**Key Note Reports Extended Abstracts**

| *SESSION 1 – THE ROLE OF AGRICULTURE MECHANIZATION IN CROP PRODUCTION TRACEABILITY* |
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| **KNR 1.1 – Traceability status and trends**<br>*Raffaello Prugger* (Tecnoalimenti S.C.p.A. - Italy), *Roberto Oberti* (University of Milan – Italy) |
| **KNR 1.2 – Demands of retailers**<br>*Friedrich Lüdeke* (GLOBAL.G.AP) |
| **KNR 1.3 – Technological solutions to generate traceability: the case of harvesters**<br>*Matteo Masin* (CNHIndustrial New Holland - Italy) |

## KNR 1.1 – Traceability status and trends

*by Raffaello Prugger* (Tecnoalimenti S.C.p.A. - Italy)

The origin of traceability is linked with a series of food scares that uncovered the deficiencies in the EU food and feed regulation widely affecting the consumer confidence (mad cow crisis 1996, dioxin contamination 1999, GMOs rejection, horsemeat scandal 2013). As a result, on one side the food businesses reinforced tools to control (track and trace) the food supply chain upstream and downstream, while, on the other, the consumers started increasingly requesting more information about the purchased food products. A new generation of concepts were so developed in a series of European and national projects (Traceback, Eden, AutenticApp, TT-Hubs, TrustyFood, Blockfil) to respond to the evolving information needs such as Traceability, Authenticity, Food Integrity, Food defense, Food transparency.

All these concepts contributed to reinterpret the food product as a "meta-product" consisting of 3 layers: the inner layer - edible, often the less costly; the outer layer – packaging, the sustainability problem; the immaterial layer – information, the most valuable.

Currently traceability is a compulsory component of the food law. It is frequently fulfilled as administrative paperwork or hybrid analog-digital work and thus potentially subject to fraud. In order to avoid deliberate or involuntary data alteration, secure data handling systems are upcoming thanks to the blockchain technologies. The future trend is to assure full interoperability across data generation, collection and handling.

## KNR 1.2 – Demands of retailers

*by Friedrich Lüdeke* (GLOBAL.G.AP)

For GLOBALG.A.P. retailers are a vital part of the whole operation and also the founding members.

GLOBALG.A.P.'s roots began in 1997 as EUREPGAP, an initiative by retailers belonging to the Euro-Retailer Produce Working Group. British retailers working together with supermarkets in continental Europe become aware of consumers' growing concerns regarding product safety, environmental impact and the health, safety and welfare of workers and animals.

The outcome was to harmonize their own standards and procedures and develop an independent certification system for Good Agricultural Practice (G.A.P.).

The EUREPGAP standards helped producers comply with Europe-wide accepted criteria for food safety, sustainable production methods, worker and animal welfare, and responsible use of water, compound feed and plant propagation materials.

To reflect both its global reach and its goal of becoming the leading international G.A.P. standard, EUREPGAP changed its name to GLOBALG.A.P. in 2007.

GLOBALG.A.P. today is the world's leading farm assurance program, translating consumer requirements into Good Agricultural Practice in a rapidly growing list of countries – currently more than 135.

The paramount demand from retailers is food safety.

According to ISO safety is "State in which the risk of harm (to persons) or damage is limited to an acceptable level". So, this is where we come from: risk mitigation.

Meanwhile the demands from retailers do not stop there. Other topics are traceability, sustainability and biodiversity.

The latest GLOBALG.A.P. Standards IFA SMART and GFS are addressing all these topics.

### **KNR 1.3** – **Technological solutions to generate traceability: the case of harvesters**

*by Matteo Masin* (CNHIndustrial New Holland - Italy)

The traceability of raw materials for the food industry strictly depends on the ability of producers and farmers to document and trace harvesting activities with digital tools.

From the first geo-referenced yield mapping systems at the end of the nineties, technology has evolved both from a hardware and software point of view, making it possible to map yields not only for the grain but also for the forage.

Combine harvesters, forage harvesters and balers are now able to transmit harvest data in real time on telematics portals, allowing farmers to monitor agronomic performance but also to track production. Technology today offers the opportunity to monitor, trace and document also the quality of production and therefore to offer added value to the food, livestock or agro-energy industry; protein content, starch content, fiber digestibility, ashes.

The farmer, the producer thus can show and demonstrate to the food industry the origin and quality of the raw materials through a digital portal accessible anywhere, both in desktop and mobile mode through a website and a dedicated app.

Not only harvesting machines can provide yield tracking but tractors and trailers in their path to the elevators (for storage) can also be monitored and tracked, to identify the path from the field to the storage facilities (elevators or silo bunkers)

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| *SESSION 2* – CLIMATE CHANGE AND MECHANIZATION: WHAT IS NEEDED IN INDUSTRIALIZED AND EMERGING COUNTRIES |
|---|
| **KNR 2.1** – **General introduction**<br>*Giuseppe Gavioli* (Gavioli Consulting LLC - USA) and *Josse De Baerdemaeker* (KU Leuven - Belgium) |
| **KNR 2.2** – **A.I. in agriculture and farm machinery: discover new correlations and trends in big data collected by machines**<br>*Spyros Fountes* (Agricultural University of Athens - Greece) |
| **KNR 2.3 - Fossil-energy-free technologies and strategies for EU farmers and solutions in the management of the farm**<br>*Thanos Balafoutis* (Center for Research and Technology Hellas - Greece) |
| **KNR 2.4** – **Renewable and low-carbon fuels for climate-smart EU ag-machinery: circular agriculture in action**<br>*Mario De Amicis* (CNH International) |

## KNR 2.1 – General introduction

*by Giuseppe Gavioli* (Gavioli Consulting LLC - USA) and *Josse De Baerdemaeker* (KU Leuven - Belgium)

***Abstract not submitted by the Authors***

## KNR 2.2 – A.I. in agriculture and farm machinery: discover new correlations and trends in big data collected by machines

*by Spyros Fountes* (Agricultural University of Athens - Greece)

***Abstract not submitted by the Author***

## KNR 2.3 - Fossil-energy-free technologies and strategies for EU farmers and solutions in the management of the farm

*by Thanos Balafoutis (Centre for Research and Technology Hellas - Greece)*

Energy needs of EU agriculture rely on fossil resources. Agricultural mechanization improved productivity and efficiency but affected the environment directly or indirectly from fossil derived fuel consumption. The last 30 years, novel Fossil-Energy-Free Technologies and Strategies (FEFTS) related to more sustainable energy production, efficient use and GHG emissions reduction have been developed, but agriculture has not adopted them as much as other sectors, mainly due to its low energy use share, but also due to other technical (fast development pace, complexity, diversity of solutions, lack of expertise, etc.) and socioeconomic (small/medium farm size, high costs, cultural perception, etc.) factors. Nowadays, FEFTS has been technically optimised, while their cost has become very competitive to conventional technologies (even very cheap due to the Ukrainian war crisis).

This report aims to identify the best ways to shift agricultural energy consumption towards a fossil-free future. To do so, primarily the main energy sources and energy consumers in EU agriculture were distinguished by analysing EuroStat data and then, the results of a survey (470 farmers/41 experts) and a series of workshops across 8 EU countries were used to obtain the needs, ideas and interests of practitioners in regard to FEFTS adoption by EU farms. Closing, the report aims to propose specific FEFTS solutions to improve farm management and assist in farm economic and environmental resilience.

## **KNR 2.4** – **Renewable and low-carbon fuels for climate-smart EU ag-machinery: circular agriculture in action**

*by Mario De Amicis* (CNH International)

At CNH Industrial we believe that Innovation, Sustainability and Productivity shall guide us to achieve a circular and more sustainable agriculture.

To reach carbon neutrality combustion engines and renewable fuels are needed.

Our biomethane tractor marks a significant milestone in the journey towards decarbonizing agriculture. It is the result of years of pioneering work on the use of alternative fuels and it represents a unique opportunity to speed up the deployment of energy independent farms. Biomethane from manure or ag waste has the best CO2-balance Well-to-Wheel of any known energy source.

Electrified vehicle technologies represent a further step towards decarbonization, not as an alternative but rather as a mean to further improve the performance, efficiency, and sustainability of internal combustion solutions. The technology wants to offer different features for different vehicle missions. In farming, the key customer needs are higher productivity, reduced operating costs, and lower risk of cross contamination. Electrification, combined with automation, is seen as an optimal solution to achieving these needs.

But there may not be one size fits all solution. In the future we see also a complementarity of all these solutions: in case of high-power demand, hybrid powertrains running with renewable fuel such as biomethane would represent the optimal solution.

The development of these technologies is a key element of our path to zero carbon commitment.

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| ***SESSION 3 – SPECIFIC MECHANIZATION: MACHINES FOR ORCHARD*** |
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| **KNR 3.1 – Innovative technologies for the sustainable management of orchards**<br>*Luca Corelli, Lorenzo Marconi* (University of Bologna – Italy) |
| **KNR 3.2 – Orchard harvesting mechanization: state of the art and future perspectives**<br>*Danilo Monarca* (University La Tuscia – Italy) |
| **KNR 3.3 – How orchard farmers could benefit from automation and advanced technology?**<br>*Daria Batukhtina (Kubota Innovation Center Europe)* |

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