ASEA

Agroecology in SouthEast Asia

1st ASEA PhD Days

Virtual meeting

1st - 2nd December, 2021 | 14:00-17:00 GMT+7

Agroecology and Safe Food System Transitions

SELMET

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT

l'institut Agro
agriculture • alimentation • environnement
SupAgro Montpellier

Ecole Doctorale GAIA
Biodiversité
Agriculture
Alimentation
Environnement
Terre
Eau

Contributions of crop-livestock integration and diversification of farming systems to the sustainable development of a territory and farms in the context of specialisation in Vietnam.

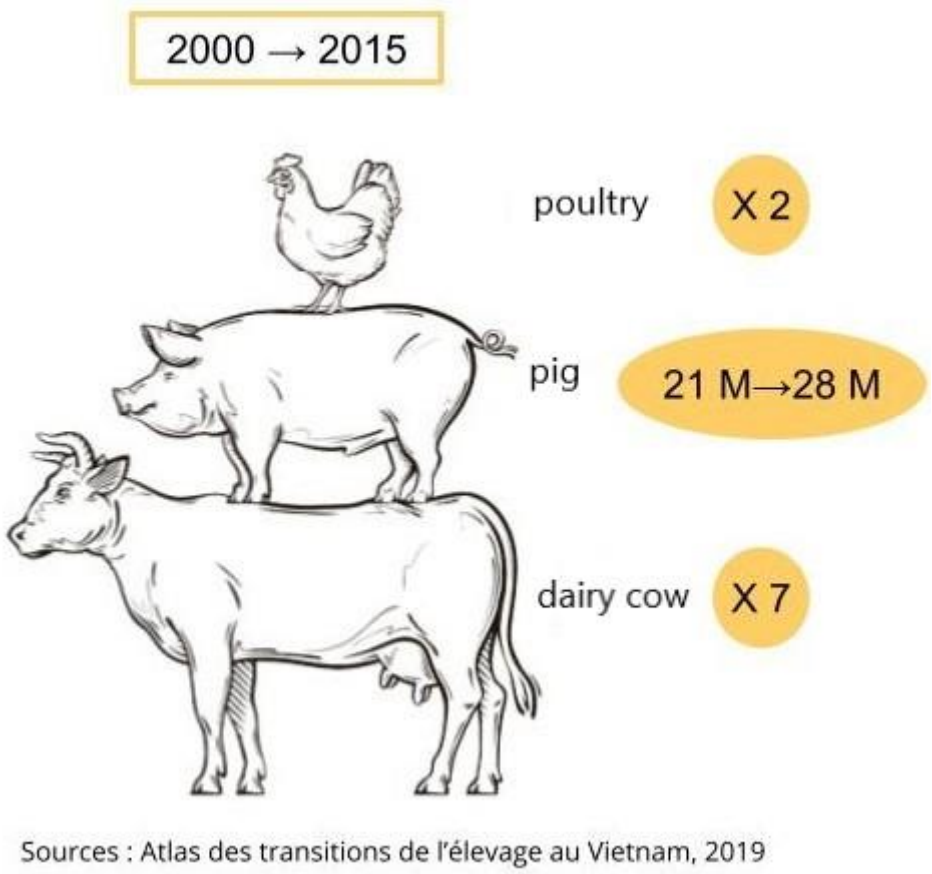
Le Trouher Alice

1st ASEA PhD Day | 1st - 2nd December 2021

PhD Framework

- GAIA Doctoral School, **UMR SELMET (CIRAD)**, Institut Agro (Montpellier, France)
- Director: **Charles-Henri MOULIN** (Deputy Director of UMR SELMET, teacher-researcher, Institut Agro, Montpellier)
- Co-supervisor : **Mélanie BLANCHARD** (Researcher UMR SELMET, CIRAD/NIAS, Hanoi, Vietnam)
- **March 2021 → February 2024**
- Funding**: ½ ASSET grant + ½ CIRAD grant**

Context



Sources : Atlas des transitions de l'élevage au Vietnam, 2019

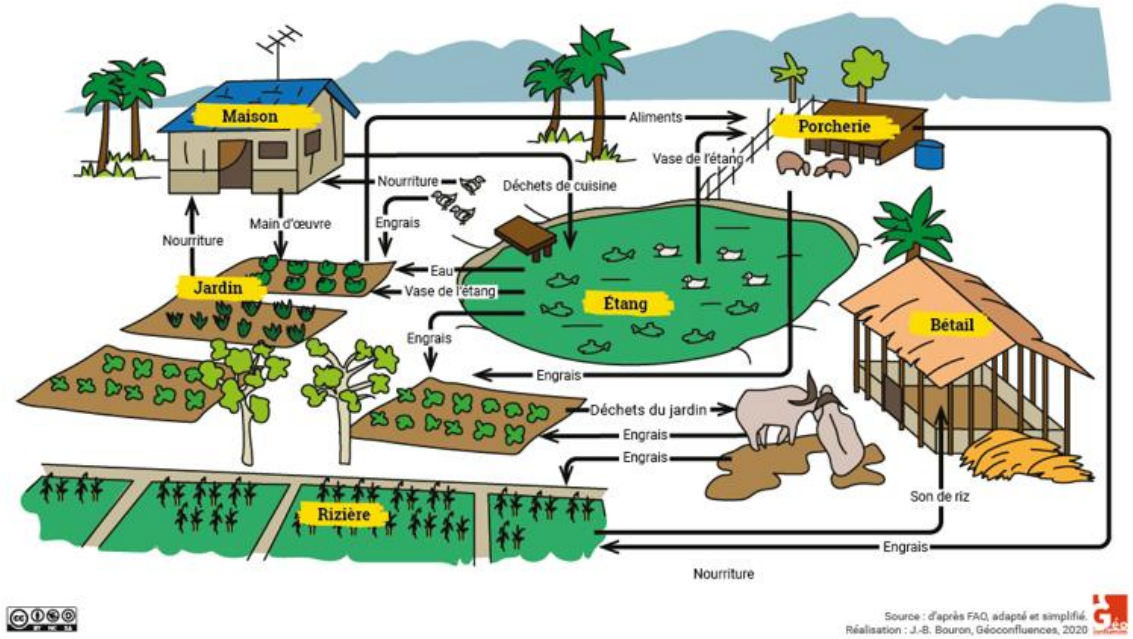
- Strong **demographic and economic growth.**
- **Increased meat consumption**, aim to become a major exporter to the ASEAN/China market. [1]
- **Specialisation and intensification** (development of commercial farms, specialisation of small farms). [2]
- Population employed in the **agricultural sector: 40.2%** in 2017. [3]

Context

Crop-livestock integration

++ **biomass and energy exchanges** between livestock and crop systems within and between farms. [4]

→ **increase in productivity**, **valorisation of plant resources** (products, crop residues, fallow land…), maintenance of **soil fertility** and improvement of the s**ustainability** of livestock systems and territories. [5,6,7,8]



Source : Cesaro, 2020.

Problematic

These changes in the agricultural sector and farming methods call into question crop-livestock integration practices and the existence of diversified family farms.

Development issues in the agricultural and livestock sector

Scientific and agronomic issues

Research question

What are the contributions of crop-livestock integration and diversification of farming systems to the performance and sustainable development of a territory and farms in the context of specialisation in Vietnam?

Sub-Questions & Hypothesis

SQ1: What strategies are adopted by the farms and, in particular, what are the **forms of diversification and crop-livestock integration** in the study area and what are the **evolutionary trajectories** of these practices?

H1: There is a **diversity of forms of crop-livestock integration** and modes of diversification of agricultural activities, depending on the territorial context (topography, available resources, history) and the situation of farmers (ethnic group, family history, etc.). This diversity is the **result of past and recent transformations**, and **the study of evolutionary trajectories provides a better understanding of future changes.**

Sub-Questions & Hypothesis

SQ2: **What scenarios** can be envisaged, taking into account the evolutionary trajectories and the will of stakeholders, in order **to assess the effects of changes in crop-livestock integration practices at the farm and territorial levels?**

H2: The growing demand for meat, the Vietnamese government's incentives, and the local context (scarcity of arable land, demography, climate) lead us to **consider different types of evolution scenarios**: the **specialisation** of certain small family farms, but also the **development of new crop-livestock integration models** at the territorial scale (between specialised farms, for example).

Sub-Questions & Hypothesis

SQ3: **What are the contributions of crop-livestock integration and diversification** to the **environmental and productive performance and sustainable development** of farming systems?

H3: Crop-livestock integration practices and diversification of agricultural activities have **variable effects on the performance and sustainable development** of farming systems and the territory, **depending on a number of indicators** (level of integration, type of farm, sustainable development components considered, etc.).

Area of study

Dien Bien Province & Son La Province

Dien Bien District

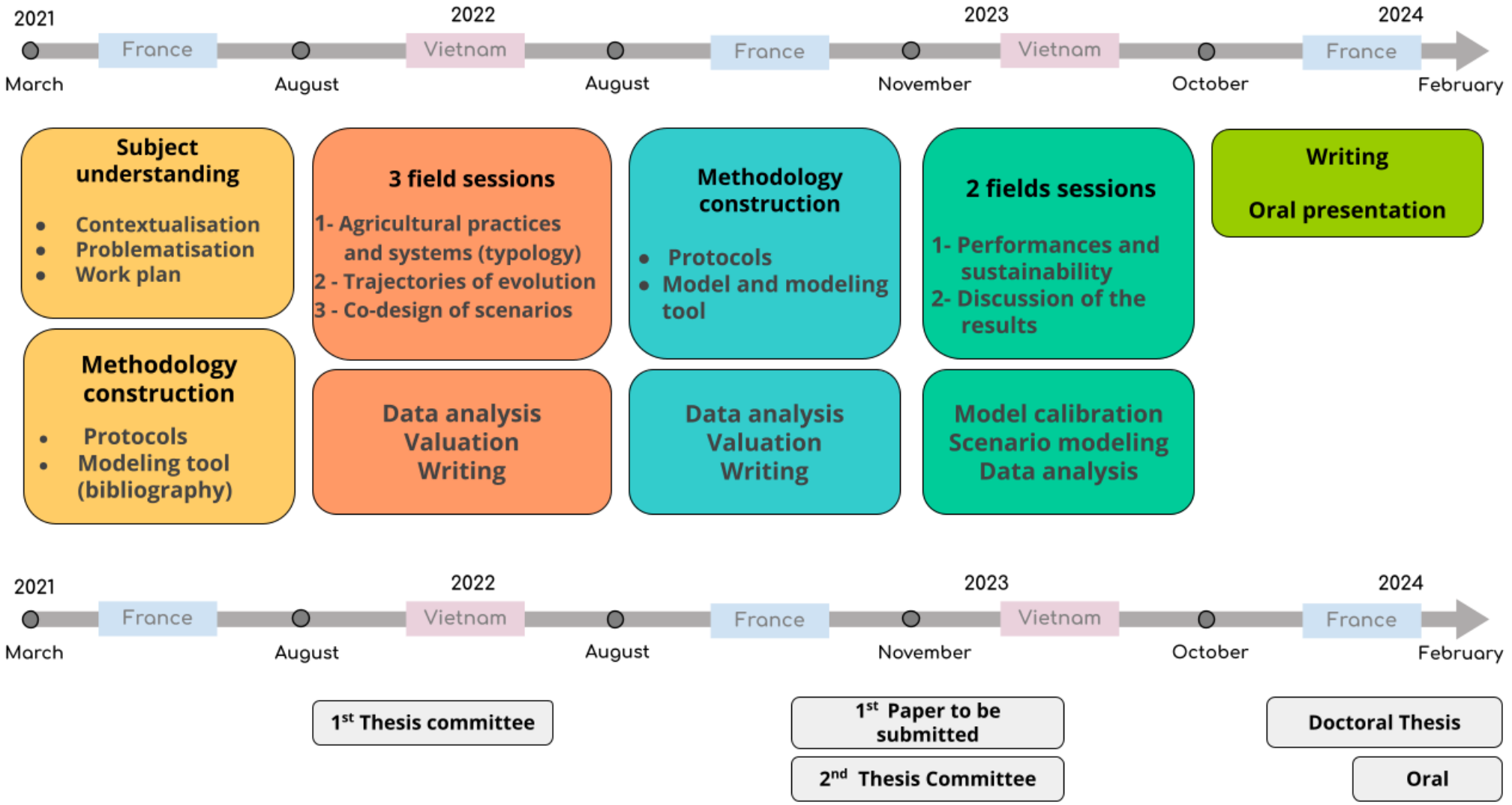
- 9550 km2, 600,000 inhabitants
- lowlands: rice cultivation (8%)
- slopes: corn crops, forests
- altitude: pasture, fallow land, forests
- Importance of bovo-bubaline livestock and coffee production in the agricultural economy. 9

→ Dien Bien: Province at the beginning of the development of its agriculture.

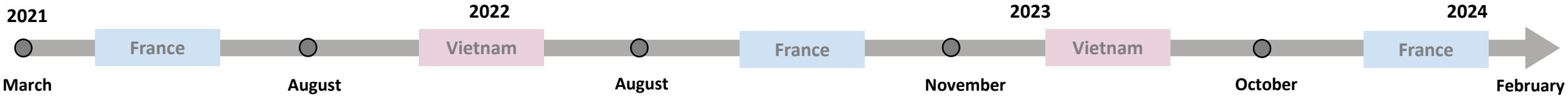
→ Sơn La: ongoing development and intensification.

Source : Carte du Vietnam adaptée de wikipédia

Planned Schedule



Method (i)



Subject understanding

- Contextualisation
- Problematisation
- Work plan

Methodology construction

- Protocols
- Modeling tool (bibliography)

3 field sessions

1- Agricultural practices and systems (typology)
2 - Trajectories of evolution
3 - Co-design of scenarios

Data analysis
Valuation
Writing

(i) Understand the diversity of forms of crop-livestock integration and diversification at farms and territory levels, as well as their recent trajectories.

❖ **Methodological point**

1- Adaptation of elements of comparative agriculture and design of a typology based on expert opinion [10,11]

2- Open-ended individual interviews with resource persons who have information on the evolution of farming systems and the territory over the last 10 years. [12]

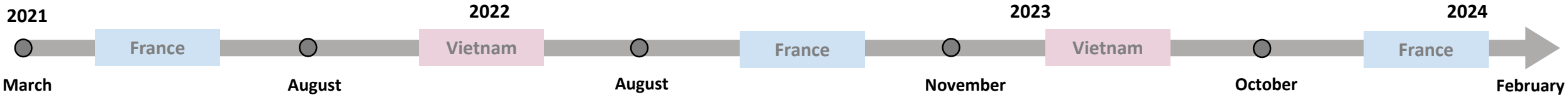
Expected results (i)

Farms types et trajectories :

- X types of farms subdivided into Y subtypes, **characterised by the diversity of agricultural activities and integration practices**. In particular according to the available arable land, the number of animals, the size of the family, the location of the farm but also according to the management systems.

- The study of farm trajectories allows us to **identify the major changes** that have taken place and the **drivers of these changes** over the last 15-20 years. In particular, changes in activities, specialisation, diversification, cessation of activity.

Method : (ii)



Subject understanding

- Contextualisation
- Problematisation
- Work plan

Methodology construction

- Protocols
- Modeling tool (bibliography)

3 field sessions

1- Agricultural practices and systems (typology)
2 - Trajectories of evolution
3 - Co-design of scenarios

Data analysis
Valuation
Writing

(ii)Co-construct scenarios (individual and collective) for the evolution of agricultural practices at farms and territory scales, based on the trajectories of the farms and by mobilizing a participatory and prospective approach.

❖ **Methodological point**

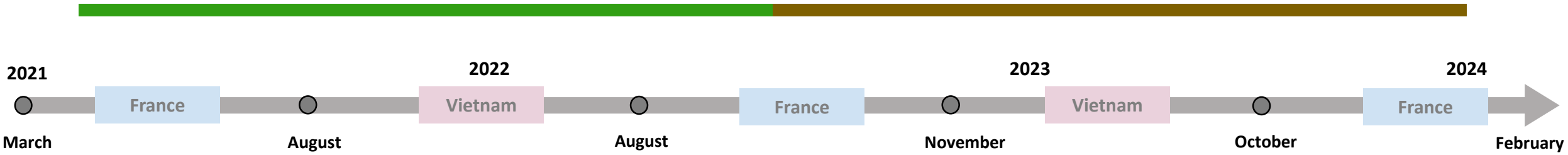
Organisation of workshops bringing together diverse and complementary actors and experts to co-construct the scenarios.

Expected results (ii)

Scenarios ideas

- **Current situation** : evaluation of the effects of current practices of crop-livestock integration and diversification
- Establishment of 1 or **more fattening big cattle farms,** fodder supply is provided by family farms in the area which have specialised and have land for crops.
- **Grouping of some mixed farms into a cooperative** in order to improve market opportunities and selling prices, collective management of herds.
- Development of value chains with **new labels** ; diversification of some farms and specialisation of others for these value-added products.

→ **These potential scenarios will be discussed, added to or deleted with farmers and stakeholders and others will emerge from our future work, including interviews and workshops.**



(iii) Conception and use of a model, to **represent the diversity** of farms, to model **biomass flow, to assess the performances associated with CLI, to assess the effects of changes** in agricultural practices on the performance and sustainable development of farms and the territory.

Methodology construction

- Protocols
- Model and modeling tool

2 fields sessions

1- Performances and sustainability
2- Discussion of the results

Data analysis
Valuation
Writing

Model calibration
Scenario modeling
Data analysis

❖ Methodological point

- 2 scales: farms and district
- Tool(s): considering the use of an excel tool

Expected outcomes

Assessment of the impacts of the scenarios

→ **Understanding the effect of the scenarios for each indicator** in order to gain visibility on the following issues: soil fertility, fodder resource management, food sovereignty, maintenance of agricultural employment at the farm and territorial levels.

→ Integration and diversification of crop-livestock farming **can improve productive, environmental and social performance in certain contexts** (scale, type of farms, etc.) that will be defined.

References

1 Enquête réalisée récemment par l'Office générale des statistiques, Lettre agro ASEAN été 2021

2 **Cesaro J.-D., Duteurtre G., Nguyen Mai Huong** 2020. Atlas des transitions de l'élevage au Vietnam :1986-2016. 65 p.

3 FAO, 2017

4 **Lecomte L.** 2016. L'impact de l'intégration agriculture-élevage sur les services rendus par l'agriculture à son territoire : élaboration d'un modèle de simulation permettant une approche par scénarii à l'échelle d'un territoire méditerranéen. Cas du géoTerroir Vallée des Duyes - Thoard.

5 **Stark F., Fanchone A., Semjen I., Moulin C.-H., Archimède H.** 2016. Crop-livestock integration, from single practice to global functioning in the tropics: Case studies in Guadeloupe. *European Journal of Agronomy*, **80** : 9-20. doi: 10.1016/j.eja.2016.06.004.

6 **Lhoste P.** 2004. Les relations agriculture-élevage. *Oléagineux, Corps gras, Lipides*, **11** (4-5) : 253-255. doi: 10.1051/ocl.2004.0253.

7 **Bonaudo T., Bendahan A.B., Sabatier R., Ryschawy J., Bellon S., Leger F., Magda D., Tichit M.** 2014. Agroecological principles for the redesign of integrated crop–livestock systems. *European Journal of Agronomy*, **57** : 43-51. doi: 10.1016/j.eja.2013.09.010.

8 **Veysset P., Lherm M., Bébin D., Roulenc M.** 2014. Mixed crop–livestock farming systems: a sustainable way to produce beef? Commercial farms results, questions and perspectives. *Animal*, **8** (8) : 1218-1228. doi: 10.1017/S1751731114000378.

9 DARD, 2021

10 **Cochet H., Devienne S.** 2006. Fonctionnement et performances économiques des systèmes de production agricole : une démarche à l'échelle régionale. *Cahiers Agricultures*, **15** (6) : 578-583 (1). doi: 10.1684/agr.2006.0028.

11 **Perrot C.** 1990. Typologie d'exploitations construite par agrégation autour de pôles définis à dire d'experts : Proposition méthodologique et premiers résultats obtenus en Haute-Marne. *INRA Productions Animales*, **3** (1) : 51-66.

12 **Moulin C.-H., Ingrand S., Lasseur J., Madelrieu S., Napoléone M., Pluvinage J., Thénard V.** 2008. Comprendre et analyser les changements d'organisation et de conduite de l'élevage dans un ensemble d'exploitations : propositi. In: *L'élevage en mouvement. Flexibilité et adaptation des exploitations d'herbivores*. Paris : QUAE : p. 181-196.