

# Summer School on agroecology and animal production

## 26 - 29 june 2017

### **1. Theoretical frameworks for an agroecological transition of livestock farming systems**

#### 1.1. Systems thinking in animal sciences

*Imke de Boer (WUR, Department of animal sciences)*

The concept of systems thinking, and its importance to solve complex problems, such as feeding the world sustainably. first explain the difference between reductionism and systems thinking, and subsequently introduce the basics of systems thinking: what is a system? How to define the boundary of a system? What is system hierarchy? And what are emergent properties? The exact definition of a system will depend on your research question and the socio-economic context of the system. Finally, a food systems lens is needed to determine the role of animal-source food in a sustainable food system.

#### 1.2. Principles of agroecology applied to livestock systems

*Magali Jouven (UMR Selmet)*

The diversity of animal farming systems and the concept of agroecology itself make it impossible to identify generic models of agroecological animal production. Though, as was done for plant production by Altieri, general principles can be drawn, and used for the adaptation or re-design of management strategies in a wide range of animal farming systems. These principles question the mere foundations of agricultural production and our relationship to nature. Thus, they challenge also pastoral or grassland-based farming systems in temperate regions, which are often considered as sustainable and nature-friendly, while in fact they could do with a little “agroecological lifting”.

### **2. How to realize the transition: practices to ensure compliance to agroecological principles**

#### 2.1. Ecosystem function in a complex environment: challenges of understanding grazed grasslands

*Juliette Bloor & Katja Klumpp (UR EP)*

Grazed grasslands are confronted by meeting multifunctional objectives and sustainable agricultural production against a background of changing environmental conditions and socio-economic uncertainty. Although there is a clear societal demand for accurate accounting of services delivered by grasslands, key aspects of

ecosystem function in grazed grasslands are difficult to predict due to the high spatial heterogeneity induced by grazing animals. We consider the challenges of linking fine-scale processes to broader-scale patterns of grassland function, and the different approaches that can be used for the prediction of field-scale performance.

## 2.2. Impacts of applying agroecological principles on animal health and welfare

*Gwenaël Yourc'h, Cécile Ginane (UMR Epia) & Isabelle Veissier (UMR H)*

To address ways to improve animal health and welfare using agroecological processes. The behavior and the robustness of animals are of prime importance. Management of animal health and one on the basics in behavior. Description of present dominant models of intensive dairy productions; Identification of the health and welfare problems associated to these and how they are managed; proposition of an alternative production model and thinking on how to make the transition from intensive to an agroecological model.

## 2.3. Animal traits for agroecological livestock systems

*Luciano B. Mendes, José Pires, Fabienne Blanc, Muriel Bonnet (UMR H) & Laurence PUILLET (UMR MoSar)*

Agroecological livestock farms are, by default, characterized as open systems in which (nutritional & environmental) parameters are very dynamic. Extreme nutritional & environmental challenges are not unusual in this type of systems, and allow for the stratification of herds in subgroups between more and less robust, via natural variability of innate traits at multiple scales: individual, herd and intra-breed. Conventional/traditional approaches to assess livestock robustness in production systems, have considered it as a function of a « one-trait » only. We have proposed to develop a more complete/integrative « multi-trait » strategy, via trade-off analyses of life functions prioritization, for instance, under systemic perturbations. Finally, we go out /step out of the boundaries of an agroecosystem, and generalize the concept of robustness to more modern semi-intensive or intensive livestock setups, which are driven by optimum productivity.

## 2.4. Grazing dairy cow system and cheese transformation

*Patrice Chassard (Bois Joli farm), Benoit Martin (UMR H)*

Saint-Nectaire is a famous semisoft washed rind cheese manufactured in dairies or farms in the small area of the volcanic plateau of Mont-Dore. PDO granted, the Saint-Nectaire is the first farmhouse cheese in France, manufactured twice a day often by women. It is made with unpasteurized milk produced by Montbéliarde, Holstein and sometimes Salers cows mainly fed diverse mountain grasslands. This local traditional cheese is essential for maintaining the rural life in this mountain area. Bois Joli farmhouse is a Saint-Nectaire cheese manufacture using a summer mountain pasture area neighboring the Puy de Sancy, the highest summit of Massif Central. This farm is experiencing in practice some of the principles of agroecology (reducing inputs,

integrated management of animal health, preservation of the grassland biodiversity and natural microbial ecosystems...).

### **3. Assessment of livestock systems under agroecology transition**

#### **3.1. Mixing herbivorous species on the same farm: advantages and disadvantages**

*Sylvie Cournut (UMR Territoires), Claire Mosnier (UMR H), Géraldine Fleurance (UMR H), Geneviève Bigot (UMR Territoires)*

Advantages and disadvantages of mixing animal species on the same farm. Synthesis of the different domains cited (resource valorization, profit maximization, risk management, marketing, work complexification, etc.). The advantages of mixing cattle and draught horse for the valorization of forage resources. The functioning of dairy cattle and meat sheep farms and analyses the links between the imbrication of the two species and the flexibility of the system. The economic risk management in farms mixing cattle and meat sheep

#### **3.2. Multi-criteria assessment: from farm to regional level**

*Olivier Godinot (UMR SAS), Fabien Stark (UMR Innovation)*

Multicriteria assessment (MCA) is a decision-making tool used to evaluate complex systems with regard to various and often conflicting objectives. A large number of MCA tools are used in agricultural research and development. I will present a few of them and illustrate them with examples at farm and regional levels. The interests and limits of these methods will be presented and discussed with the participants, as well as their potential to evaluate agroecological practices and conceive innovative farming systems and territories.

#### **3.3. Nutrient Cycle Assessment approach**

*Theun Vellinga (WUR, Wageningen Livestock Research)*

The NCA has been developed as an interactive approach with stakeholders and experts to assess the effect of (proposed) interventions -activities, measures, policies- on closing of nutrient cycles and related trade-offs. The NCA works at multiple spatial levels and is aiming at increasing a shared insight amongst stakeholders in the effect of interventions, the NCA facilitates stakeholders in taking actions.

### **4. Innovations to allow the agroecological transition**

#### **4.1. Shrub battle: Agroecology at the field level - Modelling**

*Yves Michelin (UMR Territoires)*

The aim of the SHRUB BATTLE board game is to help tutors make future rural planners aware of the complex relationships between landscape dynamics and agricultural practices. It provides a novel illustration of vegetation dynamics.

#### 4.2. Participative conception of scenarios of crop-livestock integration

*Julie Ryschawy (UMR Agir)*

Integrating crops and livestock is an agroecological option for agricultural systems, that enables maintaining production levels while limiting environmental impacts. To cope with these challenges, there is a need to design scenarios to better integrate crops and livestock. As innovations may be adopted if they are conceived with farmers, I will focus on a serious game, the Forage Rummy. We design and test scenarios favoring more autonomy in animal feeding on a dairy farm.

#### 5. Role, impact and services provided by European livestock production

*Bertrand Dumont (UMR H), Julie Ryschawy (UMR Agir)*

Collective scientific expert report on European livestock systems and their products. Their roles, economic, social and environmental impacts, and the market and non-market services they render to society, were analyzed by means of a major synthesis of data from the international bibliography. The collective scientific expert report considered simultaneously: markets, employment and work in livestock units, the consumption of inputs, the environment and climate, and social and cultural issues, etc. An initial analysis of each dimension produced an inventory that covered the elements listed below.