

## Seminar Building on a resilient dairy sector – session 1 – Chairmen: Abele Kuipers and Gustavo Schuenemann

Abstract number: 42565 / accepted / order: 1 / pres.means: Theatre / time: 15

### **Resilience4Dairy: sharing knowledge to improve sustainability and resilience of the dairy sector**

*V. Brocard<sup>1</sup>, M. Klopčič<sup>2</sup>, J. Boonen<sup>3</sup>*

<sup>1</sup>Institut de l'Elevage, 8 route de Monvoisin, 35650 Le Rheu, France, <sup>2</sup>University of Ljubljana, Kongresni trg 12, 1000 Ljubljana, Slovenia, <sup>3</sup>LTA, Kréiwénkel, 9374 Gilsdorf, Luxembourg; valerie.brocard@idele.fr

R4D – which stands for Resilience for Dairy – is an EU-funded project which aims at improving the European dairy sector's sustainability and resilience. To achieve this goal, the 18 partners of R4D have created a network enabling the exchange of practical and scientific knowledge among European dairy farmers, researchers and other relevant stakeholders. They will focus on 3 Knowledge Areas: economic & social resilience, technical efficiency and environment, animal welfare and society friendly production systems. Those issues are often addressed separately. However, they are interconnected and depend on the livestock farming system, rearing management, people involved in the production process, feeding and material resources, and level of use of innovation. R4D aims to build bridges between them in an innovative cross-fertilization, crowd-innovation and transdisciplinary approach, focusing on Best Practices allowing optimal benefits to be achieved in all three. The overall objective of R4D is to develop and to strengthen a self-sustainable EU Thematic Network on "resilient and robust dairy farms" designed to stimulate knowledge exchanges and cross-fertilization among a wide range of actors and stakeholders of the dairy industry. The six specific objectives of the project are the following: a) Structuration of the networks by selecting and connecting innovative resilient farms and relevant Operational Groups into National Dairy AKIS; b) Prioritization of farmers' needs to improve resilience and robustness of dairy farms; c) Matching farmers' needs with the inventory of best practices & setting-up of fine-tuned Knowledge Work Plans; d) Implementing collective evaluation and assessment of solutions (including cost-benefit analysis); e) Adaptation and translation of the Best Practices for practitioners and f) Communication, dissemination and demonstration of the results and best-practices. The aim of R4D is to widely disseminate relevant ready-to-use best practices based on innovations, facilitating knowledge exchange from farmers to farmers.

---

Abstract number: 41459 / accepted / order: 2 / pres.means: Theatre / time: 30

### **Indicators and Influencing Factors of Livestock Resilience**

*I.D.E. Van Dixhoorn<sup>1</sup>, J. Ten Napel<sup>1</sup>, A. Mens<sup>1</sup>, J.M.J. Rebel<sup>2</sup>*

<sup>1</sup>Wageningen Livestock Research, T.a.v. crediteurenadministratie Postbus 2176, 8203 AD, the Netherlands, <sup>2</sup>Wageningen Bioveterinary Research, Houtribweg 39, 8221 RA Lelystad, the Netherlands; ingrid.vandixhoorn@wur.nl

Current livestock production systems in Europe have been developed on the premise of a need for supplying more food with the greatest efficiency and least risks. Therefore, these systems have been designed to maximize productivity under well-controlled conditions. This has contributed to highly productive and efficient food production systems. However, we now realize that this strategy has led to vulnerabilities, especially concerning animals in livestock production systems. One of the big questions is how we shift focus from maximized production efficiency towards a system that maximizes animal resilience instead of making the animals more dependent on well-controlled conditions. Then impact of diseases can be reduced simultaneously with the use of antibiotics and the need for animal mutilations, aiming for a more sustainable production. Animal farming utilizing animal resilience starts with farming conditions that are acceptable to society and a level of management that the majority of qualified stockmen can provide. In such farming systems, animals can be bred and prepared for common day-to-day disturbances. Animal resilience can only be explored in an environment that is representative of commercial farming systems in terms of health, climate, housing conditions and diet quality. Differences in resilience between animals can be quantified by measuring variation in longitudinally recorded traits, such as daily milk production, body weight gain, activity patterns, heart rate or body temperature. Resilience at animal level is defined as the capacity of an individual to be minimally affected by disturbances or to quickly recover. A shift in strategy towards more resilient production animals therefore requires indicators of animal resilience as well as knowledge of what factors can be used to influence it. We present concepts of resilience that can be applied in research and give examples of indicators of animal resilience as well as influencing factors in dairy cows and other animals.

---

Abstract number: 43203 / accepted / order: 3 / pres.means: Theatre / time: 30

### **Reducing stress of dairy cows and farmers to improve resiliency and welfare**

*M.T.M. King<sup>1</sup>, T.J. De Vries<sup>2</sup>*

<sup>1</sup>University of Manitoba, Department of Animal Science, 12 Dafoe Road, R3T 2N2 Winnipeg, Canada, <sup>2</sup>University of Guelph, Department of Animal Biosciences, 50 Stone Road East, N1G 2W1 Guelph, Canada; tdevries@uoguelph.ca

The dairy industry has, in many ways, always had to be resilient and adaptable to be able to survive and thrive in changing circumstances. The fact that the dairy industry has been able to continue to produce and succeed through rapidly emerging challenges is a testament to the resiliency of the cows, farmers and other professionals who make up the sector. In recent years, however, many of those changes and challenges have become more pronounced and may threaten the sustainability of the industry. One of those challenges that continues to face the dairy industry is stress, both on dairy cows as well as those who take care of them. Stressors can have both physiological and psychological effects on dairy cows, which can lead to changes in cow behaviour and health status, negatively impacting cow production, reproduction, and welfare. Interestingly, there is growing evidence that the welfare of dairy cows, including their health, is related to the well-being of dairy farmers. There is evidence that farmers may experience higher levels of stress, anxiety, and depression than the average citizen. In such a high stress occupation, physical and mental stress may wear down an individual's ability to cope with complex problems; this may affect how dairy farmers deal with the animals in their care. Therefore, when considering ways to reduce stress for dairy cattle and improve their welfare, focus should also be on improving the well-being of the farmer. Combined efforts to reduce stress, and improve welfare, both of dairy cows and their caretakers, will contribute to maintaining resiliency in the dairy industry.

---

Abstract number: 42647 / accepted / order: 4 / pres.means: Theatre / time: 30

**Building resilience in the dairy sector of China**

*S. Li, W. Wang, W. Du, X. Sun, K. Yao, J. Xia*

China Agricultural University, Beijing, 100193, China, P.R.; lisheng0677@163.com

The Chinese dairy sector has undergone a fundamental transition in recent decades, with traditional smallholders being largely replaced by industrial and specialized farming systems. By 2022, the proportion of dairy cattle kept on farms with more than 100 head reached 73%. The intensification of the dairy sector has been accompanied by rapid improvements and the application of modern industrial technology, particularly in feeding strategies and farm management. For instance, there has been a significant improvement in the nutritional conditions of roughage, as TMR (Total Mixed Ration) feeding technology and high-quality whole-plant corn silage have become widely used. Additionally, almost all large-scale dairy farms in China have adopted mechanized milking. According to data published by the National Dairy Industry and Technology System, the average annual milk production per cow on large-scale dairy farms in China reached 10.1 tons in 2022. Furthermore, manure management has greatly improved with the implementation of more advanced treatment facilities, such as those that produce biogas. These advancements have contributed to the promotion of overall industry quality and resilience. Despite these achievements, the Chinese dairy sector faces numerous challenges in areas such as industry chain integration, self-sufficiency in milk and feed raw materials, improvement of cow breeding, reducing production costs, carbon mitigation management, animal welfare, and environmental pollution. China's per capita dairy consumption is only 60% of that in developed Asian countries. Given the prediction that there will be mild growth in national milk consumption in China over the coming decade, it is crucial to address these challenges and work towards a more resilient and sustainable Chinese dairy sector.

---

Abstract number: 43204 / accepted / order: 5 / pres.means: Theatre / time: 30

**Building Resilience in Farming: Dairy Cattle and Workforce Management**

*G.M. Schuenemann<sup>1</sup>, J.M. Piñeiro<sup>2</sup>*

<sup>1</sup>The Ohio State University, Dept. of Veterinary Preventive Medicine, Columbus, OH, USA, <sup>2</sup>Texas A&M University, Dept. of Animal Science, Amarillo, TX, USA; schuenemann.5@osu.edu

To ensure long-term sustainability of dairy farming, it is essential to build a resilient workforce. Dairy farms in US are consolidating at a faster rate today than any other agricultural commodity. In January 2022, the dairy cattle inventory was 9.3 million cows distributed among 30,000 farms, with an average annual productivity per cow of 11,000 kg of milk. About 50% of licensed dairy farms, mostly with less than 500 cows, ceased operation in the past 20 years at a rate of about 2,300 farms per year without changing the national milk cow inventory. Today, about 5% of US dairy farms are milking 60% of cows with an average herd size of about 3,300 cows. The farm workforce shortages have been an issue for the past few decades and 75% are immigrant workers. This is influenced by demanding work schedules and physically demanding jobs, limited access to educational opportunities or simply individual preferences to live near larger urban communities with greater access to developed infrastructure (e.g. internet, health services, entertainment, schools). Some dairy farms have been able to reverse this labor shortage by providing their employees with housing, covering expenses associated with transportation, offering educational opportunities and work-related clothing. The dairy community faces challenges (e.g. extended drought, increased regulations, changing consumer preferences, workforce shortages) as well as opportunities (e.g. growing demand and precision technology). The adoption of advanced technologies such as automation and data analytics can help reduce labor costs and improve the overall productivity and efficiency of farm operations. However, these solutions include investing in education and training programs, enhancing workplace safety and health, and promoting diversity and inclusion in the workforce. Today, leading dairy operations are completely integrated with an established network of suppliers and professionals, actively engaged with their local communities with a logistic that goes from the farm to consumers. Farms have been integrating best animal welfare and sustainability practices with strong emphasis on

prevention and continuous improvement.

---

Abstract number: 42651 / accepted / order: 6 / pres.means: Theatre / time: 15

**Working on resilience in the Ukrainian dairy sector**

*L. Stepura*

Scientific and Methodological Center for Higher and Pre-Higher Vocational Education, Smilianska str. 11, 03151 Kyiv, Ukraine; ludmila.stepura@gmail.com

The resilience of the dairy sector in Ukraine depends firstly on the cooperation with producers of raw milk. This is especially the case under the conditions of the war. The resilience of raw materials production and adaptation to the real conditions are impacted by many factors: transport logistic, (un)interrupted supply of electricity, use of generators (that leads to production cost increase), mobilization of professionals to the Ukrainian army, etc. The large-scale invasion of the Russian occupiers on the Ukraine territory affected both, producers of dairy raw materials and their processors and consumers. The supply chains between farms, processing plants and trade networks have been disrupted. In order to improve the economy of feeds, farmers started to feed cows only twice per day, which reduced milk yield. In the occupied territories, farms were completely or partially destroyed. The number of cows in all categories of farms decreased by 13.1 percent in 2022; as a result, the industry did not receive 1 million tons of milk (volume was 8.7 million tons in 2021). Dairy farms in the de-occupied and frontline areas are / will not be able to produce fodder for livestock without demining of their fields and will be forced to reduce or completely close dairy production. Nevertheless, some time after the start of the large-scale war, the country's dairy sector managed to adapt to the new conditions. However, in autumn of 2022, the industry also experienced problems caused by the deliberate damage to the energy infrastructure, but Ukrainian producers also later adapted to these challenges. Nowadays, the dairy sector meets the needs of the domestic market despite considerable industry losses. Due to significant migration of citizens to abroad, the domestic market of dairy products consumption reduced. According to the Association of Milk Producers, the production of milk in 2022 compared to 2021 decreased by 12.1% to 7.66 million tons. The figures for the fall in milk production could have been much higher, but thanks to the efficient functioning of dairy farms in safer regions and the relocation of livestock from war-affected areas, losses were minimized. In particular, the central and western regions of Ukraine increased milk production due to business relocation and increased demand for raw materials.

---

Abstract number: 41775 / accepted / order: 7 / pres.means: Theatre / time: 15

**Future scenarios for livestock agriculture in New Zealand**

*C.L.E.M.E.N.C.E.E. Vannier<sup>1</sup>, T.H.O.M.A.S.A. Cochrane<sup>2</sup>, L.A.R.R.Y. Bellamy<sup>2</sup>, T.I.P.E.N.E. Merritt<sup>2</sup>, H.E.R.V.E. Quenot<sup>3</sup>, B.A.P.T.I.S.T.E. Hamon<sup>2</sup>*

<sup>1</sup>Landcare research, 54 Gerald Street, 7608 Lincoln, New Zealand, <sup>2</sup>University of Canterbury, 20 Kirkwood Avenue, 8041 Christchurch, New Zealand, <sup>3</sup>CNRS, place du recteur Henri le Moal, 35043 Rennes, France; vannierc@landcareresearch.co.nz

Agriculture in New Zealand (NZ) faces disruptions from climate change, increasingly stringent environmental regulations, and emerging technologies. Given the importance of agriculture to the NZ economy, government and industry need to develop policies and strategies to respond to the risks and opportunities associated with these disruptors. Livestock production in NZ represents 64% of the agricultural export revenue and 85% of agricultural GHG emissions, mainly from methane and nitrous oxide. There is a research gap in understanding how future disruptions from climate and technology could impact on the environment and productivity. To address this gap, we have developed and applied an assessment tool of NZ livestock farming systems to explore pathways and interventions for increasing agricultural resilience, sustainability, and profitability over the next 5-30 years. A systems dynamic model developed using Stella Architect was designed as a Decision Support Tool (DST) to bring together production, market values, land use, water use, energy, fertiliser consumption, and emissions for each of the main agricultural sectors (dairy, beef, sheep, cereals, horticulture, and forests). The parameters are customisable by the user for scenario building. With stakeholder consultation, scenarios were designed to assess pathways and interventions to underpin strategy initiatives in the arable, dairy, and beef & lamb sectors related to food security and climate change adaptation and alternative protein production. Simulation results suggest potential synergistic opportunities between sectors to enhance productivity and reduce emissions. Achieving food security and cereal self-sufficiency in NZ through a multi-sectoral approach and the development of an alternative protein market (100% NZ branding) could lead to carbon emission reductions and improvement of carbon sequestration. Furthermore, the interactive DST and simulations improved stakeholder engagement, which can facilitate future land planning and policy formulation.

---

Abstract number: 41533 / accepted / order: 8 / pres.means: Theatre / time: 15 (changed to 30 min)

**Breeding approaches to improve robustness and resilience in dairy cows**

*K. May, S. König*

Institute of Animal Breeding and Genetics, Justus-Liebig-University Gießen, Ludwigstraße 21B, 35390 Gießen, Germany; katharina.may@agr.uni-giessen.de

Dairy cows are exposed to environmental challenges including rising and fluctuating temperatures, or increasing pathogen infection pressure due to resistances against available drugs. Against this background, it is imperative to develop breeding strategies for improved robustness and resilience. Robustness reflects the cow's adaptation ability to environmental challenges, implying improved disease resistance and tolerance to environmental stressors by maintaining high production (e.g., milk). A resilient cow is robust and recovers quickly from disease. Genetically, breeding for robustness suggests the selection of genotypes with stable genetic values in different environments, i.e., animals being robust against the impact of genotype-by-environment interactions. Classical breeding approaches focus on the analysis of simple production traits in dependence of environmental descriptors including herd management or climate characteristics by applying reaction norm and random regression models. Such approaches can be enhanced by considering novel functional traits reflecting health, metabolic stability or resource efficiency, and by a more detailed description of the farm environment including feeding or emission aspects. Hence, the general approach of genotype-by-environment interactions can be extended. Insights into the causal genetic mechanisms of cow health are possible when considering genomic data, i.e., dense marker genotypes, genome sequences or gene expression data. Approaches in this regard are genome-wide association studies with the ongoing annotation of potential candidate genes, up to the study of gene expressions in different environments. In ruminants, a further genetic contribution is due to the genetics of the microbiome, addressing novel studies on genotype-by-genotype interactions. Similar methods are suggested when studying the genetic mechanisms of disease resistance, i.e., simultaneously considering the genotype of the host (cow) and the genotype of a pathogen (e.g., endoparasite). Setting-up genetic relationships or similarity matrices for both species (host and pathogen) allow deeper insights into the functional diversity, being a main driver for selection response in a long-term perspective.

---

Abstract number: 41667 / accepted / order: 10 / pres.means: Theatre / time: 15

**Labour: a key factor in the resilience of the European dairy farmer**

*S. Debevere<sup>1</sup>, L. Dejonghe<sup>1</sup>, I. Louwagie<sup>1</sup>, I. Vuylsteke<sup>1</sup>, E. Béguin<sup>2</sup>, S. Fourdin<sup>2</sup>, P. Rondia<sup>3</sup>, L. Boulet<sup>3</sup>, S. Mathieux<sup>3</sup>, G. Elluin<sup>4</sup>*

<sup>1</sup>Inagro vzw, leperseweg 87, 8800 Rumbeke-Beitem, Belgium, <sup>2</sup>IDELE, 54-56 avenue Roger Salengro - BP 80039 , 62051 St Laurent Blangy, France, <sup>3</sup>Centre wallon de Recherches Agronomiques, Rue de Liroux 8, 5030 Gembloux, Belgium, <sup>4</sup>Chambre d'agriculture du Nord Pas de Calais, 54-56 avenue Roger Salengro - BP 80039, 62051 Saint Laurent Blangy, France; sandra.debevere@inagro.be

In the Horizon 2020 project "Resilience for Dairy", 82% of questioned people in the European Dairy sector indicated that work-life balance is an important factor for farmers to be resilient. Indeed, today, dairy farmers are under increasing pressure due to rapid herd growth and increased competitiveness. Rising labour demands are affecting the quality of life of livestock farmers. The Franco-Belgian Interreg project "CowForme" aimed to create jobs and increase labour efficiency on dairy farms. The aim was to reduce the workload and increase quality of life. By means of a survey, CowForme investigated what were the biggest challenges for farmers to work with staff. Also the motivation and obstacles of jobseekers to work on a dairy farm were explored. The results of the survey will be presented and discussed. In focus groups, several advisors and dairy farmers shared their experiences and possible solutions how to optimize the workload on the farm. In the presentation, some practical examples will be given that were proposed in the focus groups. During the project, many ways were used to spread information to farmers: study tours, videos, webinars, fact sheets,... All this information can be consulted at [www.cowforme.eu](http://www.cowforme.eu). By small, but efficient solutions, farmers can save a lot of time and improve their work-life balance and resilience.

---

Abstract number: 42877 / accepted / order: 11 / pres.means: Theatre / time: 15

**Resilience of dairy farming: the farmers' point of view**

*E. Castellan<sup>1</sup>, C. Baussor<sup>2</sup>, V. Brocard<sup>1</sup>*

<sup>1</sup>Institut de l'Elevage, 149 rue de Bercy, 75012 Paris, France, <sup>2</sup>Chambre d'agriculture de Normandie, 6 rue des Roquemonts - CS 45346 -, 14053 CAEN Cedex 4, France; elisabeth.castellan@idele.fr

The concept of "resilience" is not a familiar and concrete one for breeders. Within the frame of EU H2020 Eurodairy program, the French dairy farmers involved in the project proposed a definition from their point of view; then, they imagined a methodology to evaluate it on their farms. Hence a tool named 2MAINS (tomorrow, or 2 hands) was created to simply evaluate the resilience of the farms considering 5 topics (strategy, technical efficiency, economics, social issues, environment). This tool is mainly a good support to start discussions and thought processes on a farm. This process was first implemented with a group of dairy farmers from Hauts de France, then nationally widened with farmers from Normandy, Rhône-Alps and Brittany, to make sure that the steps proposed could fit with various production backgrounds. The second stage consisted in identifying practices considered as resilient for each of the 5 topics, and to share them thanks to video testimonies. These practices were gathered on French farms but also abroad, thanks to the exchange trips organized during the project. These exchanges of innovative best practices are now going on within Resilience4Dairy EU project. The dissemination process about the notion of resilience has also been realized in agricultural schools towards the

dairy farmers of the future.

---

Abstract number: 42561 / accepted / order: 12 / pres.means: Poster

**Local breed as an alternative to Holstein-Friesian cows in a farm with low level of milk production**

*M. Sobczuk-Szul, Z. Nogalski, M. Momot, P. Pogorzelska-Przybyłek*

University of Warmia and Mazury in Olsztyn, Department of Animal Nutrition, Feed Science and Cattle Breeding, Oczapowskiego 5, 10-719 Olsztyn, Poland; monika.sobczuk@uwm.edu.pl

Local breeds becomes an interesting option for livestock breeding especially for small producers and in organic systems. Developing local breeds usually requires added value, which could be for example health – promoting ingredients in milk. Although, it is important to generate new approaches to milk production from these breeds and determine the quality of milk from farms with reduced supplementation with concentrates. This study aimed to evaluate the milk quality of black-and white and holstein friesian cows under system with reduced use of concentrate, simulating organic production conditions. The experimental material were milk samples collected from 32 cows – 16 of each breed. Cows were in the same barn and similar age and calving date. Milk samples were collected twice in winter season. Average milk production level from this farm was 6500 kg. Local breed cows had lower milk yield compared to the Holstein-Friesian cows. There were no differences between the content of basic ingredients in milk and between breeds, which may indicate a good use of fodder by black-and-white cows. However the milk produced by local breed proved to be a more valuable source of compounds such as desirable fatty acids or proteins than that of the Polish Holstein-Friesian breed. The results of this study are pave the way for future research, within the pasture feeding period. Project financially supported by the Minister of Education and Science under the program entitled "Regional Initiative of Excellence" for the years 2019-2023, Project No. 010/RID/2018/19, amount of funding 12.000.000 PLN.

---

**Seminar Building on a resilient dairy sector – session 2 – Chairmen:  
Valerie Brocard and Marija Klopčič**

Abstract number: 42820 / accepted / order: 1 / pres.means: Theatre / time: 15

**COMPARISON OF SELF-ASSESSMENT AND OBJECTIVE INDICATORS OF ATTRIBUTES DRIVING FARMS  
RESILIENCE**

*D. Martin-Collado<sup>1</sup>, B. Soriano<sup>2</sup>, J. Lizarralde<sup>3</sup>, J.M. Mancilla-Leyton<sup>4</sup>, N. Mandaluniz<sup>3</sup>, P. Gaspar-García<sup>5</sup>, Y. Mena-Guerrero<sup>4</sup>, A. Prat-Benhamou<sup>1</sup>*

<sup>1</sup>Agrifood Research and Technology Centre of Aragon , Av. Montañana, Zaragoza, Spain, <sup>2</sup>Polytechnic University of Madrid, P.º de la Senda del Rey, Madrid, Spain, <sup>3</sup>Basque Institute for Agricultural Research and Development, Campus Agroalimentario, Arkaute, Spain, <sup>4</sup>University of Sevilla , Ctra. de Utrera, Sevilla, Spain, <sup>5</sup>University of Extremadura , Av. de Elvas, Badajoz, Spain; dmartin@cita-aragon.es

Strengthening farming systems' resilience is on the top of the EU and national political agendas. Given the relative novelty of resilience research field, several approaches have been proposed to develop this concept, but there is a lack of methodological consensus to assess resilience at a farm level. Commonly, resilience assessments have been based on objective or subjective measures, assuming that each approach have different strengths and weaknesses. However, very little is known about how subjective self-assessment and objective indicators-based resilience measures compare. Our study aims to fill this research gap in the farming system's field by providing a comparison of both measurement approaches. We understand resilience as result of farm and personal attributes contributing differently to farm robustness, adaptability, and transformability, through the resilience principles set by the Resilience Alliance: system reserves, diversity, tightness of feedbacks, openness, and modularity. Based on this, we identified attributes as specific factors measuring each principle and we did an evaluation of them using self-assessed statement and objective indicators separately. Finally, statistical analyses were based on 149 face-to-face farmer surveys covering four representative small ruminant farming systems in Spain. Results show a moderate correlation between indicators and self-assessed measures, which vary across attributes (-0.27/0.45), suggesting that the two types of measures are not interchangeable. However, in most cases, a

positive correlation exists. The clearest alignment between the two measurements is found in attributes of social capital, redundancy, and knowledge networks, while the highest discrepancy is found in farmer life quality. We argue that our results have new highlights for the understanding of farm resilience assessments.

---

Abstract number: 42585 / accepted / order: 2 / pres.means: Theatre / time: 15

**Inventory and analysis of needs towards resilient dairy farming in 15 EU countries**

*A.M. Menghi, C.S.S. Soffiantini*

Centro Ricerche Produzioni Animali (CRPA), Economics, Viale Timavo 43/2 - Reggio Emilia, 42122, Italy; a.menghi@crpa.it

Within the R4D – Resilience for Dairy H2020 UE founded thematic network, an inventory of needs for dairy farmers to be resilient have been created. The inventory is a result of an online questionnaire spread by R4D partners across 15 EU Countries, 535 answers have been collected. In the survey, a list of 43 needs have been selected and proposed to stakeholders, asking them to assign a score from 0 to 5 to each of them according to the potential to improve farm resilience. The key areas explored across the survey were (I) technical efficiency, (II) environment, animal welfare and society friendly production systems and (III) economic efficiency and social resilience. Responders have also been asked to add other relevant needs, with an open-ended question. Moreover, information about their background and, when applicable, their farm has been asked. The results have been elaborated according to geographic distribution, sex, age, level of education, profession and dimension of the farm. Regardless regional specificities, it is clear that the improvement of work-life balance and the necessity of a transparent and effective communication with civil society are in the top 10 issues that farmers have to face, to be resilient in the future, just on the same level of other more technical challenges, like animal health/welfare and energy self-sufficiency.

---

Abstract number: 43178 / accepted / order: 3 / pres.means: Theatre / time: 15

**Assessment of solutions for resilient dairy farming in fifteen European countries**

*A. Kuipers<sup>1</sup>, J. Zijlstra<sup>1</sup>, R. Loges<sup>2</sup>, S. Ostergaard<sup>3</sup>*

<sup>1</sup>Wageningen University and Research, De Elst 1, 6708 WD, the Netherlands, <sup>2</sup>Kiel University, Grass and Forage Science/Organic Agriculture, Hermann-Rodewald-Strasse 9, D 24118 Kiel, Germany, <sup>3</sup>Aarhus University, Department of Animal and Veterinary Sciences, Blichers Alle 20, DK-8830 Tjele, Denmark; abele.kuipers@wur.nl

An assessment scheme was developed based on 5-scale questions related to the sub-categories social resilience (less to more); economic resilience, technical efficiency, environment, animal welfare, societal perception items, readiness and acceptability (low to high). This assessment scheme was applied to 185 practices, techniques and tools (named solutions), which were collected in 15 European countries as part of the EU-Resilience for Dairy project. 62 experts from universities and research institutes from 15 EU-countries scored these solutions with in total 3300 assessments. The same sub-categories, with focus on readiness and acceptability, were also scored by farmers and stakeholder in local workshops in all 15 countries. The scoring took place with in mind farm types or systems where the solution is applicable and attractive. When answering the question about the impact of the solution, the average dairy farm in the region was taken as a reference. Practices and techniques were analyzed within the four composed categories: socio-economic, technical, animal welfare and environment, and readiness. It appeared that top ranking solutions by the experts differ in several cases from those chosen by the farmers and stakeholders. Moreover, the choice of solutions was locally coloured.

---

Abstract number: 42772 / accepted / order: 4 / pres.means: Theatre / time: 15

**Knowledge needs and solutions related to resilience in the European dairy sector**

*K. Kuoppala<sup>1</sup>, M. Rinne<sup>1</sup>, N. Browne<sup>2</sup>, V. Brocard<sup>3</sup>*

<sup>1</sup>Natural Resources Institute Finland, Production systems, Tietotie 2, 31600 Jokioinen, Finland, <sup>2</sup>Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork P61 P302, Ireland, <sup>3</sup>Idele, Dairy Unit, 8 route de Monvoisin, 35650 Le Rheu, France; Valerie.Brocard@idele.fr

The EU dairy sector is currently facing many challenges, which leads to multiple needs both within the farm gate and across other stakeholders. In the project Resilience for Dairy (R4D, funded by European Commission), the knowledge needs of 15 European countries were derived from an on-line survey and meetings of the National Dairy AKIS (Agricultural Knowledge and Innovation Systems) of the R4D project partners. Several solutions were also identified that could improve the resilience of the dairy sector. The most urgent needs were categorised within 1) ecological and environmental footprint/mitigation of climate change/inputs efficiency, 2) financial needs and 3) social issues: building society friendly dairy systems. Solutions were most often sought within 1) ecological and environmental footprint/mitigation of climate change/inputs efficiency, 2) labour conditions, 3) dairy cattle management and 4) animal nutrition and grassland management. Category "Ecological and environmental issues" scored highest in terms of both needs and solutions. The reasons for that are probably two-fold: the pressure from the society, and the dependency of individual farm success on local weather and biotic resources. The second highest topic was related to financial and labour issues, which are the core of running resilient dairy

businesses. Practical management issues related to dairy cow care, nutrition and feed production were emphasized as solutions, which is logical as they can be controlled at farm level. There were clear differences in the top scoring areas between regions. Direct comparisons of the needs and solutions across regions is hampered by the non-standardized format, as they were presented as open questions to NDA representatives, but on-line survey was standardized. Although animal welfare scored high in the on-line survey, it was not emphasized in the NDA outputs, which could mean that although an important topic regarding the image of the dairy chain, it is not experienced as a matter limiting the resilience of dairy farms.

---

Abstract number: 43141 / accepted / order: 5 / pres.means: Theatre / time: 15

**Resilience of contribution to food security of specialized Walloon dairy systems**

*C. Battheu-Noirfalise<sup>1,2</sup>, E. Froidmont<sup>2</sup>, D. Stilman<sup>2</sup>, Y. Beckers<sup>1</sup>*

<sup>1</sup>ULiège GxABT, Passage des Déportés 2, 5030 Gembloux, Belgium, <sup>2</sup>Walloon Agricultural Research Centre, Rue du Serpont 100, 6800 Libramont, Belgium; c.battheu@cra.wallonie.be

The contribution to food security of dairy systems was mainly addressed through its dimension of food availability, including ("net indicators") or not ("gross indicators") the penalizing use of human-edible feeds. Here, we approach its dimension of stability of supply for both cases. Using accounting data, we calculated the annual gross (GP) and net protein productivity (NP) of 80 dairy farms of the Walloon region (Belgium) over a ten-year interval (2011-2020). We clustered the farms based on nine management parameters using a kmeans algorithm. The difference between the clusters was tested with a mixed model. We calculated the production resilience indicator (mean<sup>2</sup>/sd<sup>2</sup>) for each cluster and estimated the significance of their differences with a Monte-Carlo procedure. Last, we calculated those indicators on two periods separated by the end of milk quotas (2015) in order to analyse its impact on GP and NP resilience. Three clusters were identified. The first farm type was intensive and grass-based (IG). It reached a high GP (302 kgCP/ha) and NP (269 kgCP/ha) associated with the highest resilience for both indicators (81 and 53 for GP and NP, respectively). The second type was also intensive but rather maize-based (IM). It used the same amount of concentrates as the first type but with a higher CP-content. This type reached similar GP (302 kgCP/ha) as the first type but its NP (232 kgCP/ha) was lower. Moreover, its resilience was lower for both GP (55) and NP (21). The last type was extensive and grass-based (EG). It used less concentrates than the two previous types with similar CP-content compared to IG. Its GP (185 kgCP/ha) and NP (202 kgCP/ha) as well as its resilience of GP (49) were the lowest. However, it reached a higher resilience in terms of NP (41) than IM but still lower than IG. Between 2011-2015 and 2016-2020, all types showed a decrease in the resilience of NP and GP linked with type-specific management changes. IG showed an increase in milk production and a decrease in concentrate use and CP-content of concentrates. IM showed an increase in milk production and fodder yield. EG showed a decrease in the use of maize silage.

---

Abstract number: 42084 / accepted / order: 6 / pres.means: Theatre / time: 15

**Innovative solutions supporting resilience of Dairy farms in Netherlands**

*P.J. Galama, J. Zijlstra, A. Kuipers*

Wageningen University and Research, Wageningen Livestock Research, De Elst 1, 6700 AH, the Netherlands; paul.galama@wur.nl

Resilience for Dairy (R4D) will tackle urgent sustainability challenges faced by dairy producers by bringing together dairy farmers, farming organisations, advisors, researchers and all relevant actors across 16 member states to close the divide between research and innovation in Europe. R4D is built around the multi-actor approach to implement more intense cooperation between researchers, advisors, farmers and relevant actors to facilitate greater exchange and acceptance of co-created solutions. R4D draws on the EU, national and regional connections of the 17 consortium members to appropriate networks, on the three related key themes of economic and social resilience, technical efficiency and environmental and society friendly production systems. In each of the 16 countries meetings with farmers and stakeholders have been organized to identify needs and solutions to make the dairy sector more resilient. These relate to the farm, the farmer and the dairy chain. The solutions are focusing on the resilience items of robustness, adaptation or transformation. A list of most important shocks and challenges for the dairy sector are made and solutions are selected. The results of the meetings in Netherlands will be shown. Topics are development of new revenue models like credits for CO<sub>2</sub> reduction, CO<sub>2</sub> storage and energy production, or care farming or valorization of dairy products like A2 milk; increasing soil fertility; grassland management in relation to biodiversity; new housing systems in relation to cow comfort, less emissions and manure quality; personal development in relation to communication with society and cooperation between farmers. It is noticeable that the Dutch farmers and stakeholders present in the meetings had a relatively strong interest in a "nature kind of approach" to farming. This implies a lot of focus on solutions in the area of quality of soil and crop and grassland farming. There was also quite some interest expressed in socio-economic topics, like communication with society and cooperative forms of manure management along the chain, instead of more detailed techniques and practices at farm level. The group of farmers was forward looking, but deeply concerned about the present discussions and policies in the public domain in the country.

---

Abstract number: 41673 / accepted / order: 7 / pres.means: Theatre / time: 15

## Needs of the dairy sector: a Hungarian overview

L. Czeglédi, B. Béri, I. Komlósi, E. Török

University of Debrecen, Department of Animal Science, 138. Böszörményi Street, 4032, Hungary; czegledi@agr.unideb.hu

The current distribution of the Hungarian cow population is 60% dairy, 35% beef, and 5% dual-purpose. The Holstein-Friesian is the dominant dairy breed (97%) having an average of 10 804 kg milk production in a 305-day lactation. The Hungarian dairy sector can be characterized as intensive milk production and farms of 440 cows in average. 46% of cows are kept on farms with more than 500 cows and 31% on farms with 300-500 cows. Deep bedding, laying boxes, two or three milking a day, and a high proportion of concentrate in the daily ratio are common in most of the farms. Grazing of dairy cows is not common due to the low yields of pastures. An online survey was conducted where respondents, Hungarian dairy farmers and dairy stakeholders, were asked to select their level of interest in a range of needs within three different fields: technical efficiency; environment, animal welfare, and society friendly production systems; economic efficiency and social resilience. Concerning all areas, the innovative systems (milking strategies; feeding system; analysis for early detection of diseases), the improvement of welfare conditions and the effective communication to the general public of agricultural practices were the main issues identified by the respondents. Innovative devices for measuring grass growth and techniques for grazing management, environmental footprint assessment techniques as well as feed additives to mitigate methane emissions were not identified as crucial needs. In the field of technical efficiency, the main needs were relationship with the application of innovative milking, feeding as well as animal health monitoring systems. The improvement of welfare conditions of calves and cows, and the effective communication to the general public of agricultural practices, and the role of agriculture in society proved to be the main issues within the field of environment, animal welfare, and society friendly production systems. Within the economic efficiency and social resilience field, the main requirements were the using of innovative and reliable information channels as well as the salary.

---

Abstract number: 42981 / accepted / order: 8 / pres.means: Theatre / time: 15

### Eco-efficient low-cost pasture based dairy production on a mixed farm in Northern Germany

R. Loges, F. Taube

Kiel University, Grass and Forage Science/Organic Agriculture, Hermann-Rodewald-Str. 9, 24118 Kiel, Germany; rloges@email.uni-kiel.de

Recent intensification in European agricultural production is accompanied by serious environmental trade-offs questioning the sustainability of current specialized production systems for both all arable cash crops and animal products. Under the temperate conditions of North-West Europe, ruminant-based integrated crop-livestock systems are considered as a strategy towards ecological intensification. This is the background for the interdisciplinary project: "Eco-efficient pasture-based milk production" established 2016 at the organic research farm Lindhof in Northern Germany. The project aims at fulfilling relevant ecosystem services linked to dairy systems: high quantity and quality of agricultural commodities; low nutrient surpluses, a low carbon footprint and contributions to agrobiodiversity. Data are presented based on a 98 spring-calving Jerseys/crossbred dairy herd on an organic former arable farm as an alternative to traditional specialized systems. Measurements include: productivity, production costs, nitrate-losses and product-carbon footprint compared to typical regional dairy farms. The results illustrate the capability of a rotational ley grazing system to provide both a high milk performance per ha combined with low environmental footprints and additionally offer significant yield benefits for the arable crops in the crop rotation. Lindhof acts as pilot-farm in the EU-Horizon2020-project R4D – Resilience for Dairy.

---

Abstract number: 42130 / accepted / order: 9 / pres.means: Theatre / time: 15

### Factors contributing to the financial resilience of spring-calving pasture-based dairy farms

G. Ramsbottom<sup>1</sup>, B. Horan<sup>2</sup>, K.M. Pierce<sup>3</sup>, D.P. Berry<sup>4</sup>, J.R. Roche<sup>5</sup>

<sup>1</sup>Teagasc, Animal and Grassland Research and Innovation Programme, Teagasc, Oak Park, Carlow, R93 XE12, Ireland, <sup>2</sup>Teagasc, Animal and Grassland Research and Innovation Programme, Teagasc, Moorepark, Co. Cork, P61 C996, Ireland, <sup>3</sup>University College Dublin, School of Agriculture and Food Science, Belfield, Dublin 4, D04 R7R0, Ireland, <sup>4</sup>Teagasc, Animal and Grassland Research and Innovation Programme, Teagasc, Moorepark, Co. Cork, P61 C996, Ireland, <sup>5</sup>University of Auckland, School of Biological Sciences, Private Bag 92019, Auckland, 1142, New Zealand; george.ramsbottom@teagasc.ie

The objective of this study was to identify factors contributing to the financial resilience of spring-calving pasture-based dairy farms when ranked by average operating profitability (i.e., net profit/ha). A dataset of 315 Irish pasture-based dairy farms with complete records for 8 consecutive years was used in this analysis. The farms were characterized by expansion and intensification during the 8-year study period, as evidenced by the annual increase in milk fat and protein yield per cow (+15%;  $P < 0.001$ ); mean annual pasture DM consumed/ha also increased linearly (+19%;  $P < 0.05$ ); production costs increased linearly ( $P < 0.01$ ) while net profit was highly variable between years. The 8-year average net farm profit/ha was €1,611/ha, €1,189/ha, €937/ha and €630/ha for the highest, second highest, second lowest and lowest profit quartiles respectively ( $P < 0.001$ ). The highest profit quartile contained, on average,

smaller farms (59 ha) with greater technical efficiency (stocking rate 2.42 LU/ha; 5,511 litres milk/cow; and, 9.9T pasture DM/ha utilized) ( $P < 0.001$ ) than the other profit quartiles. When affected simultaneously by a combination of milk price reduction and adverse weather, they experienced the greatest nominal reduction but highest nadir farm profitability ( $P < 0.001$ ). The highest 8-year average net profit quartile experienced a reduction of €850/ha and nadir profit of €763/ha in the adverse year but profit recovery the following year of €743/ha. The second highest, second lowest and lowest profit quartiles had reductions of €730/ha, €625/ha and €562/ha; nadir profits of €478/ha, €311/ha and €46/ha; and, net profit recoveries the following year of €618/ha, €533/ha and €478/ha respectively.

---

Abstract number: 43194 / accepted / order: 10 / pres.means: Theatre / time: 15

**Planning for resilient dairy farms in the USA**

A. De Vries

University of Florida, 2250 Shealy Drive, Gainesville, FL 32608, USA; devries@ufl.edu

Resilience implies to many dairy farmers in the USA the capacity to withstand unplanned changes to their production environment with as little impact as possible. The production environment may include physical aspects of dairy production, such as weather, crops, animal disease, energy, and labor availability. It can also include prices for milk, feed, and access to buyers and suppliers. In the presentation I will give examples of common practices that are used on dairy farms in the USA. The need for resilient dairy farms and a more resilient dairy sector was highlighted during the COVID pandemic when milk plants were shut down and feed could not be delivered. This led to dumping of milk, unwanted changes in rations, and forced reductions in herd sizes. An example of resilience related to changing weather is the increase in the number of barns equipped with heat abatement and raising dairy heifers indoors year-round. Dairy farmers also maintain their own power generators in case the power goes off due to storms. Related to cropping, dairy farmers may grow different varieties of corn, the main forage source, depending on maturity, yield, and disease resistance. Many farmers also maintain a one-year supply of corn silage, so that disappointing crop yields do not lead to the need to purchase forages. Forward contracting of feed stuffs is also common, as is hedging of milk, such that future prices are known and variation in prices is reduced. Dairy farmers may also maintain several suppliers of the same goods to not become reliable on a single supplier. Most dairy farmers keep ownership of their own heifers, even when they may be raised by a heifer grower in another state. This practice reduces their risk to high heifer purchase prices and biosecurity. To account for unplanned culling, dairy farmers often raise a buffer of 5 to 10% more heifers than they need. On average, this practice reduces cow longevity. Cross training of farm labor is common so that different people can do the same jobs. Some dairy farmers even pay potential workers to be on stand-by in case their help is needed. In summary, resilience is on the mind of many US dairy farmers, and they use a large variety of practices to keep a resilient dairy farm.

---

Abstract number: 42476 / accepted / order: 11 / pres.means: Theatre / time: 15

**Towards a socially sustainable dairy sector with cow-calf contact systems**

H.W. Neave, M. Bertelsen, E.H. Jensen, M.B. Jensen

Aarhus University, Department of Animal and Veterinary Science, Blichers Alle 20, 8830 Tjele, Denmark; heather.neave@anivet.au.dk

The intensification of the dairy sector has led to social sustainability challenges. To address concerns around animal welfare and societal values, alternative systems that provide cow-calf contact have been proposed. Such systems have been shown to increase work satisfaction for farmers, which also relates to social sustainability. However, cow-calf contact systems also present challenges with reduced saleable milk and high animal stress during later separation. Some proposed solutions include reducing daily contact duration and novel weaning methods. We conducted two studies (48 and 56 cow-calf pairs each) providing either full-time (23 h/d) or part-time (10 h/d during daytime) cow-calf contact for 8 wk. We used three methods to wean off milk and separate calves from their dams (using a fence-line): two-step (milk and dam removal separated by a week) or gradual (time with the dam reduced to 50% then 25%, over 2 wk), compared to simultaneous (milk and dam removal occurred together). Our findings suggest that cow and calf behaviour in part-time contact systems also foster strong bonds between cows and calves. However, calves become hungry during daily separation periods, and the vocal response to separation is not reduced, compared to full-time contact systems. A two-step (versus simultaneous) weaning process reduced behavioural and vocal responses of calves to separation, but both cows and calves were similarly vocal during gradual weaning (versus simultaneous). Thus, dividing the weaning and separation process into two steps may be one strategy to reduce the negative behavioural responses of calves at weaning. Further scientific exploration is needed to address welfare, economic and staff labor concerns regarding cow-calf contact systems. In doing so, there can be transformative, proactive development of alternative management systems that support social sustainability and thereby a more resilient dairy sector.

---

Abstract number: 41034 / accepted / order: 12 / pres.means: Theatre / time: 15

**Resilient, healthy or efficient? The ideal animal according to breeders of small ruminants in Europe**

E. Janodet, M. Sautier

INRAE, GenPhySE, Chemin de Borderouge, 31320, France; estelle.janodet@inrae.fr

Health, resilience and efficiency of herds is a major issue for the sustainability and profitability of farms. Genetic selection is one of the means for increasing the performance of animals for those three traits. Our study aimed at better understanding the diversity of breeders' preferences with respect to the relative importance of traits related to animal resilience, health, and efficiency (SMARTER H2020 project). Data were obtained through preference surveys based on choice experiment that were administered to small ruminants breeders in 5 countries and for 14 breeds ( $n > 600$ ) with the decision-making software 1000minds. Results highlight differences in preferences between the proposed traits with a lower degree of importance for feed efficiency ( $P < 0,05$ ) and prolificacy ( $P < 0,05$ ) compared to the other 6 traits (dairy production, dry matter in milk, mastitis resistance, parasitism resistance, mortality at weaning, functional longevity). We present divergent preference profiles identified through cluster analysis and characterize them. We investigate the correlations between preferences profiles and i) livestock systems and ii) breeder's profile. Our results may contribute to inform small ruminants industries' experts, especially on the revision of breeding objectives for more resilient and efficient animals.

---

Abstract number: 42646 / accepted / order: 13 / pres.means: Poster

**Strategies and cases of resilience from dairy farming community in Slovenia**

*M. Klopčič*

University of Ljubljana, Biotechnical Faculty, Dept. of Animal Science, Groblje 3, 1230 Domžale, Slovenia;  
Marija.Klopccic@bf.uni-lj.si

Milk production is the most important production sector of Slovenian agriculture. Dairy cattle farming has been concentrated and specialized since the mid-1990s, which is reflected in the reduction of the number of dairy farmers, the increase in the average size of the herd per farm, the increase in the milk yield of cows and the higher quality of milk. The milk production sector in Slovenia is characterized by family farms with an average of 19 dairy cows per herd, with a large proportion of tied-in housing systems (70 %) and with a very unfavourable land structure (a large number of small plots (35), which complicates the development and efficiency of Slovenian dairy farms.

Within the R4D – Resilience for Dairy H2020 EU founded thematic network, Slovenian dairy farmers together with researchers, advisers and stakeholders (NDA) discussed about future challenges and solutions for dairy sector in Slovenia. Given that Slovenia is dominated by permanent grassland, they think that 'Increase grazing vs indoor feeding to meet customer desires and added milk value' can be one of the most suitable solutions. In order to improve the well-being of the animals and to make their work easier, there is a distinct desire for freewalk housing system to improve animal welfare and animal health. They also think that personal development on a wide spectrum of topics to increase resilience skills of dairy farmers is very important in this uncertain time. Given that the ownership structure of agricultural land is very unfavourable, there is a clear need for land consolidation to be more efficient. In Slovenia, diversification and the search for additional sources of income through added value are very important, because we have many hilly and mountain dairy farms with small herds (e.g. PDO/PGI/AOP, organic, hay milk/meat, A2A2 milk, agro-tourism, forestry...) to increase income for farmers. Also the topic about reducing emissions of ammonia and GHG is fully in discussion.

---

Abstract number: 42273 / accepted / order: 14 / pres.means: Poster

**How farm management influences the longevity of dairy cows: A comparative study of Swiss dairy farms**

*R.C. Eppenstein, A. Bieber, M. Lozano-Jaramillo, M. Walkenhorst*

Research Institute of Organic Agriculture FiBL, Animal Science, Ackerstrasse 113, 5070, Switzerland;  
rennie.eppenstein@fibl.org

Increasing the productive lifespan of dairy cows is an important means to lowering the environmental impact of dairy production. Farm characteristics, such as location, production type and breed are fix characteristics for most farms. However, farm management strategies can influence the longevity of their dairy herds in the medium- and short-term. Within the framework of the research project "Longevity of Swiss Dairy Cows" (Nutzungsdauer Schweizer Milchkühe), we aimed at identifying management choices that affect the productive lifespan of dairy cows. Based on data from the Swiss census and the major breeding organizations, we built a database of 142 farms. We defined 15 farm types that best represent the diversity of Swiss dairy production with regard to geographic regions, production zone, breed and production type (organic vs. conventional). We allocated 10 dairy farms per farm type. Five of the 10 farms were chosen for having a low average productive lifespan (APL) of their dairy herd. The other five farms were chosen for having a high APL. APL was defined as the average lactation number of all cows culled 5 years in retrospective. From the initial 142 farms, 68 farms participated in a survey to assess the differences in management practices. From these participating farms, 30 were further clustered into matched pairs and were visited on-farm. Farms with low APL did not differ from those with high APL regarding their milk production and average dairy herd size. However, they significantly differed with regard to their APL, thus confirming a successful selection strategy of matched pairs. On average, dairy cows from farms with low APL were culled 2 lactations earlier than cows from farms with comparable characteristics, but with a high APL. Compared to farms with low APL, farms with high APL were characterized by a higher percentage of loose housing systems, a higher percentage of energy rich feed

rations, better fertility and more animals being inseminated with meat breeds. No statistical differences were found in relation to antibiotic treatment incidences and other health parameters.

---

Abstract number: 41083 / accepted / order: 15 / pres.means: Poster

**High herd exit rates existence of small herds: A case study from North West Province, South Africa**

*M.D. Motiang<sup>1</sup>, E.C. Webb<sup>2</sup>*

<sup>1</sup>Agricultural Research Council, Animal Production, Old Olifantsfontein Road, Irene, 0062, South Africa, <sup>2</sup>University of Pretoria, Department of Animal and Wildlife Sciences, University of Pretoria, Pretoria, 0002, South Africa; dan@arc.agric.za

The aim of this paper was to compare herd balance between different herd sizes. Data were collected from 308 randomly selected cattle farmers from RSM District North West Province in 2012. Data were divided into four herd size categories of 1-10, 11-30, 30-70 and >70. Data were analysed using IBM SPSS statistics 22 (2013). The GLM multivariate analysis was performed to test effect of herd size category on calving, herd mortality and off-take rates. Means were separated using least significant differences (LSD) tests. Results show that the average calving rate of 55% and cumulative exit of 27.3% resulting from 10% mortality, 15% off-take and 2.3% slaughter rates. Although calving rates did not differ significantly across herd size categories, small herds of 1-10 had significantly higher values for herd exit rates than larger ones. Herd mortality rates ranged from 6% in large herds of >70 to 18% in small herds of 1-10 while off-take rates were 16% and 23%, respectively. Small herds also had significantly ( $P < 0.05$ ) higher slaughter rates (3%) than large herds (1%). Overall herd exit for small herds was 43% compared to 20%-21% for other herd categories. On average small herds of 1-10 had 5.9 head of cattle consisting of 3.84 cows that produce 2.06 calves but lose 2.57 head of cattle through sale, slaughter and mortality, which results in a negative herd balance of -0.5 as compared to the average of 0.85 for all herds. This negative herd balance implies that small herds will shrink and ultimately disappear in 12 years if the status quo continues. Herd size categories of 11-30, 30-70 and >70 recorded herd balance of 1.08, 0.95 and 12.02, respectively. Although small herds recorded the highest herd exit values, their average off-take rate of 23% was within the national average of between 25% and 30%. However, 18% mortality rate for these herds was higher than previously reported of approximately 10%. It is recommended that farmer development programmes focus on herd mortality in order to stimulate growth of small herds in the study area.

---

Abstract number: 42729 / accepted / order: 16 / pres.means: Poster

**Building on a resilient dairy sector- highlights and discussion**

*A. Kuipers<sup>1</sup>, V. Brocard<sup>2</sup>, M. Klopčič<sup>3</sup>*

<sup>1</sup>Wageningen University & Research, De Elst 1, 6708 WD Wageningen, the Netherlands, <sup>2</sup>Institut de l'Elevage, 8 route de Monvoisin, 35650 Le Rheu, France, <sup>3</sup>University of Ljubljana, Biotechnical Faculty, Dept. of Animal Science, Groblje 3, 1230 Domžale, Slovenia; abele.kuipers@wur.nl

This seminar intends to contribute to sharing insights on how best to support dairy farmers in coping with change to achieve a more resilient operation and peace of mind. The concept of resilience and indicators from a technical, environmental and socio-economic perspective, and analysis of needs and solutions, gathered in 15 EU countries in the context of resilience, will be presented, as well as interesting cases of resilience in the field. The focus will be on herd, farm management and communication with society, with aim to answer two key questions: How does the dairy farmer/farm family cope with shocks, barriers and uncertainty in market and environmental policies in the management of the farm? This time slot will be utilized to summarize the findings and farm cases, and discuss the various presentations of this seminar.

---

Abstract number: 41386 / accepted / order: 17 / pres.means: Poster

**Economic and environmental impacts of cattle longevity extension by altered reproductive management**

*R. Han, A. Kok, M. Mourits, H. Hogeveen*

wageningen university and research, Wageningen, 6706KN, the Netherlands; ruozhu.han@wur.nl

Introduction: Prolonging dairy cattle longevity is regarded as one of the options to contribute to a more sustainable milk production. Since reproduction failure is the primary reason of culling, this study investigates the effect of extending cattle longevity on farm's gross margin and greenhouse gas emissions (GHG) by altered reproductive management. Materials and Methods: An adapted model of Kok et al. (2017) is used to stochastically simulate the dynamics of a Dutch dairy herd of 100 cows, by modelling individual cow lactations and calving intervals, while accounting for culling for fertility reasons, mastitis, lameness and other reasons (i.e. general culling). Moreover, the model computes the GHG emissions using a life cycle approach. To extend cattle longevity, two altered strategies for reproduction management were evaluated: 1) the insemination extension strategy, in which the maximum number of inseminations (AI) per cow before she is culled for infertility was raised from 4, to 5 or 6 times, and 2) the reduction in subfertility culling standard strategy, in which the milk production threshold for culling non-pregnant cows was reduced from 20 kg to 15 or 10 kg/day. The model was run for 500 herds of 100 cow places for each reproductive management strategy alternative. Results and Discussion: Age of culled

cows increased with the increased maximum number of AI from 2040 to 2195 days. The change was larger from 4 to 5 times AI (108 days) than from 5 to 6 times AI (47 days). Annual gross margin increased from €165,847 to €167,570, while GHG decreased from 0.926 to 0.915 CO<sub>2</sub>-equivalents per kg FPCM. With the decrease in the subfertility culling standard from 20 to 10 kg/day, the age of culled cows increased from 1968 to 2132 days. Annual gross margin decreased with € 168,188 to minimal €161,210, while GHG increased with 0.002 CO<sub>2</sub>-equivalents per kg FPCM. Implications: The increased maximum number of AI and subfertility culling standard can benefit a dairy farm economic and environmental sustainable development.