as POs.

In Poland, during communist times the state was seen as negatively impacting farmers' production options. Correspondingly, post-communism there has been considerable optimism about the role the state can play, particularly in relation to the EU. However, there are concerns that this has not happened in reality and many farmers are critical of current state policy, arguing that it is not supportive of orchard fruit growing in terms of providing direction and enabling /encouraging investment.

Environmental legislation that is designed to protect the wider environment, as well as ensuring food safety, is creating problems for all commercial fruit growers in the EU, in that fruit as a sector uses a lot of pesticides and is heavily governed by EU regulations. This legislation includes restricting certain chemicals, leading to concerns that a range of diseases (such as Psilla and Xilella) are now difficult to control; furthermore, that there is a lack of investment into research and development of new chemicals that would conform to the legislation and yet help protect crops from encroaching diseases.

The 2014 EU Russian embargo has significantly impacted fruit producers in all three countries, effectively denying access to one of their main market outlets. In Belgium, for example, Russia used to be the most important non-EU export destination, accounting for 25% of fruit exports overall in 2013 and up to 40% for pears. In Poland, fruit producers in the Malopolska region were frustrated that the state response to the embargo was to distribute free apples in the region, which were the fruit from large-scale industrial apple producers from around Warsaw who were no longer able to market their produce to Russia. This was seen as negatively impacting traditional producers in the Malopolska region, as it effectively undercut their local market.

Strategies

As mentioned above, in terms of market outlets, the Russian embargo of 2014 has created significant problems for producers in all three case studies. This has meant that it is increasingly important/strategic to develop and consolidate new markets. However, in some cases, most notably China and the USA, this is complicated by the imposition of onerous

(perhaps even impossible) phytosanitary barriers that are as much to do with protecting local producers as preventing the spread of infection.

The pear supply chain in Italy is highly fragmented, leading to inefficiency and a lack of organisation. A key strategy has been to aggregate diverse existing groups and to concentrate production and thereby improve both quality and negotiation power. The most important example of this is "O-pera", an organization that involves exclusively Italian fruit growers specialized in the cultivation of pears. It represents more than 1,000 pear fruit growers, with the support of agronomists and technicians. Each O-pera pear follows a precise path, from cultivation to packaging. There is a focus on developing new varieties which are more attractive to the consumer. However, this takes time and needs to be carefully evaluated. The idea is to open up new markets and market opportunities. Pears from Emilia-Romagna have had PGI status since 1998, which has enabled the promotion of typicality as well as a close link between the product and the territory of origin. In addition, O-pera are also working on creating a new label which identifies high-quality pears. Innovation is important, not only in terms of varieties, but also new technologies – especially in relation to pest management.

In Belgium, VBT[1] has been working to increase access to new markets by putting pressure on the Flemish and EU governments to increase the speed of bilateral trade negotiations. *VBT* has also lobbied for financial support for those growers most deeply affected by the Russian boycott. The dramatic drop in the price of apples in the Belgian market in 2014 appears to have been the result mainly of the influx of Polish apples that year, which traditionally were exported to Russia. Nevertheless, it is apparent that consumer preference for Belgian apples has at least to some extent protected Belgian apple producers. GlobalGap is an important international standard. In Belgium, in addition to this standard, Vegaplan has been developed, which has involved collaboration along the supply chain helping to ensure access for those products that achieve this standard. It incorporates cross compliance measures, as well as being exchangeable with the German equivalent, thereby allowing access to the German market.

In Poland, there are three main models for selling apples: producer groups, which are mostly focused on international (global) and national markets; cooperatives, which are mostly focused on regional markets; and small family producers, which are mostly focused on local markets. The Polish government has attempted to gain new foreign markets for apples, although with little success so far (mainly for the reasons outlined above). In relation to the Russian embargo, Polish producers had to stop exporting apples to Russia, but instead started to transport them to Belarus and Ukraine, where the apples were repackaged for further export to eventually reach the Russian market. As a result, Belarus has become a leading importer of Polish apples, accounting for 26% of Poland's total exports of apples.

Another key issue in all three cases is the dominant position of retailers in the supply chain, and concerns that they take a disproportionate percentage of the final retail price. In this respect, most of the risk is with the producers, while the margin is concentrated on the retail side. As mentioned above in relation to O-pera in Italy, the development of cooperatives is a key response in all three case studies. In Poland, cooperatives are seen as critical in allowing access to large supermarket chains and subsequently to overseas markets, in aggregating the outputs of large numbers of small-scale producers. Cooperatives have also,

[1] *Verbond van Belgische Tuinbouwveilingen* (association of Belgian Horticultural Auctions).

historically, been important in Belgium, although increasingly farmer trust in cooperatives has diminished. There is a feeling amongst many farmers that due to the merger of co-operatives, there are effectively only two very large cooperatives remaining and that the voices of individual producers are being lost. As such, more and more farmers are leaving fruit cooperatives in Flanders and signing direct individual contracts with retailers.

Discussion and conclusion

This paper has provided a qualitative analysis of farm-level strategies in response to market and regulatory factors. There are some key findings specific to each of the three sectors and some wider common themes, especially in relation to the Veerman et al (2016) risk management recommendations.

In the four milk case studies there are clear differences in how the dairy industry is structured. Low milk price is the dominant market condition in producers' minds (even if there are wider structural issues to address). The cases show how farmers are adapting to price volatility and there are differences in how strategic decisions are translated. In Denmark market arrangements are very dominated by one big co-operative, but there is more diversity in the UK and France and contracts to discourage overproduction (although Arla is dominant in these countries too). Farmers in each country see themselves as competitors with neighbouring countries. The dairy cases show how we understand strategies as multi-level. For instance, farmers adopt strategies to adapt to market conditions, but processors are also adopting strategies (new forms of contract, for example, to control production) and are important for how farmer decision-making is done; strategies are evident at two levels (farm and collaborative). The response of many dairy farmers to poor milk prices is to cut costs of production. The analysis supports the need for producer organisations and the role of production contracts and to a lesser extent futures markets (Veerman et al., 2016), although producer organisations are questioned in terms of their influence and leverage.

In the arable cases, farmers identified increasing input costs, climatic events and pest resistance, as well as being increasingly exposed to and connected with the global market, as key conditions for their business. Exposure to these pressures is intensifying the restructuring processes that were already occurring. Strategies are focussed on improving farmers' negotiating power (e.g. contractualisation was recognised), but innovation, cooperation, diversification and being responsive to market changes are also widely observed strategies. Cooperation was a way that groups of farmers can achieve certain goals – either to supply inputs or to search for new markets. However, the strategy is also contested, and some farmers will always look for better prices by establishing direct contact with possible buyers. There are cultural attitudes to account for too. Polish farmers, for example, were sceptical about cooperation. At a farm level, crop rotation is an important risk management tool which is often overlooked (cf. Veerman et al., 2016). It can reduce both environmental and financial risks via an agronomy-based approach to risk management. Insurance is the more talked about financial-based strategy in the literature and it was noted as a promising strategy to stabilise farms' income, but it was also criticised, with concern that insurance forces 'good' farmers to pay for 'bad' farmers.

In terms of responding to changing market dynamics and regulations, the most important characteristic of orchard fruit production is the long rotation period of the trees. In the case of apple trees, this is 10-14 years, whereas for pears it is 25 years or longer. This clearly represents considerable lock in and inflexibility. In all three cases, there is recognition that the world market for apples, in particular, is characterised by oversupply. There are also concerns that consumer tastes are changing, and that many of the traditional varieties are no longer popular. As such, there is a need to develop new varieties (which takes considerable time and investment), as well as new markets. The latter is complicated by the

imposition of onerous phytosanitary standards in a number of countries, most notably China and the USA. The Russian import ban dating from 2014 has also complicated matters, in that Russia was an important export destination for fruits. This has further necessitated the development of new export markets, as well as of domestic markets – the latter in many cases revolving around the development of new varieties and more distinctive qualities. Policy support for fruit growers in both Italy and Belgium has been considerable, most notably in the guise of O-pera and the work of VBT, respectively. However, in Poland, where there were high expectations of government support following the demise of communism, there is disappointment that policy has been lacking in terms of both direction and investment. A final issue is the role of POs and cooperatives as a means of improving the market power of what are often small-scale and fragmented producers, in the face of powerful corporate retailers. Cooperatives are becoming more important in Poland and have remained important in both Italy and Belgium. At the same time, however, there are signs in Belgium of discontent amongst producers due to the amalgamation of cooperatives, and a feeling that their voices are no longer being heard. This is leading some to negotiate directly with retailers, especially larger producers.

In conclusion, this paper has provided important data from farmers that informs recommendations in risk management studies initiated by Veerman et al (2016) and others (e.g. Martino et al., 2017). In all sectors we can see how agricultural commodities are becoming more exposed to markets and the different ways that farmers are adapting, some of it constrained by structural issues. The Russian embargo on EU products emerged as a common factor that caused the reorganization of food markets and forced farmers and governments to take action to alleviate negative effects. Farmers often frame issues linked to price and respond at a farm-level (which may help them but not the wider sector). Collaborative approaches are much needed, especially co-operatives, although not all sectors or commodities trust these arrangements. Contractualisation and insurance clearly have important roles, especially production contracts (which have been around for some time but are evolving with new tools to better monitor markets). Some less discussed strategies have also emerged, especially the potential to improve crop rotations (arable and orchard fruits). The case study material documents organisational, associational and producer group roles as collective organisations, which are important formalised arrangements, but it should be noted that informal social ties also play an important role and should be considered as part of farmers' strategies to manage market uncertainty. This is a particularly important in countries with significant land fragmentation and a large number of family farms. There are two other concluding remarks to note. The first concerns the issue of 'lock in' and what this means for adaptive capacity (Darnhofer et al 2016) – dairy and fruit growers, for example, cannot easily switch production and increasingly neither can some arable growers (due to specialisation); adaptive capacity is not easy to action in reality, especially for farmers in more industrial production pathways. Investments in innovations and more specialised equipment can thus be a strategy that reduces farmers' longer-term possibilities. Second, strategies at a farm-level are multi-level and interconnected - the farm-level is determined by banks, unions, the value chain, etc. We see evidence of a heterogeneity of strategies (cf. van der Ploeg and Ventura, 2014), but options in some cases are limited (dairy in Denmark) because of wider structural issues linked to financialisation.

Acknowledgements

This paper has received funds from the EU's Horizon 2020 research and innovation programme under Grant Agreement No 635577 (SUFISA project). Responsibility for the information and views set out in this paper lies entirely with the authors.

References

Banks, J. and Marsden, T. (1997). Reregulating the UK dairy industry: the changing nature of competitive space". *Sociologia Ruralis,* 37 (3): 382-404.

Bonjean, I. and Mathijs, E. (2016) SUFISA conceptual framework: interim draft. Internal working paper for the H2020 SUFISA project.

Derville, M. and Allaire, G. (2014). Change of competition regime and regional innovative capacities: Evidence from dairy restructuring in France. *Food Policy*, 49: 347–360

Darnhofer, I., Lamine, C., Strauss, A. and Navarrete, M. (2016). The resilience of family farms: Towards a relational approach. *Journal of Rural Studies* 44: 111-122.

European Commission (2017) *Modernising and simplifying the CAP: economic challenges facing EU agriculture*. European Commission Agriculture and Rural Development, Brussels.

Gereffi, G., Humphrey, J. and Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1): 2005: 78–104

Grandori, A. (2014) Improving oprganisation forms in the agri-food industry. *British Food Journal*, 117 (10): 2418-2434.

Martino, G., Karantininis, K., Pascussi, S., Dries, L., Codron, J.M. (2017) *It's a jungle out there – the strange animals of economic organisation in agri-food value chains.* Wageningen Academic Publishers, Wageningen.

Veerman, C.P., Valverde Cabrero, E., Babuchowski, A., Bedier, J., Calzolari, G., Dobbin, D., Fresco, L.O., Giesen, H., Iwarson, T., Juhasz, A., Laure Paumier, A., Šarmír, I. (2016). Improving Market Outcomes – Enhancing the position of farmers in the supply chain. Report of the Agricultural Markets Task Force, Brussels, November 2016.

Van der Ploeg, J.D. and Ventura, F. (2014). Heterogeneity reconsidered. *Environmental Sustainability*, 8: 23–28.