

The Know-how of Livestock Farmers Challenged by New Objectives for European Farming

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Abstract

New challenges appeared recently about rangelands in France, because of a new social concern about their environmental value. In this paper, the role and use of these lands are described from an historical perspective (19-20th c), to better understand how the increasing technology and market co-ordination led modern stock breeder to lose confidence into this resource. Through new eyes, these lands are now perceived as “landscapes”, support for biodiversity when appropriate grazing management helps to control shrubs dynamics. Restoring the quality of this vacated and vacant rural lands became the goal of new public policies and livestock producers are assigned new functions. That creates some confusion in leading farmers minds, who are quite fearful about applying “archaic” methods, as herding out to pasture, when no technical handbooks are available. Through research, we have intend to make understandable and teachable the savoir-faire of the herders that still graze their flocks on rangelands. That leads to point out some “post-modern” management models, that combines both biological and social aspects, as the grazing circuits shaping that increases dietary motivations for coarse resources. This research ambitions to be operational for the different agents concerned, using new methodologies that associates: 1° the representations agents have of their environment and the reasons underlying their activities; 2° modelling of real-life processes; 3° the finding of experimental analytical studies. The new objectives for farming provide a one-time opportunity to stimulate interdisciplinary approaches involving natural, technological, human and social sciences.

Introduction

Rangelands in France, in particular around the Mediterranean, are being increasingly viewed with renewed focus because of new concerns about their environmental value. From a technical angle, the response to new social demand will require the development of appropriate management skills for these lands, carriers of spontaneous plant formations. To deal with this challenge, their role and use must be viewed from a historical perspective. Formerly they were an integral part of crop/stock production systems, but became increasingly marginalised as modern technology was adopted in both agriculture and livestock production. Now they could become a pawn in the game that brings together urbanites in search of "Nature" and farmers in search of diversified sources of income.

From the animal's rumen standpoint rangelands have always been considered to provide a dietary mixture that varied by season, and even by day and was usually heterogeneous and bulky because the high lignified fibre content, tannin-protein complexes, wax and mineral

matter make it relatively unfermentable. The herbivores have various grazing strategies (Crawley, 1983; Hofmann, 1985) to compensate for this discomfort; a) careful selection of the most nutritive part of the plant as they spend long hours trekking the lands (these are the concentrators); b) wolfing down large quantities in great haste throughout their daily eating period, maximising their large rumen space and accelerated digestion transit time to capitalise on the digested fractions (the gluttons); c) adopting both of the above eating patterns, in turn, depending on the season and the grazing context, or else travelling to areas where better conditions could be found for the next day (the opportunists).

In Europe, on the livestock side, the producers often had to change their opinions about the value of rangelands. Not that the lands themselves changed or that their herbivores did not know the right strategies, but because production processes and goals in livestock production evolved in keeping with the times and the producers' need to fit into an ever-changing social context.

Rangelands integrated into Multicrop-Livestock

Rural lands in Western Europe through the second half of the 19th century, unlike the United States, were densely and increasingly populated; the space was *full*. Although the crop and stock farmers were already engaged in trade, the requirements for the operation and reproduction of the production systems - which covered most of their household needs, - were met almost exclusively out of local land resources. The social and spatial organisation were based on a principle that could be called *domestic co-ordination* (in the sense of Boltanski-Thévenot, 1991) or *domestic governance*.

In those days, rural spaces were subject to complementary uses that combined a variety of components, depending on their location, the land tenure system and their potentials, in other words, the user's perception and the techniques available. Much of the energy and fertility of the Mediterranean ranges, be they wooded or not, was exploited: trees were felled (cutting of oak and beech coppice was often followed by three successive years of cropping); aromatic and medicinal plants were picked; shrubs were cut and bundled for firewood or used in compost; herds grazed during daytime and were parked on cultivated lands at night (Hubert, 1991). At that time, sheep were valued more for their manure than as a source of wool or meat, since manure was essential to maintaining the fertility of soils with a biennial rotation of cereal crops grown mainly for home consumption. The main of the flock was chiefly composed of wethers that were not to be slaughtered until the fourth or fifth shearing. The rangeland thus contributed to the biological reproduction of the production system, but, through repeated use, gradually changed: wastelands expanded, coppice growth slowed down, and the more fragile soils eroded.

These lands were considered worthwhile if the animals could find enough to eat from the very rough vegetation, largely composed of indigestible elements. Herding practices, that are still current in many parts of the world today, mainly meant that a drover ushered the animals over a long daily circuit that formed a loop. After eating, time was allotted for rest, i.e. rumination/defecation periods which, whenever possible, were to be spent on arable lands. This fertility transfer was more efficient when the herds were large, and the animals were parked or individually tethered during the night in areas cultivated by the livestock owner(s) themselves. The better pastures and crop residue were kept for periods when the herd included

lactating females. The rangelands could sustain the adult animals and the end-of-growth periods for replacement animals at other times of the year.

This organisation of animal movement created a link between the rangelands (a potential reserve for nutrients) and the plots where the whole family worked to produce food and tradable goods. As population pressure increased, the herders had to take their animals further away. This movement required a greater energy output and thus decreased the system's performance. In some cases, the choice of plots to cultivate was changed to fit in with herd movement, and areas were selected where there was still a hint of grazeable roughage. When the underwood and the scrub around it no longer provided enough, the herds "attacked" the forest canopy and eventually were forbidden entry. The shepherds' know-how, or *savoir-faire* including the woodland-to-field fertilising circuit they invented, and the grazing circuits designed to stimulate appetite for rough vegetation, was recognised as professional qualities worth developing. This *savoir-faire* was passed down from parents to children, and throughout the regions there were generations of "good shepherds" who "knew animals well".

Rangelands marginalises by Agricultural Modernisation

Starting in the second half of the 19th c, and more generally during the present century, alongside the soar of urban populations and, even more so, the development of transportation networks and facilities, a new economic regime spread throughout the European countryside with the creation of national and international food markets, and the development of the upstream and downstream agro-food industries. *Market co-ordination* (or *Market governance*) imposed its constraints upon the agricultural production systems and brought about a territorial specialisation process at the regional and local levels (Weber, 1983 ; Julliard, 1976). The market determined both the zones best suited for each product and, inside each zone, and even each agricultural holding, the plots where technology-based production had the greatest chance of being saleable and economically profitable. The implementation and efficacy of modern techniques can be credited also to progress in product transport and trade (fertilisers, imported feeds, fuel, etc.). Since sources of fertilisation were hither forth external, the crop farmer no longer had to maintain a herd of animals. Livestock production became a profession on its own, and since it was targeted to producing commercial meat or milk, it entailed specially bred animals fed on a "rich" diet, in other words, permanent grasslands or sown pastures and feed concentrates.

As labour and capital were increasingly concentrated on agricultural zones, and livestock production became a speciality in its own right, the old-time grazing areas were left to lie fallow, or were transformed into forestlands. Afforestation became state policy as the government encouraged land owners to plant trees. Many plots were planted in conifers, without much "spatial" or economic logic. "Postage stamp" reforestation, was the term used for this patchwork of small, isolated plots. And the absentee-owner usually neglected to have even the initial thinning and pruning work done. Further, land size and difficulty of access curtailed the sale of off take. Opposite examples could be found in the land tenure strategy adopted by large companies such as insurance companies and banks, which bought lands and planted conifers, thereby making whole valleys inhospitable to human settlement, and creating region wide mosaics of fragmented rural areas.

Although these rural areas were no longer used for agriculture nor managed productively, they were not abandoned. They were used for hunting and for activities that brought together rural

dwellers and "urbanites" in search of "Nature". Huge areas were involved where plant successions abide by a spontaneous dynamic, thus, in the summer, creating conditions that favour the outbreak of sweeping fires which devour hundreds and even thousands of hectares in just a few hours, make the front pages of regional and national newspapers, and exceed the capacity of much of the most sophisticated fire-fighting equipment.

In the context of modernisation, most rangelands were worthless for the stock breeders, especially when composed of more heterogeneous, woody vegetation than grassland (Joffre et al., 1991). Agricultural modernisation made the stock breeders lose confidence when they had to cope with resources that new agricultural techniques could not control. As genotype-related productivity increased, the animals required diets that were constantly being adjusted to match each of their physiological states. So the question was, "how can a producer adjust to changing energy requirements if he does not control the fodder supply?" Actually the producers no longer wanted to control this supply since shepherds as such had been cast aside as "obsolete tools", and herd-tending was considered either as an unprofitable activity, worthwhile only to humour grandma and keep her memories of the past alive, or as alpine transhumance by specialised shepherds with low salaries and little social rank.

The reign of optimisation through computed feed rations distributed in troughs to guarantee individual animal performance close to the highest genetic potential was based on a classification in which the value of feed was estimated through fodder analyses and then entered into dietary tables. As soon as he got out of school, the livestock producer, armed with his calculator, chose a production system, the underlying reasoning he had to use because of the type of animals to be fed, and his - always ambitious - performance objectives. The herbivore was assimilated to a continuous flow thermodynamic process in which the four legs, the horns and the memory were nothing more than useless organs. The young farmer was taught that he would be dealing with an "animal entity" composed of a juxtaposition of digestive and productive functions that should be capitalised through the transformation of feed units into standardised market products. In this animal representation, the livestock producer's performance was measured in terms of energy output. Since it would seem counterproductive to allow the animals to move around in search of food, the livestock producers followed the advice of the (thermo-) technicians and nearly always adopted a 0-grazing system.

Reassigning Rangelands to new, environment-related usages

The "success" of this production model, imposed by *market co-ordination*, led, as of the 1970s in Western Europe, to structural surpluses of non solvent agricultural products that grew and exacerbated international competition (see GATT debates). The increasing importance of the cost of the trade war and surplus stock management in the public financing crisis led the European Union to reconsidering public support to the development of agriculture, while certain leading segments of public opinion took advantage of the slack in the strongholds of the "modern" farmers to highlight the negative effects of these farmers' methods and of territorial specialisation. They decried the artificialisation and pollution of productive areas on the one hand, and, on the other, the abandoning of large parts of the rural countryside with its harmful effects, such as deterioration of the landscape, reduction of regional biodiversity, and increased risk of fires (Hubert et al., 1993). Restoring the quality of these *vacated and vacant* rural lands became the goal of public policies based on *territorial*

coordination (or *governance*) in which the rangelands were assigned new social value, and the livestock producers were assigned new functions (Deverre et Hubert, 1994).

Through new eyes, these spaces were perceived as "landscapes", the ultimate reservoir for rare species and support for biodiversity, in any case, a vision miles away from what was seen as "city space", for this was a vision of a "wild" countryside, which was also an opposite to what is readily called "standard" agricultural land development with its land consolidation, stripping of hedges and earth banks, drainage, irrigation, and orderly plots used for major crops and dairy production. The question of the day became: "how should these lands, that were intensively exploited for centuries and abandoned a few decades ago now be managed?" What can be done to control the dynamics, which, otherwise, with time, would make these landscapes "homogeneous", uninterrupted stretches of vegetation especially prone to forest fire? What can be done to guide the future of these landscapes, protect the animal and plant species that live there and are threatened with extinction, and ensure satisfactory biodiversity? How can the wooded zones, that are ill kept and whose productive functions are strongly doubted, be made attractive and become part of the landscape? Much is expected from the farmers, who are on site and often own these areas. Their function as producers of marketable commodities only is now being challenged.

In the Mediterranean zone, animals are now increasingly being taken out of their sheds. The herds are often "contracted" to participate in controlling the dynamics of undesirable vegetation, such as readily inflammable scrub in the forest, or as part of new technical requirements to associate typical landscape with rangelands and high quality foods. These new agricultural policies that promote the use of rangelands are creating quite some confusion in the minds of the professionals who feel slightly fearful about applying the seemingly "archaic" method of taking animals out to pasture. But even more importantly, animals out to pasture no longer fit into the dietary model, with its specific line of reasoning that the producers learned in school (Meuret, 1989). What goes into a grazing ration is the result of the animal's discriminating feed selection. Consequently, precise knowledge of the dietary resources obtained from a grazing area is not available, because it depends on the animal's choices. Further, all the feeding models have been constructed on an individual animal basis. Yet, in the grazing areas, individual choice depends largely on the group behaviour of the animals, their social characteristics and their relations with the herder. Technical books don't touch the subject; some scientific writings contain a scant idea or two on it. Since technical recommendations and references cannot be found in the usual sources, the producers and their technical support services resign themselves to consulting the marginalized "off-centre" sources of former times, namely, the "poetic" users of the rangelands and... the transhumant shepherds.

The "poets" are astonishing because, against all expectation, they often rear genetically improved, highly productive breeds. They use the lands according to a detailed schedule either in succession or in combination with improved herbage. For them, periods of rangeland grazing, for instance, are not synonymous with inferior performance. The herders, the "transhumants" build up very substantial reference bases through steadfast observation of the state of relations between man, the herd and the grazed area.

For the last few years, through research, we have tried to make the *savoir-faire* of the herders understandable and teachable, and to assess its results in diet management (Meuret, 1993a). In the rangelands, this *savoir-faire* is expressed through the organisation of daily grazing circuits

that combine various parts of the land area in order to develop synergetic intake sequences during a meal (Meuret et al., 1993). Since the composition of rangelands is very varied, the search is not for uniform, high quality plots where "sure" meals are available. Quite the contrary, the shepherds seek to optimise spatial diversity, and differences in palatability by devising sequences that stimulate appetite for the more abundant, but rougher vegetation which does not automatically appeal to the animals. Reactivating the technique of grazing circuits does not mean merely returning to old-time land use practices. The genotypes are very different, and the performance targets much higher. The sharpest contrast between the practices of these "post-modern" producers and the productivistic models' intensive feeding plans is that the former, rather than trying to limit the animals' selective behaviour, tries to use foreseeable behaviour as a tool to use in exercising maximum control over the nature of the feed consumed and the feeding sites.

Following research conducted with these experts, space-ration models have been designed which favour intake of "target" vegetation. The aim is to control the invasiveness or ensure renewal of this vegetation as part of a plan for large enclosed paddocks or standard herdtending circuits. The zones in the circuit are usually composed of various plant communities and are assigned one of the following six roles in the meal: appetite promotion, moderation, main course, booster, secondary course, dessert (Meuret, 1995). The quality of the design depends on the shepherd's control over the frequency with which the animals come into contact with sites that offer the new resources and the most preferred plants. Combining this type of organisation with recent animal nutrition models that encourage kinetic analysis of meals and consider interactions between feeds could result in animal uptake of fodder from rough pasture lands at levels close to those of grass silage.

Conclusion

Scientific research in agriculture has often been carried out during rather than prior to major economic and social changes. And in some cases it has only given formal expression to local *savoir-faire* rather than inventing new practices. The great 18th and 19th century agronomists built theory around the principles of organic fertilisation, when European agriculture had already provided great support for expanding populations. They based their comparisons on rational analyses of results from well established production systems (Young, 1976). Paradoxically, just when organic chemistry achieved its targets, agriculture, as a result of the tremendous progress in transport and the development of trade relations, no longer wanted it, and preferred using mineral fertilisation.

On the other hand, 20th century agronomic research unquestionably prepared the scientific and technical bases for the formidable development of plant and animal genetic productivity, and, thus, for the agricultural sector to respond adequately and quickly to the expanding horizons of the world of commerce. A number of resounding fiascos also occurred when, as a result of inadequate technological backing, traditional practices and climatic hazards could not be overcome. Several "green revolutions" and "genetically improved breeds" sold by the West to southern countries did not survive the shortcomings of a simple technological transfer. The consequence was marginalisation of part of the planet, and as shown above even of difficult areas in the Old World.

Nowadays, mastery over genotypes, the ability to predict animal and plant behaviour, as well as massive resort to synthetic products, have at long last made it possible to produce

agricultural commodities in controlled artificial conditions and to a great extent independent of territorial constraints. At the same time, the changing social environment is assigning new tasks to the farmers and requesting them to re-utilise abandoned lands as well as to apply "environment friendly" practices in these areas. In this context, the methodology and knowledge produced by modern agronomic science initially appeared largely inoperative. However, experimental science soon adjusted to the new "social demands" and a concern has emerged for assessing the welfare of animals in extensive farming situations, rehabilitating "hardy" breeds because of their ability to consume rough rangeland resources and producing industrial feeds with low polluting outputs in animal excreta. Might not these new agricultural trends rather provide a one-time opportunity to break away from the century-long tradition of overly segmented agricultural research marked by a concern for "objectiveness"? Research might then become a full partner in the development of new compromises in the relations between agriculture and society, and could formulate original questions relative to the technical feasibility of new projects and to the quality of their incorporation in local communities. Technical activities would have to be considered from a different angle because of the novel nature of notions attached to the "values of rural lands". This should help pull down the barriers between scientific disciplines and stimulate interdisciplinary approaches involving natural, technological, human and social sciences.

This research ambitions to be directly operational for the agents concerned, i.e. the farmers, land managers and decision makers (Osty, 1993). The methodologies that are needed in this perspective must take account of three ingredients: 1) the representations agents have of their environment and the reasons underlying their activities; 2) modelling of real-life processes; 3) the findings of experimental analytical studies. For instance, in the case of animals feeding on rangelands, the research focus will be on the action of "steering intake of rough forage resources". The act of rationing the animals is viewed both in its biological (eating) and organisational (making the animals to eat) aspects. By observing the intake processes on scales of time and space which fit in with the farmers' perception, we remain consistent with their own representations (Meuret, 1993b). A new research "object" emerges, viz. the "grazing circuit" and its effects on the dynamics of daily meals, since this circuit is the focus of the farmers' practices. Researching this new object raises questions which relate to other scientific fields: spatial analysis of territorial dynamics (geography, ecology...), understanding external factor that dictate appetite (animal nutrition).

The new questions which emerge from studying these objects produced by "subjective" (i.e. linked to the acting subject) interdisciplinary approaches, might be easily overlooked by traditional objective methods, for instance ethical considerations concerning livestock farming activities (Thompson, 1995), management of herd performance or collective or individual values relating to rangeland use.

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