Report of the 21st Meeting of the OECD Network for Farm-Level Analysis, Oslo, 4-5 June 2018

Participants

1. The meeting was attended by 24 participants from 16 countries: Australia (video-conference), Canada, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Ireland, Italy, Korea, Latvia, the Netherlands, Norway, Sweden, and the United Kingdom. Participants are contact persons from ministries and research institutions, nominated by their delegation, and invited experts.

Content and structure of the meeting

2. The 21st meeting was co-organised and hosted by the Norwegian Institute of Bioeconomy Research (NIBIO) and sponsored by the Norwegian Ministry of Agriculture and Food. Its objectives were to:

- Discuss various studies on farm characteristics and performance (Sessions 1, 4 and 6).
- Discuss progress with the implementation of the network project on drivers of farm performance and next steps (Session 2).
- Discuss future possible contributions to OECD work in 2019-20 (Session 3).
- Discuss the organisation of a joint seminar, including a stocktaking of achievements and reflexion on ways forward (Session 5).

3. The agenda of the meeting and the list of participants are available on the network website: www.oecd.org/agriculture/farm-level-analysis-network/.

Introduction

4. **Nils Bergset,** who represents Norway at the OECD Working Party of Agricultural Policies and Markets (APM), welcomed the participants and briefly presented the situation of Norwegian agriculture and the main objectives of agricultural policies.

5. Norway is a small country in terms of population (5 million), sparsely populated, with agricultural land covering 3% of the territory. Agriculture accounts for 2% of total employment, and the food industry for 19% of industry employment. The scale of farm operations is relatively small with an average size of 23.5 ha. With the long winters, animals are kept indoors for long periods. Other important characteristics are the relatively high share of rented agricultural land (44%), and the dispersion of land ownership among 180 000 landowners, compared to 45 000 active farmers.

6. Policy goals are to reach food security and preparedness; to maintain agriculture all around the country; to increase value creation; and to achieve sustainable agriculture with lower Greenhouse Gas (GHG) emissions.

7. The presentation was followed by questions regarding land renting and related arrangements. Farm operators rent land to reach a more viable size of operation. The

duration of leasing arrangements is ten years. Ownership is dispersed because of inheritance laws that require equal sharing of property among siblings. The speaker was also asked about the availability of sustainability indicators to monitor achievements, given the importance of this objective in the policy framework. Sustainability indicators are being developed. One source of information is data collected by cooperatives.

Session 1: Farm characteristics and performance

8. **Øyvind Hoveid** from NIBIO presented the preliminary results of an analysis of land use intensities in grain production, which tests the effects of distances in Norwegian agriculture, and is conducted with Maureen Kilkenny, from the United States Department of Agriculture. The von Thünen model (1842) based on transportation costs and off-farm employment is used to test the following hypotheses, all other things equal: 1) Farm-land intensity falls the further away from pick-up point; and 2) Farm land use intensity rises the further away from off-farm opportunities. While Norwegian policy traditionally compensated farmers with a competitive disadvantage to remove the von Thünen pattern, these compensations have been partly removed in the last decade, so the distance effect may be visible. Norway has information on farm location and pick-up location, which was used to estimate econometrically distance as a function of selected agricultural variables and all other factors (unobserved, random spatial variable). Bayesian statistics help create these random variables and the authors constructed a Lingren map consistent with the data. The analysis has not revealed clear distance effects so far, so the hypotheses are not confirmed. The next step is to verify if it is not a problem of data or analysis.

9. Discussion focused on the effect of different factors, such as policy parameters, land prices, farm scale and transport costs. As differences in support reflect different conditions, they should not affect the distance story. Other effects could be investigated. There were also technical questions on the size of the survey, as with high levels of information, the influence of prior distribution decreases. The survey represents 300 farms in East Norway but they do not all produce crop.

10. **Concetta Cardillo** from CREA presented an analysis comparing multifunctional farms with conventional farms, based on the Italian FADN data. The multifunctionality of farms represents a way for the agricultural sector to react to instability of incomes that appeared during recent years and can be considered as a new model of agriculture that associates to the traditional production of food and fibres, the production of non-food goods and collateral services. Therefore it represents a new employment and income opportunity for agricultural entrepreneurs, and can also ensure the permanence of populations and agricultural workers, especially in rural areas.

11. The study, realised by Concetta Cardillo and Orlando Cimino from CREA, aims to analyse the contribution of multifunctional agriculture to the family income generation and to compare this new kind of farms with the traditional ones. For this purpose multiple correspondence analysis and cluster analysis techniques have been applied, they allow the identification of homogeneous groups of farms within the agricultural sector according de level of likelihood of appropriate variables. The analysis is performed through Italian FADN data for the year 2015, dividing the sample of about 9 000 farms into 2 sub-samples: conventional farms and multifunctional farms, according to the presence of other gainful activities that has been assumed as a proxy of the multi-functionality. Based on the information from the FADN database, and using the cluster analysis method, several homogeneous groups of farms were identified, in particular, 3 groups for conventional farms and 4 for multifunctional farms. The comparison at territorial level demonstrates that

multifunctional farms are more concentrated in specific areas of the Country, indeed over half of them are located in Northern Italy and about a third in the Centre. In general, the analysis reveals that multifunctional agriculture is made by younger and more educated agricultural entrepreneurs compared to conventional ones.

12. The analysis and the comparison of farm performances has also been conducted using several economic values and showed that multifunctional farms tend to specialise more in the production of renewable energy and in offering services rather than in the sector of agri-tourism, because those activities seem to be more profitable. The contribution of multifunctional agriculture to the family income generation has therefore positive effects, albeit they differ on the basis of characteristics of the farms, their location and their production specialisation. Finally, FADN data could be useful to assess the phenomenon of multi-functionality for certain aspects, however there are some aspects that remain uncovered because of a lack of information, especially related to the distinction of different multifunctional practices realised outside of the farm.

13. The presentation was followed by questions for clarification and suggestions. It would be interesting to consider trends and resilience using a panel but the methodology for representing Other Gainful Activities (OGA) has changed over time. A participant noted that energy has the highest income and asked whether the methanisation of manure was included, and whether it was supported. The primary goal of methanisation becomes energy production. There used to be incentives to energy production, but no longer. A suggestion was made to use a diversified-specialised comparison rather than multifunctional or not, but this has already been done.

14. **Klaus Mittenzwei** from NIBIO presented an analysis of the potential economic benefits of land reallocation between farms, in terms of reducing transport costs, and thus the carbon footprint. The issue is that in Norway, farm enlargement to exploit economies of scale and adopt scale dependent technologies is achieved by renting land, resulting in farms with small, dispersed parcels and increasing transport time for farmers. There is not much literature on the topic, so as part of a larger project for 2017-20 on methods and process to facilitate land reallocation, the author developed an economic (linear programming) model, with the objective of minimising regional transportation costs, using GIS referenced network elements in a geographic region. The analysis applies to 8 case study regions at municipality level. The two types of transport considered are to move roughage and spread manure. Land can be reallocated though changes in ownership/user, field sharing and yield potential. The analysis is looking at the effect of land reallocation on transport cost, agricultural area per farm, and farm survival. The example presented is in a valley, with fields both side of the road. The model generates a solution that reduces total regional distance by 42% but in this case, some farmers have to travel longer distances. With the additional constraint that no farmer should have to travel longer distance, total regional distance is reduced by 39%. Then reallocation was restricted to renting land, total transport distance was reduced by only 32%. The next step will be to calculate additional variables, such as transportation equipment per farm, transport cost, GHG emission coefficient; consider land heterogeneity; and implement a binary allocation constraint. In the analysis, the number of farms is fixed but it would be interesting to let the number of farms vary.

15. In the discussion, a suggestion was made to discuss the results with farmers, which could see additional constraints. More workshops will be organised to present this work, which will provide this opportunity. There were technical questions about the translation of GIS data, which is done with a programme in GAMS. The issue of sharing equipment

was also discussed. In Denmark, the large farm has all the equipment and shares with smaller farms. This has not happened in Norway, reflecting high transaction costs. It was noted that Europe has a long experience with land consolidation and reparcelling, which could be useful to Norway. In France, it happened in the 1960s and 1970s, with government support. The transport issue was more complicated when animals had to be moved from one pasture to the other. In Ireland, the taxation system was a problem to land transaction. The government got rid of the tax but it is still difficult.

Session 2: Drivers of farm performance

16. Will Chancellor and Shiji Zhao provided an overview of recent and on-going analysis at the farm-level in ABARES, Australia (Box 1).

Box 1. ABARES project including farm-level analysis

Recent publications:

- Exploring the relationship between farm size and productivity: Evidence from the Australian grains industry – Journal of Food Policy: www.sciencedirect.com/science/article/pii/S0306919218302422?via%3Dihub.
- What difference does labour choice make to farm productivity and profitability in the Australian horticulture industry? A comparison between seasonal workers and working holiday makers — ABARES publication commissioned by World Bank: www.agriculture.gov.au/abares/research-topics/productivity/productivity-drivers/seasonal-workers-report#download--the-full-report
- Evaluating the benefits from transport infrastructure in agriculture: a hedonic analysis of farmland prices – The Australian Journal of Agricultural and Resource Economics: https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-8489.12243.

Recently submitted:

- Deregulation reforms, resource reallocation and aggregate productivity growth in the Australian dairy industry
- Dynamic Adjustment of Agricultural TFP and Climate Change: A Cross-regional Comparison of Broadacre Farms in Australia

Some current and possible future work:

- Estimating farmland value
- Testing drivers of farmer income using administrative tax data
- Estimating productivity of the vegetable industry
- The relationship between ICT investment and farm performance
- Estimating Chinese agricultural productivity
- Comparison of financial attributes between farm households and typical households
- Microsimulation model

17. Discussion focused on measurement of land value, the speakers asking participants about the experience in their country. A participant indicated that the 165th EAAE seminar

will be on Agricultural Land Markets – Recent Developments, Efficiency and Regulation on 4-5 April 2019 in Humboldt University in Berlin, Germany. www.agrar.hu-berlin.de/en/institut-en/departments/daoe/abl-en/eaae165/.

18. **Johannes Sauer** from the Technical University of Munich presented progress with the implementation of the network project on drivers of farm performance, which aims to analyse correlations between farm characteristics and farm performances, to more accurately predict farm responses to policy measures. Preliminary results on two countries had been presented at the previous FLA network meeting in November 2017. This time Johannes presented the results of four country case estimates for dairy farms in the Czech Republic and Estonia, and crop farms in Hungary and Italy, which are part of a draft report discussed by the APM Working Party on 22-14 May 2018 [TAD/CA/APM/WP(0218)16]. He also presented preliminary results for rice farms in Korea. They suggest that the most productive are also more environmentally sustainable, use more family labour, are more innovative and operated by younger and more educated farmers.

19. The next steps are to include France (crop and dairy farms), Denmark (pig farms), Norway (mixed farms) and Chile (possibly fruit and vegetable farms) in the analysis. Ireland, Switzerland, the United Kingdom and the Netherlands have at some stage expressed interest in participating in the project. Johannes will continue bilateral discussions and efforts to build up capacity.

20. The discussion started with the remark that there are several components to sustainability: economic, social, and environmental. In the analysis (and more generally in OECD work), the term “sustainability” refers to environmental sustainability and this should be made clear. While we are not measuring social sustainability, we measure economic sustainability by technical change over time. There was also a question about the weights of variables in each index, which are measured using Principal Component Analysis. A comment was that the impact of age may not be linear, but follows a quadratic curve. In the analysis, the effect is assumed to be linear. Johannes was asked whether different pairs of correlation could be made, for example could we identify more explicit results on the correlation between farm size and environmental performance. When asked about the effect of policy, Johannes explained that that this aspect will be investigated in a later phase, linking policy changes to different classes, and estimating the effect of policies on farmers switching to more effective farm technologies. It was noted that for the Czech case, mixed dairy farms, which are numerous, are excluded, following the EU classification and that in the country, biogas is an indicator of innovation.

Session 3: Future activities

Catherine Moreddu, OECD, provided an overview of areas in the OECD programme of work for 2019-20, where potential contributions from the network would be useful. Work on drivers of productivity and sustainability performance will continue to be welcome. New topics to be explored include gender issues, labour and skills, farmers' participation in value chains, risk management, antimicrobial use. Participants were asked about their views on possible contributions and whether they are aware of studies available on the topics above.

21. Regarding gender issues, we could consider trends and identify possible differences: Are farms operated by women part of an exit strategy, following the retirement of the husband? Do farms operated by women have different strategies, or performance? Several participants stressed the need to test some hypotheses, but it is not clear what these

could be. As part of a larger project on employment, the French Ministry is looking at trends first using administrative data (agricultural social security).

22. On antimicrobials, Hans Vrolijk mentioned an EU project on that topic, with Dutch participation. Specific investigation was also made in Denmark. Michael Friis Pedersen suggested that sustainability issues could be included in the analysis.

23. Participants were asked about data availability regarding farmers' integration, such as contracting or use of cooperatives. This information is available in Korea and the Netherlands, maybe in Canada, but not in other countries represented. France will have a project on farmers' organisation next year, based on specific enquiries. They will also have a project on the dairy industry, whether they market milk through cooperatives or not, and the type of transformation.

24. Hans thinks it would be important for the network to work on climate change. Another question for analysis mentioned is the relationship between productivity and income. For example, farms in Korea have high productivity and low income. This would require information about prices.

25. Johannes shared initial ideas for future work on farm performance. As a follow up of current project, he suggested investigating:

1. Farm performance over time
   - productivity-technology class membership dynamics
   - sustainability / structure / diversity / intensity etc. dynamics
   - characteristics of farms switching classes, triggering factors, policy implications
   - i) identify switching farms, ii) estimate correlations/importance of characteristics
2. Policy effects varying over farm classes
   - variance in policy effects on farms in different technology classes?
   - magnitude and factors across countries and sectors
   - policies: deregulation, environmental, land etc. related policy changes
   - i) identify switching farms, ii) estimate policy correlations/effects
3. Technical change over time considering technology classes: different strategies regarding input use: labour, land and capital. Impact of policies on input allocation dynamics.

26. He also suggested work on labour productivity, considering gender, education, peer group, migration, aging and other effects; and on land market developments and productivity-sustainability implications.

27. An additional idea shared after the meeting would be to analyse empirical evidence on the correlations between farm size and the sustainability of production. We touch on this question already in the current project, however, we would have to use a more detailed methodology to robustly disentangle these correlations (if any). Special attention could be paid to the following characteristics that (might be) correlated with farm size and determine sustainability of production, such as intensity of input use; diversity of production; part-time or full-time; off-farm income; labour intensity; labour constraint; budget constraint; socioeconomic issues: gender, education, extension etc.; and investment activity.

28. A Joint seminar with OECD APM delegates is planned for 15 November 2018, preceding the FLA network meeting on 16 November. Possible topics could be:

productivity-sustainability trade-offs, overview of FLA network contributions, including current projects, and discussion of expectations.

Session 4: Policy impact

29. **Christian Stettner**, University of Hohenheim, Germany, presented a study in progress about the econometric analysis of the effects of different types of subsidies on farm production. In contrast to most previous studies, the novel approach presented is entirely based on a theoretical microeconomic model, that explicitly allows subsidies to have an impact on input use, and takes linkages between the farm and the farm household into account. Through the rigid use of a farm household model, family farms can be depicted adequately, which constitute the predominant entrepreneurial form in agriculture globally.

30. The novel theoretical approach has been empirically applied to a large panel data set on Norwegian crop farms. Endogeneity in subsidies and inputs are accounted for in the theoretical model. In order to obtain consistent coefficient estimates, an instrumental variable approach was used for the estimation of Cobb-Douglas production functions. Input demand functions were specified in both the quadratic and the translog functional form. Standard errors were calculated by means of the Delta method.

31. The analysis reveals mixed effects with respect to direction and magnitude of subsidy effects. Preliminary results also show a high degree of statistical imprecision and need further investigation. In line with previous studies, the results suggest that decoupled subsidies do not have an impact on production. Overall, the novel approach presented constitutes a useful method for the consistent econometric estimation of the effects of different types of subsidies on production.

32. There were a number of questions about the model specifications, including the inclusion of subsidies, the representation of land, and the types of output. Output subsidies are part of the income to be maximised. Land is assumed to be a fixed factor, so is not included. Output is an aggregate. Participants also commented on the low impact. A participant suggested using a reduced form.

Session 5: Stocktaking of achievements

33. **Catherine Moreddu,** the OECD network animator, made a presentation of network objectives and achievements after ten years. The presentation also contained suggestions and questions about the way forward.

34. Participants will provide written comments on the presentation, including additional information and suggestions. A similar presentation could be made at the joint seminar between the network and the APM to stimulate discussion on expectations.

Session 6: Sustainability-Quality

35. **Hans Vrolijk** from WUR presented efforts to measure sustainability based on investments in agriculture, horticulture and fisheries. Sustainability is an important Dutch Policy objective. Measures are designed to stimulate investments in sustainable production systems. At the request of the House of Representatives the performance of the Ministry of Agriculture (LNV) is measured annually on the basis of indicators for agriculture, horticulture and fisheries (as part of the yearly budget cycle). Wageningen Economic

Research provides on a yearly basis an estimate of the amount of sustainable investments compared to the amount of total investment in agriculture, horticulture and fisheries. The investments in sustainable production systems are based on administrative data related to the subsidy schemes and tax deduction regulations facilitating these sustainable investments. Examples of these sustainable production systems are green label glasshouses, sustainable stables, investments in energy savings and renewable energy. The total investments are estimated based on the Dutch Farm Accounts. For the year 2015, the total amount of investments was EUR 3.36 billion, of which sustainable investments were EUR 1.1 billion (33% of the total). An estimate was also made for 2017, which foresees a small decrease to 30%. The yearly fluctuations are influenced by the policy schemes in place but also by the economic climate and the willingness of farmers to invest.

36. It was noted in the discussion that farms may invest sustainably without claiming rebates or subsidies. Moreover, these are for additional efforts above minimal requirements for sustainability. The importance of taxation measures for sustainability was outlined, but income tax incentives only work for farms making profit and in some countries, few farms do.

37. **Daniel Muluwork Atsbeha**, from NIBIO, presented an analysis of quantity-quality trade-off in the Norwegian dairy sector, based on farm-level data collected by cooperatives in Norway. Milk production is still under quota restriction in Norway. A restricted profit function is used to estimate the impact of increases in production quota. Increase in demand for milk is represented as an input into processing. As the premium for protein is much higher than the premium for fat, and increase in quota results in an increase in protein content. Participants made a number of suggestions, for example to look at organic milk.

Summary of next steps

38. The 26th PACIOLI meeting will take place in Budapest from 30 September to 3 October 2018. Registration is open until mid-July through the website: www.pacioli.org.

39. The OECD Secretariat will undertake the following:

- Send the Summary Record to participants for comments. Contributions by speakers are welcome.
- Prepare a written report including the Summary Record, Agenda and List of participants for the meeting of the Working Party on Agricultural Policies and Markets (APM) on 13-15 November 2018.
- Organise the next meeting of the Network on 16 November 2018, back-to-back with the November 2018 APM meeting, which will include a joint Seminar between the Network and the APM on 15 November.

40. Participants were invited to:

- Continue to liaise with Johannes Sauer regarding the project on analysing drivers of farm performance, and signal interest in participating to Johannes and Catherine.
- Provide comments on the presentation of stocktaking of network achievements and way forward, preferably by end of September 2018.
- Provide information on farm-level work of which they are aware on gender issues, labour and skills, antimicrobial use, and market integration.

Concerning the website:

- The final Agendas, Lists of Participants, and Summary Records will be posted on the website: www.oecd.org/agriculture/farm-level-analysis-network/fla-meeting-oslo-june-2018.htm
- Presentations made at the meeting will be posted if the authors send a version to be shared.