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## UNDERSTANDING, REDESIGNING AND IMPROVING FEED SELF-SUFFICIENCY IN LIVESTOCK FARMING

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### 1 – Introduction

In recent decades, the livestock farming model has resulted in a sharp increase in agricultural production. Livestock intensification was based on (i) the high production potential using selected animals and plants, (ii) the use of inputs to minimise the effects of environmental variability. In this context, a major challenge for livestock farmers is to simultaneously contribute to human food and nutritional security, based on limited resources, while reducing the negative impacts of agriculture on human health and the environment (Duru et Therond 2015). Many researchers propose agroecology as a promising way to overcome these challenges (Dumont et al. 2014; Altieri et al. 2017). In agroecological approaches, self-sufficiency appears as a central concept to improve the sustainability of livestock systems (Magne et al, 2019).

For French dairy sheep, the high use of inputs affects farmers' incomes and degrades the viability of farms. An increase in feed self-sufficiency (FSS) could be a way to get off a relevant start for the agroecological transition, but according to different patterns of agroecological levers implemented by farmers (Thénard et al. 2018). The redesign of the system toward improved the FSS must take into account the local and social characteristics of farmers and the supply chains. Despite this, the FSS implementation by farmers remains uncertain and scientists want to have a better understanding of their development conditions. In this article, we propose to identify among farmers and advisors the different perceptions of FSS and the means by which they intend to achieve them.

### 2 – Materials and methods

This study was carried out in the two main French dairy sheep areas producing PDO cheeses: Ossau-Iraty PDO for the department of Pyrénées Atlantiques; and Roquefort PDO for the departments of Tarn and Aveyron. The choice of these two regions should make it possible to identify levers for FSS, to compare and analyse in a context of two different socio-technical systems. We organized two participatory workshops in each



region: one with advisers and technicians and the other with farmers. To design a shared representation of a FSS breeding system, we used a method using the serious LEGO® game. These workshops were followed by an individual approach with ten farmers' interviews.

### 3 – Results – Discussion

The issue of FSS is included in the PDO cheese specifications. All actors seem to consider that farms need to improve it to maintain the specific features of the cheeses. With LEGO® serious play, participants have built, step by step, a common livestock model based on essential internal components and their links with external actors of the livestock system (Figure 1). Those components were mainly defined by the diversity of grasslands and cultures. The links with external actors included supply-chains, agricultural development, banks, and social organisations.

First, for farmers and technicians the FSS could be improve with different internal solutions: grazing management, increasing resource diversity, use of legumes in meadow... For all the groups, a shared way has identified to increase the FSS on farms: barn hay drying because this conservation process can improve the quality of fodder and therefore limit the supply of concentrate. However, this solution was considered at different scales in the two regions: at the farm level for Roquefort area ; and at the territory level for Ossau-Iraty area for collective use. Second, the issue of FSS is relevant at different levels in the two regions. For the Roquefort area, FDD is mainly defined at a farm level by improving it with technical solutions. For the Ossau-Iraty area, the FSS is developed on a territory scale and relies on cooperation between actors, for example between breeders and crop farmers. This territorial level involves interactions between mountains and plains and is a mean to achieve self-sufficiency at the territorial level.



Figure 1: an example of FSS farm modelling by farmers with the Lego® serious play

During the individual interviews, farmers have explained their perception and levers usable for FSS development at the scale of their farm. The interviews have generally confirmed the results designed with LEGO® method. In the Ossau-Iraty area farmers had expressed the same perceptions of FSS and practices to implement it, independently of the type of farming systems. These convergences suggest that agricultural advice could be similar to improve the FSS for all farms. In the Roquefort area, farmers have expressed

different levers to improve the FSS of their farm. Even though the majority of farmers has cited the barn hay drying, each of them suggests improving FSS by different ways: grazing management, crops development, high-diversity sown meadow use ... These levers depend of the practices already used by farmers, and agricultural advice ought to be specific to improve the FSS for each farms.

#### 4 – Conclusions

LEGO® serious play were used in different managerial contexts (governance, corporate strategy and management of transformations). In our project, the playful use of LEGO® serious play was an interesting method of design in agriculture. This collective design of the components of a livestock system allowed participants to exchange and build a common description of a FSS system without *a priori*. Beyond the technical dimensions, the FSS of a farm is reached when the farmer feels autonomous that means when I can decide about the strategic or management choices. This study is an important step for the agro-ecological transition of these local contexts. In addition, the study can contribute to challenge changes in livestock from the global to the local level identifying obstacles and levers for the transition.

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