Animal domestic biodiversity in farms: considering social interactions surrounding the farms together with farming systems specificities

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Abstract: *Animal domestic biodiversity is recognized as a lever for agro-ecological transition in livestock farming. On territories, the consequences of the use of local breeds in terms of territorial dynamics and social interactions surrounding the farm, and their connection with food production need to be more investigated. We make the hypothesis that their use is a mean, for farmers, to create social links with others actors in a territory. We conducted case studies of two French farms, exemplary as regards their interactions with various stakeholders, using local breeds from deferent species (cattle and sheep) in contrasted territories. We propose an approach (i) to identify persons concerned by the farm and its production (goods or services) (ii) to characterize point of view of actors that interact with farmers on territories and their related practices. Related social interactions surrounding local breeds farms can be of importance, and not only as "side effects" but as part of farmers'projects. The development of educational projects for instance or the close links with consumers rest on specificities of the livestock farming systems, of breeds' abilities, and the food produced but can also contribute to reinforce the visibility of the farmer, its activity and its products. We than discuss the possible contribution of such a focus (on social interactions surrounding the farm and links with farming systems and food production) to approaches of agroecological transition that takes into account both sociotechnical and socioecological dimensions.*

Keywords: *Agroecology, domestic biodiversity, social interactions, education, territorial development, livestock farming systems*

Introduction

Animal domestic biodiversity is recognized as a lever for agro-ecological transition in livestock farming (e.g. Dumont et al., 2013). On territories, the consequences of the use of local breeds, in terms of landscape shaping, linked to their rusticity, and in terms of food production, especially typical food products have been the object of several studies (e.g. Verrier et al., 2005). Actually, the contributions of the livestock farming systems using those breeds are acknowledged as very diverse, including contributions with social dimensions, which are less studied. Furthermore, knowing better this diversity of contributions is at stake for several reasons. First of all, the consequences of the use of local breeds in terms of territorial dynamics should be more investigated. Second, those contributions are dynamics and in interrelations, and can contribute through a diversity of processes to add value to the local breeds themselves and to the associated livestock farming systems (e.g. Lauvie et al., 2018). In a context where more and more attention is payed to ecosystem services produced by agroecosystems, studies underline the interest to consider all kind of services, including the ones with social dimensions, and to study the underlying processes (socio ecological and technical processes) (Lescourret, Magda et al., 2015). Such a statement involves considering stakeholders related to agroecosystems, and their practices (Lescourret, Magda et al., 2015). Social interactions surrounding the farm, and their connection with farming systems and food production need to be more investigated, and qualitative analysis are necessary to investigate such aspects (Beudou et al., 2017). Are the use of local breeds and the livestock farming system associated, a mean, for farmers, to create social links with others actors in a territory? The aim of this paper is to question, thanks to two farms cases,

what are social relations that are developed around them, and what role play the local breed and the farming system associated in such relations.

Identifying stakeholders concerned by a farm and interviewing them

We conducted case studies of two French farms using local breeds, that were considered exemplary as regards their interactions with various stakeholders. They were identified thanks to previous studies conducted, that has allowed identifying that those farms were developing relations with various types of stakeholders[1]. One of the farms is using a local cattle breed, the *Bretonne Pie Noir*, while the other is using a local sheep breed, the *Raïole*. They are situated in contrasted territories. The First one, with *Bretonne Pie Noir*, is in the Western part of France, in the North-eastern part of *Pays de Loire* region. The other, with *Raïole*, is located at the foot of the *Cevennes* Mountain in south-eastern France, in a Mediterranean area called *garrigue*. None of the farms interviewed are situated in the cradle of origin of the corresponding breed, but in an adjacent area.

To identify persons concerned by the farms and their productions (goods or services), we have first interviewed the farmers (one of the two farmers was interviewed by phone, and the other farmer was interviewed face to face). The themes of this first semi structured interviews were the role of interactions with other stakeholders in the project and practices, and the identification of persons concerned by the farm activity from the farmer's point of view.

Then we have identified, together with the farmer, stakeholders to interview. We conducted semi structured interviews with them. Seven interviews with stakeholders were conducted at the foot of the *Cevennes* Moutain for the *Raïole* case, while four stakeholders were interviewed by phone for the *Bretonne Pie Noir* case. The themes addressed during those second stage interviews were the modalities of interactions with the farm, the point of view on those interactions, the point of view on the livestock farming system and on the breed, the other interactions in link with livestock farming activity.

In the *Raïole* case, the farmer was also interviewed a second time, during shepherding, after a first set of stakeholders' interviews. Actually this first set has highlighted the need to deepen the knowledge of the livestock farming system, and in particular the organisation of the rangeland valorisation among the year by the flock, as it appeared as a key element for interactions.

The interviews and phone interviews analysed in the present paper have taken place between December 2017 and February 2018. Notes taken during interviews were analysed to identify the diversity of stakeholders concerned by interactions with the farm and precise the type of interactions, in their dynamics. Specific attention was also given in the analysis to the place given to the breed and the farming system in the interactions.

The diversity of stakeholders concerned by the farm and the diversity of links with the farms and the farmers

[1] One of the farmer was identified through interviews conducted during a student internship in 2016 (Nozières-Petit and Lauvie, submitted), the other during workshops gathering local breeds' farmers, conducted in 2017, in the frame of a project leaded by the Federation of Local breeds of Brittany (*Fédération des races de Bretagne*) (project still on going, funded by the *Fondation de France*).

The diversity of stakeholders identified by the farmer as interacting with the farm.

During the first step interviews, the farmers have identified a diversity of stakeholders that have interactions with the farms. In both cases, the farmer has identified other livestock farmers (individuals or organized in collective associations or working groups), customers who buy products from the farm, school teachers and pupils, organizers of local events where farm products can be sold (market for Christmas or other occasional market), friends and/or neighbours who give a hand when needed. Specifically, in the case of the *Raïole* were also identified passersby or inhabitants who see the flock when it grazes close to a road, private landowners, local public authorities, natural area's or forest's management institutions, stakeholders using the same territory (hunters), technicians of extension services and a veterinary. Specifically, in the case of the *Bretonne Pie Noir*, participants to cultural activities organized in the farm were also identified (as they organize shows with artists and festive meals in the farm), as well as local associations, like the one that manages a solidarity grocery in a close village.

We have grouped the stakeholders identified in categories (see table 1). Among those stakeholders identified by the farmers, several were interviewed during the second stage so that each category was represented by at least one person interviewed (except school teacher and pupils and other livestock farmers who could not be interviewed at this stage).

Type of Stakeholders mentioned ((R) when specifically mentioned in *Raïole* case and (B) when specifically mentioned in *Bretonne Pie Noir* case)	**Examples of stakeholders**
Other livestock farmers	Colleagues using the same breed or the same territory, working group
Customers	
School teachers and pupils	
organizers of local events where farm products can be sold	Organizer of market for Christmas, member of an association organizing occasional market
friends and/or neighbours who give a hand when needed	
passersby or inhabitants (R)	
private landowners (R)	
local public authorities (R)	
stakeholders using the same territory (R)	hunters
Farming, Livestock farming or environmental management stakeholders (R)	technicians of extension services, a veterinary, natural area's or forest's management institutions
participants to cultural activities organized in the farm (B)	
local associations that manages a solidarity grocery in a close village (B)	

Table 1: Stakeholders identified by farmers as interacting with them and their farm : categorisation and examples.

The stakeholders interviewed were customers who buy products of the farm, local authorities of the village where the farm is settled, organizers of local events where farm products can be sold, landowners, persons involved in the same association as the farmer outside of the farm, persons who participate to events on the farm (meals or shows). We also met the head of local hunters' association who use the same territory, a technician of extension services, a village inhabitant and a person who give a hand to the farmer when organizing events on the farm. Each person interviewed can belong to several categories (for instance a customer can also be involved in the same association as the farmer).

The diversity of links between stakeholders and the farm and farmers.

Contrary to approaches where beneficiaries are strictly distinguished from providers of services, we here observe that in all the interactions there is a mutual contribution and a mutual benefit, to a certain extent.

However, in some cases the reciprocal benefits are more obvious, like for the sale of products from the farm, or the fact to furnish a service (brush clearing, fire prevention, land fertilization etc.) while benefiting the feed resource from the pasture.

In other links, the farmers appear more as the main service providers. That is the case with educational or cultural services, when pupil and teachers are welcomed in the farm or close to the flock, or when shows are given on the farm. That is also the case while the farmers, talking about the farming activity, increase awareness on this activity. That is the case as well through the establishment of a sheep farming activity in *Garrigue*, which is a way to go on with a former activity in the area. Another link concerned is the involvment in association activities outside the farm with an aim to contribute to local social links (like with the involvement in the association that manage locally a solidarity grocery). The fact to care about giving to other stakeholders the possibility to utilize the same areas for different utilization can also be considered in this category, as well as the stabilization of the landuse (when areas utilised are recognised for agricultural use).

In the last category of links, the farmers appear more as beneficiaries of services, like for instance when friends give a hand when a show is organized, or when various stakeholders (extension services, local authorities) contribute to facilitate the farm settlement.

Social interactions set in temporal and spatial dimensions

All these social interactions are inscribed in a temporal dimension.

For each interaction, a distinction could be made between the first step, the creation of the interaction, and the following steps, that ensure the persistence of the link.

<u>The first steps of the interactions</u>

The creation could be on the initiative of one part or the other. For example, the reception of educational project is, in the *Bretonne Pie Noir* case, on the demand of the teachers, and for the ***Raïole*** case, on the initiative of local authorities and farmer.

Furthermore, the creation could be mediated by other stakeholders. For example, in the ***Raïole*** case, local authorities contacted the private owners to incite them to rent their lands to the farmer, co-organized with the farmer a feast for her installation. Other links (like contacts for buying meat) can be initiated fortuitously, for example, by meeting the farmer on the way side while shepherding.

<u>Maintaining the interactions: saving time for exchanges and using other mediating tools.</u>

For the persistence of the links, the fact that farmers create moments for meeting and save time for exchanges appears important (sales, events on farms, periods of shepherding near the village etc.). In the *Bretonne Pie Noir* case, a customer insists for instance on the importance for him of moments shared discussing with the farmers when he comes to buy products. Farmers are also aware of this importance. One for instance underlies her taste for talking with people. The other notices for example the increasing knowledge of the farming system by persons with whom the interaction is regular, and who address more and more precise questions. We observed that the links evolve during time. Some persons change their status and become friends of the farmers, more than collaborators or customers for instance. The level of knowledge of one another is modified and increased.

Exchange of information and interactions can also be mediated by intermediate tools (like e-mails, municipal information sheet, satisfaction questionnaire for meat sent through internet, text messages on mobile phone…) or rest on set ups not dedicated specifically to the farm (like a temporary market organized locally for instance).

For this dimension of maintaining exchanges, the contribution the farmers 'personality is visible in both cases (local authorities underline in one case that they initiated the contact with land owners and the farmer « have done the rest »). Moreover, in one of the case the fact that the farmer has been trained in a recognised shepherd school, is mentioned as contributing to her credibility. Other existing links between stakeholders can also play a role, like in one case the fact that the head of hunters 'association is family related to one land owner, and in other case the fact that several customers – and friends - are also involved in the same association for local solidarity grocery. In the *Raïole* case, the fact that the farmer lives in the village is also important for different stakeholders.

Lack of understanding and difference of appreciation under the same situation also exist. Some links, especially not essentials for farming activity can be hard to maintain, or to strengthen, due to circumstances, like, for the interaction with the teachers of the village in the *Raïole* case, a difficulty to organize regular exchanges with pupils after the first experiences.

<u>The role of the farming system in the interactions maintenance: from technical choices to products' quality.</u>

Technical choices within the farming system can also participate to establishing or maintaining the links. In the *Raïole* case, the outdoor system and the feeding system based on mobility, make the farmer particularly visible, valorising the lands in the village, which induces the appreciation of stakeholders.
However the very same system can also raise questions from stakeholders, like for instance in the *Raïole* case, the fact that some technical choices (integral outdoor system and combination of mobile parks and shepherding) are different from the traditional practices, or the fact that several stakeholders are worried about the possibility to earn a living with this system. In the same *Raïole* case, the great exposure to uncertainty (meteorological constraints, availability of the grazing resource) and the associated amount of work demanded is mentioned by a stakeholder from extension services as matter that needs vigilance and reflexion about how to increase the security of the system.
Nevertheless, stakeholders integrate their own experience of what the system produces to build their opinion or make it evolve. Some person notice for instance that the choice of a management of the flock exclusively outdoors, including for the lambing period, finally appear satisfying. The experience of the quality of the food products is a well-integrated by the stakeholders and contribute to sustain the links in both cases. In the Raïole case, some stakeholders also give their vision of the state of the vegetation after the flock has pastured lands.

Spatial embedding of the livestock farming activity

Between the two situations studied, it is to underline that the spatial embedding of the activity is much contrasted. Thus, in the pastoral system of the *Raïole* case, the farmer does not own the land she exploits. Closed interactions are necessary with the owners of the lands she enhances. On the contrary, the *Bretonne Pie Noir* farm is private and spatially clearly delimitated but farmer welcomes on farm non-farming activities, like artistic shows, and reciprocally is involved outside of the farm, for instance in the association for local solidarity grocery.

The local breeds considered as part of a specific livestock farming system that generates social dynamics:

We see in the interviews that social interactions related to the farm activity are of importance, and not only as "side effects" of the farming activity, but as well as a part of farmers' projects. Indeed, this aspect is important for both farmers interviewed, due to their trajectories, their will to contribute to local social links, and as well their own motivations for interpersonal communications. In those interactions, different dimension of the livestock farming activity appears as core element and the local breeds are considered as part of a specific livestock farming system that generates social dynamics (see table 2).

The feeding system valorising rusticity of the local breed

Both livestock farming systems are specific from the point of view of the feeding system, which both respond to agroecological principles by being based on the maximal use of local feed resource. In the *Raïole* case, settled in the *Garrigue* area, the system is pastoral, and the mobility of the flock is a key aspect, with an aim to valorise spontaneous vegetation on a diversity of areas that are not property of the farmer. As a consequence, land use questions are a core stake of social relations surrounding the farm. Indeed, landowners and local authorities provide lands (private properties or commons) to pasture, so an agreement has to be established with the farmer. Moreover, those two categories of stakeholders, together with other users of the territory like hunters or tourists, occupy the same geographic area for other activities. As a consequence, they have views or expectancies about how the farmer should do to contribute, by livestock activity and especially by organisation of grazing, to reach an expected state of landscape. Another consequence of this system, where the flock is often moved (until several times a week) from a small grazing park to another, is that a very large part of the landscape around the village is explored. This give a large visibility to the flock which is mentioned as appreciated by the persons interviewed. In the *Bretonne Pie Noir* case the feeding system is based on the on farm resource (native grasslands are pastured by the herd that is kept outdoors, and hay is given during the period of the year when it is needed, but even during this period the herd have access to the pastures). When discussing this feeding system, several persons mention that an interest of the system is to minimise the cost for the farmer who don't need to buy feed. In both cases, for feeding system, this is the choice of specific practices that contributes to social interactions, and appears important to other stakeholders, more than the choice of local breed itself. However, those practices are facilitated by the characteristics of the local breed, especially its rusticity, and stakeholders interviewed are aware of this aspect.

Animal welfare as a key concern: a less direct connection with the local breed

Animal welfare in the livestock farming system is also a key element in the social interactions. Stakeholders pay attention to this aspect and mention it in their discourse,

particularly in the case of the *Bretonne Pie Noir* case, where the different stakeholders appreciated the good conditions where animals were raised. They quoted the fact that they were raised "free", or closed to "natural conditions", as they were raised outdoors. Several mentioned that they were raised in a system where the calf stays with its mother, and is only separated during the night, the cows being milked in the morning. Indeed, the farmer progressively wish to go from a system producing meat to a dual propose system, to produce meat and to process milk on farm, as their children wish to settle. This aspect of calves staying with the cows is considered as positive by several persons but not related with the breed used. In the case of the *Raïole*, the fact that the flock is outdoor all the time, in particular whatever the meteorological conditions, can be considered as a problem by some persons in terms of animal welfare (this was not mentioned by the interviewed persons but reported by the farmer herself). As a consequence, the farmer, who appears also as paying a lot of attention to the welfare of her flock, has to explain to those persons the principles and interests of such a system, and to explain the adaptation of the local breed to be conducted in such conditions.

The importance of products' direct selling

One of the interactions identified is also directly linked to a common aspect of both farming systems, the use of direct selling. This allows a close link with consumers. Food produced (meat) is appreciated for its taste, its quality, or even the diversity from one animal to another, but it is most of the time not directly related to the breed in the discourses. Such a close link between farmers and consumers contributes to a good knowledge of the farming activity. Reciprocally, other activities can also contribute to reinforce the visibility of the farm, its activity and consequently its products. In the *Bretonne Pie Noir* case, festive meals and artistic shows organized on the farm place are followed for those who wish by a visit of the farm with an explanation of the farming system. In the *Raïole* case, discussions with local walkers or inhabitants occur while sheepherding, the visibility of the flock being especially important as the *Raïole* explores a large landscape around the village.

Knowledge of the breed raised

Most of the interviewed persons know the breed that the farmer is raising and its name. Some interviewed persons mentioned spontaneously the breed quickly in the interview, other mentioned it spontaneously when they were asked about the specificities of the system, the last ones mentioned the breed when they were asked about the type of animal raised. For the interviewed persons it appears that what was important was what the breed allowed in terms of farming system more than the breed itself. As a consequence, the different persons were able to mention the specific abilities of the animals that made them adapted for the concerned farming system. Some have mentioned the rusticity in general for both breeds while other have mentioned specific characteristics. The characteristics mentioned were for instance the adaptation to outdoor systems, the ability to lamb outdoors. the good wool and the fact that it is not sensible to the cold for *Raïole*, and the small size, the fact that it is approachable (in terms of behaviour), the fact that it is not too heavy, the fact that it is a dual purpose breed, the ability to calve outdoor without assistance, the fact that it produces less milk but is rustic for *Bretonne Pie Noir*.

Dimensions of the livestock farming system	*Feeding system*			*Animal welfare*		*Direct selling of the products*			*Type of animal raised*	
Exemples of practices or technical choices mentionned	mobility of the flock	Valorisation of spontaneous vegetation	Minimisation of cost by minimising feeding inputs	Animals raised outdoors	calves staying with the cows	Meat quality	Taste	Diversity of the products	Choice of a rustic animal	Animal approachable in terms of behaviour
Associated appreciation	+	+	+	+/-	+	+	+	+	+	+
Associated role of the local breed	Permitted by rusticity					More associated to the system than to the breed			Adaptation to outdoor raising and pasturing specific environments	Dimension associated with breed

Table 2: Dimensions of the livestock farming system carried in the interviews

In their discourses the persons can make comparison with other species, especially to mention the different effects of pasturing (with horses for instance) or the complementarity between two species in the farm (complementarity between milked cows and pigs). They also can make comparison with other breeds (other local breeds they know, or on the contrary breeds that are considered as not at all adapted to the system).

Discussion and conclusion

Our study is focused on social interactions surrounding the farms using local breeds.

The methodological choice to first identify the diversity of concerned stakeholders with the farmer himself has permitted to identify a large diversity of stakeholders. However this is a first step and we should now go further, including the stakeholders who were mentioned by other persons then the farmer as concerned by the farming activity. Using qualitative semi structured interviews has generated a rich corpus, including about more technical dimensions of the farming systems, that were discussed as well by stakeholders not directly concern with agricultural activity. We should however apply the same approach to a larger number of farms, as those two were chosen as exemplary from the point of view of social interactions.

We have indeed seen our focus on social dimension embarks directly technical dimensions, as the specificity of the livestock farming system plays an important role in the building of those interactions. It also embarks ecological dimension (landscape management, impact of pasture, and more generally environmental impact of the Livestock farming system). Indeed, such an approach contributes to link sociotechnical and socioecological dimensions when dealing with agro-ecological transition, the sociological dimension being here tackled not through theoretical principles but through the study of social dynamics that are developed in agroecological systems (Dumont et al., 2016).

Those social interactions we have focused on are part of the diversity of services produced by livestock farming systems. As underlined by Beudou et al.(2017), in depth qualitative approaches are necessary to characterise those contributions. Our study also shows that such qualitative approaches focused on a poorly known category of services, can also contribute to identify dynamics of services through time and links between them, as social interactions are here related with other categories of services, for instance with provision service of food product or to services linked with maintenance of a rangeland ecosystem. Such an approach also confirms that processes underlying provision of services are ecological but as well technical and social. Multidisciplinary approach gathering livestock farming systems approach, ecology and social sciences would allow to go further in the analysis of the role of farming system, and of the breed, in the provision of services.

Finally, in the area of genetic resources management, our exploratory study contributes to tackle the diversity of modalities to add value to local breeds, considering production of food together with other products, including services, but also considering adding value through market and adding value through other processes then market. Those modalities are in interactions, and can possibly conduct to synergies or to tensions.

To finish with, this exploratory study confirms the interest to consider the diverse contributions of a farm, in particular to social dynamics, in links with farming systems characteristics, and with the whole food system.

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