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Towards Social Management of Livestock Farming Systems

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Livestock farming systems are generally investigated at the farm level according to the way their production processes are managed (Brossier *et al.*, 1993; Landais *et al.*, 1989). These can then be aggregated into types to help technical advisers in their work. This mainstream research approach to farming systems takes no account of techniques produced collectively. Nor does it consider delayed effects such as occur in animal breeding which organises and sometimes spearheads the extension of other techniques. This is particularly relevant in ruminant farming systems in which breeding is controlled by the farmers and integrated in their production process and is not managed by specific firms as in cropping and pig and poultry systems.

Dealing with the farm level only is no longer acceptable where agricultural sustainability is being sought. The prospective and territorial impacts of farming systems need to be studied at the wider level of the agrarian system which encompasses the connections between a community and its living territory across historical time. We have developed some concepts and methods to include this dimension in the management of livestock-based farming systems.

Conceptual aspects

Animal generation

In this approach, the generation of animal populations is integrated with the productive processes relating to these populations. The term "animal generation" refers to three elements which modern technical research has partitioned and recombined as best possible (Figure. 1): reproduction (insemination and egg transfer concerning the "container"), selection of breeding animals (indices linked to the genetically "content") and management (intensive and controlled, representing the "context"). One consequence is that power and control over these processes has been transferred to national and international structures, for which Gruson (1987) coined the term "hard structures" and which rely on the advice of top scientists. The resulting indirect and delayed consequences of this situation for the sustainability of livestock systems may be extensively questioned. For example, the selection of animals on heritable productive traits measured at the first phase of the production cycles of young animals in intensively managed conditions may have adverse effects on traits of low heritability (fertility, adaptability) and consequently change the overall lifetime performance pattern, particularly if environmental constraints increase (Vallerand, 1979). It seems necessary then to return to the general meaning of animal generation as used in medieval times (Russell, 1986) when the scientific determinism of these three components was confused in people's minds and held no

practical interest for the farmers. This might help us give an insight into what farmers really do, how some of them collectively innovate, influence and possibly alter the control exerted by the present "hard technical structures" on dominant models.

Technology: a social concept

In 1965, a pilot study was conducted with ethnologists in a human community living in the Aubrac mountains (French Massif Central). This original local community was at the time threatened by the on-going socio-economic change and by EC regulations aimed to evacuating farming from marginal areas (Mansholt plan). The project's ambition was to record as much information as possible on past and surviving social practices in order to help people find adapted solutions that would enable them to integrate modernity with tradition. In the first stage, the technical influence of scientists helped the farmers alter their cattle systems based on a local breed and shift from milking to suckling using Charolais crossing. In the second phase, the farmer community showed contrasted reactions to what they termed "the ranching and American influence" promoted by the scientists. They expressed this by:

- integrating the benefits from the fattening stage into their systems;
- preserving the local breed from assimilation by beef breeds;
- introducing a Bavarian dairy breed to maintain and improve their local original cheese production (Laguiole), thus keeping out of the increasing Friesian and Holstein influence.
- The present situation is an example of a remarkable integration of tradition and modernity through local products derived from the animal (cheese, meat, horned cutlery) and from the gastronomic use of native plant products.

Three decades later, this process offers an opportunity to verify the interest of the concept of "fait technique" (technical fact) formulated 50 years ago by a promoter of that research, the French ethnologist Leroi Gourhan (1945-1973), who applied it initially to reindeer herding. He compared the technical fact to a membrane which, like that enclosing biological cells, surrounds the social group and through which the group selects, transforms by assimilation, utilises and exports technical innovations. This phenomenon highlights the role played by territorial and social influences in the relations developed by the social group with its environment as well as in the social group's internal transformation. After being first applied to a human community and to an animal population considered to be endangered, the concept was then extended to two other situations (Vissac, 1996):

- one in La Réunion and French Guyana where it was considered that no past experience existed on suckler cattle farming;
- the other in a widely distributed dairy cattle population (the Montbéliarde in Franche-Comté) where tough and continuing resistance to the application of the French "Animal Breeding Act" (1966) has been growing over the past three decades. The resistance which developed in the name of breed identity and purity was more generally aimed at safeguarding farming practices and their products from industrial modernity and related technostructures.

These applications illustrate the contrasted behaviour of farmer groups in integrating tradition with modernity at three stages in the evolution of a human community and its associated livestock population.

The present situation, an inheritance from past evolutions

The modern evolution of animal populations and management techniques of the animal generation may be described briefly and chronologically as follows (Figure. 2, Vissac, 1993). In this process technical means are crossed with animal populations and livestock farming systems:

- local populations of unregistered animals under domestic control (Corsica and other island situations in general);
- registered animal populations controlled by elite breeders (local breeds, chiefly in suckling herds);
- animal populations managed under the influence of large collective breeding organisations (administrative management);
- animal populations integrated in industrial production systems (pig and poultry systems chiefly.)

These successive "waves" have accumulated more or less rapidly depending on the pace of technical change in the farming systems, the older ones being forced by the more recent to change their technical logic (lines in Figure. 2) sometimes to the point of extinction of the livestock system and even of genetic destruction. Figure 3 gives the example of Brittany's rural society which has changed its livestock population and agrarian system almost with each human generation since the beginning of the century. Until recent times, this trend was justified by the superiority over former animal populations of recently established ones with their associated technical background.

This is no longer the case now that extensification and local development based on original local cultures are being advocated. Conflicts arising from the pressure to integrate techniques linked with a particular type of animal population and its related farming system can no longer be solved by merely opposing modernity to archaism (lines in Figure. 2). Conflicts of this kind can be very severe when these animal populations and farming systems stand geographically close to each other, a situation which occurs frequently in some "melting pot" areas.

– An extreme such example is the Corsican pig raised in more extensive systems and which crossbreeds readily with wild boar owing to a total similarity of their chromosome conFigureuration in this particular island situation.

– The Aubrac cattle system based on the use of mountain pastures in summer (*estivage*) is another example. EC regulations imposed by the northern sedentary systems to control brucellosis (no vaccination; slaughtering of herds containing reactive animals) are in perfect coherence with the XVIIIth century enclosure revolution in England. They cannot be rigorously applied in the above situations due to the seasonal movement and mixing of the cattle herds. Telephone connections and transport facilities, which enable the farmers to

cope with unexpected local climatic conditions, are an additional factor of frequent and unplanned animal movement. In this case, the social group organises itself so as to bypass the regulations, and only the politically influent are able to benefit from the premiums linked with regulation implementation. This occurs commonly in the pastoral systems of southern regions and elsewhere outside Europe.

Managing livestock farming systems through the animal population and the landscape

To meet sustainability objectives the organisation of production processes needs to be tied in with territorial management. This in turn requires that the agrarian system is taken into account. Individual and collective practices related to the animal generation must be linked to the notion of "quality of the agrarian systems" which integrates simultaneously the quality of animal products and that of amenities including the indirect costs of adverse effects on the environment (pollution, erosion). In this comprehensive approach, general indicators are needed which are linked to a greater or lesser degree to human practices and their effects on the overall quality of the agrarian system: the animal population and landscape, which together give a rough expression of domesticated animal and plant diversity in the agrarian system, could play a prominent role in this respect.

We are faced here with complex human systems whose major issues as well as territorial and social boundaries are not fixed. They evade any form of reasoning based on the rules of positive rationality aimed at defining acceptable optimal solutions (Figure 4 derived from Le Moigne et al., 1991). Procedural rationality provides a more appropriate reasoning base to deal with the social network of agents being investigated (techno-economic or socio-technical networks according to Callon, 1989). At the farming system level, the scientific objective is to highlight the link between these concepts in order to help the social groups to devise negotiation procedures regarding the management of their activities and needs. The projects should either alter or make use of their relations with the agrarian system to reach a common end (Figure 5).

In effect, all these concepts express varieties of meanings emanating from both the scientific disciplines and the social spheres and which influence the social debate (see Audiot, 1995, for the various meanings of the breed concept). Breeds, practices and, why not, landscapes for example, may have biological and ecological meanings. These meanings have significant but different values for the farmers, consumers and managers concerned by a given territory. They relate to specific socio-technical networks and to their representatives in the different social spheres: these networks often ignore each other, although they may converge at the individual's level through his/her multiple implications, and express an identity linked to a particular place. This attempt at a "social translation" (Callon, 1989) using "boundary objects" (Star et al.,1989) may help promote a debate between different social networks so that new conFigureurations may progressively evolve. The difficulties in this type of research arise from the contrasted realities of socio-technical networks and from unequally adequate information to undertake this translation work: at present, it would seem that these networks are better able to deal with breeds than with landscapes and environmental qualities and defects. However, there are obvious links between the Holstein dairy breed and maize cropping areas, between dual-purpose dairy breeds or beef breeds and grazed bocage areas, between local breeds and the agro-environmental conservation requirements in some protected areas (Vissac, 1995).

The concept of "totemism" used by some anthropologists such as Levi Strauss (Testard, 1987) to characterise the relations between man and wild animals could well be applied here to farm animals. Testard observed that in Australia the clans in a particular aboriginal tribe display a range of attitudes which are organised at the tribal level into systems that are adjusted to the concomitant evolution of human predation needs and of animal resources. He noticed that the link between people and the land was not concerned in the same way as in the industrial and western world by the dominant principle of ownership, by individuals, of the land and its associated resources. This is one difficulty of attempting to transport the concept to western cultures and exemplifies the importance of cultural identities also put forward by Haudricourt (1962) when referring to livestock husbandry. This author attempted to explain differences in people's attitudes to their fellow men in the Far East and in European countries by examining their livestock systems. In the former, rainfall and temperature link along the season in a manner favourable to plant growth and lead to the farming of individual cattle for draught, manure and milk. In Europe, the contrasting seasonal pattern of these two climatic factors lead to capitalising resources and animals as herds. Haudricourt sees in this difference an explanation to the past propensity to social domination prevailing among European peoples, one expression of which may perhaps be found in the creation of the earlier mentioned "hard structures".

Conclusion

The need to take account of collectively managed techniques in livestock farming systems management is evident where sustainability is concerned. This involves considering the links between different types of techniques which combine differently according to the "waves" of animal populations and the related farming systems that have accumulated in the course of history and may sometimes occur on contiguous territories.

Seeking an acceptable compromise between productive and environmental goals has now turned into a major challenge. This requires that the production processes and the territorial dimension are linked together, taking the agrarian system as an appropriate scale of work. Animal breeds and landscapes could provide useful indicators in this attempt. Helping social groups that are concerned by this debate at the local and regional levels involves informing these concepts which can be considered as "boundary objects" by translation procedures. In this debate, one should keep in mind the existing divide between cultures regarding issues such as individual ownership of the land and its resources, the role of livestock in the farming systems and the constraints of organisational aspects on individual freedom.

References

Audiot, A. (1995) Races d'hier pour l'élevage de demain. Editions INRA, Coll. Espaces ruraux, 229p.

Brossier, J., Bonneval, L. de, Landais, E. (eds) (1993) Systems studies in agriculture and rural development. INRA, 415p.

Callon, M. (1989) La science et ses réseaux. Editions La Découverte, UNESCO, 214p.

Gruson, C. (1987) In: Vers une éthique politique. Editions de la Maison des Sciences de l'Homme, Paris.

Haudricourt, A.G. (1962) Domestication des animaux, culture des plantes et traitement d'autrui; L'Homme T.1, Paris.

Landais, E., Deffontaines, J.P., Benoît, M. (1989) Les pratiques des agriculteurs. Points de vue sur un nouveau courant de la recherche agronomique. *Etudes rurales* 109, 125-128.

Le Moigne, J.L., Orillard, M. (1991) Quelques réflexions épistémologiques pour une recherche en socioéconomie de l'environnement. Note de recherche 91-25, GRASCE, Aix-Marseille III.

Leroi Gourhan, A. (1945-1973) Evolutions et techniques. II Milieu et techniques. Editions Albin Michel, 475p.

Russell, N. (1986) Like engend'ring like: heredity and animal breeding in early modern England. Cambridge University Press, 271p.

Star, S.L., Griesemer, J. (1989) "Institutional ecology", "Translations" and Boundary Objects: amateurs and professionals in Berkeley's Museum of Vertebrate Zoology 1907-1939. *Social studies of science*, vol.19, 387-420.

Testard, A. (1987) Deux modèles du rapport entre l'homme et l'animal dans les systèmes de représentation. *Etudes rurales*, 107-108 ; 171-193.

Vallerand, F. (1979) Réflexions sur l'utilisation des races locales en élevage africain : le cas du mouton Djallonke dans les conditions physiques et socioéconomiques du Cameroun. Thèse doct. ing., INP Toulouse, 242 p.

Vissac, B. (1993) Société, race animale et territoire. Entre les théories et l'histoire : réflexions sur une crise. *Natures Sciences Sociétés* 1(4) ; 282-297.

Vissac, B. (1995) Populations bovines et systèmes agraires dans les Marais de l'Ouest. *Courrier de l'environnement*, INRA.

Vissac, B. (1996) La génération animale (in preparation).

Annexes

Generation elements	Objects of biodiversity	Livestock farming modes
Container (*physiology, embryology*)	Animals, semen, embryos	Hunting Domestic Elitist
Information content (genetics)	Phenotype, genotype, genetic variant	Administrative Integrated
Environment context (pathology, nutrition, socio-economics)	Microbes, parasites cultivated feeds, grazed forage	

Figure 1: Generation of biodiversity in livestock farming

	Mobility	Reproduction (container)	Selection (content)	Husbandry (context) feeding	sanitary
Hunting	+++	natural	natural	no control	no control
Domestic	++	natural (collective)	artificial (phenotype)	extensive	vaccination
Elitist	+	natural + AI	artificial (phenotype)	semi-intensive grazing	vaccination and eradication
Administrative	+	AI	artificial (genotype)	intensive	eradication
Integrated	0	artificial	artificial (genotype + genes)	zero grazing	germ free

Figure 2: Livestock farming modes and mastering of animal generation elements

well structured	PROBLEM	poorly structured
positive	RATIONALITY	procedural
well defined	GOALS AND CONDITIONS	not defined
final, optimal	SOLUTIONS	partial, satisfactory
objective model	REPRESENTATION	modelling of project

Figure 3: Reasoning processes

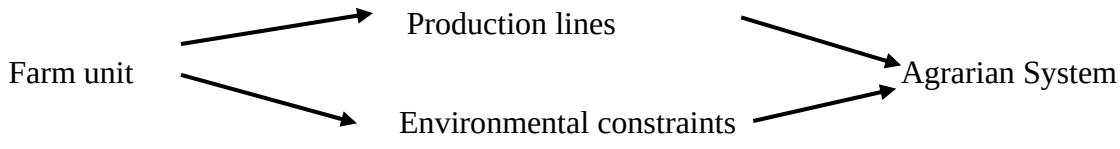

Figure 4: Problem complexity and structuring