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Is the increase in beef cattle in upland farms driving environmentally-friendlier farming?

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Abstract. In France, the last 30 years have seen a steady increase in beef cattle whereas dairy cattle are on the decline. Few studies have attempted to investigate the potential effects of this trend on grassland environment quality. To progress on this point, we led farm surveys on eighteen farms in an upland region of the north-eastern Massif Central to capture and analyse changes in grassland management practices over the last decade since abandonment of milk production. Our analysis finds that the five different types of beef conversion observed create globally favourable conditions for grassland preservation and extensive management in these areas. The main issue for the preservation of grassland landscapes in temperate mountain zones will be the capacity of new suckler farms to increase the labour's income.

Keywords. Dairy farm – Beef production – Changes – Grassland – Environment.

L'augmentation des bovins viande dans les élevages bovins de montagne conduit-elle au développement de pratiques plus respectueuses de l'environnement ?

Résumé. *Dans les montagnes françaises, depuis une trentaine d'années, les effectifs de bovins viande augmentent alors que ceux des bovins lait diminuent. Les conséquences de cette évolution sur les qualités environnementales des prairies sont peu étudiées. Afin d'apporter des éléments sur cette question, nous avons réalisé des enquêtes sur 18 exploitations récemment converties du lait à la viande dans une région traditionnellement laitière au Nord-Est du Massif Central. Nous avons caractérisé les changements de pratiques concernant les prairies depuis l'arrêt de la production laitière et le passage à la production de viande. Nos résultats mettent en évidence que, pour chacune des 5 formes de conversion identifiées, les changements de pratiques sont globalement favorables pour l'environnement et pour une gestion extensive des prairies. A terme, la préservation de ces prairies et de leurs qualités environnementales dépendra fortement de la capacité de ces élevages et de leurs filières à améliorer le revenu des éleveurs.*

Mots-clés. *Exploitation laitière – Production de viande – Changement – Prairies – Environnement.*

I – Introduction

In France, the last 30 years have seen a steady increase in beef cattle, whereas dairy cattle are on the decline (Perrot *et al*., 2005; France Agrimer, 2013). Few studies have investigated the effects of this shift on grassland management and natural resources (biodiversity, water, soil) in agricultural landscapes. However, in lowlands as in mountains, milk and beef production lead to contrasted grazing and fodder practices in terms of grazing rotation, cutting grassland, stocking forage, among other practices. Thus, it is important to look at new suckler farms that have recently turned away from milk production. Their changing grassland practices have to be analyse and qualify in terms of preservation of natural resources.

In temperate French mountain areas, milk production has become increasingly compromised due to market changes, CAP reforms, and changing social expectations (Begon *et al*., 2009; Perrot *et al*., 2009; Chambres d'Agriculture, 2013). The recent decline in dairy cattle stemmed from the ces-

sation of the smallest milk farms and from the conversion of milk farms to beef. The future of livestock activities in mountain areas hinges on two key issues of conversion. The first is a socioeconomic issue: will beef production, which in these regions is essentially oriented to unfattened animals, lead to better farmers income and quality of life? The second is an ecological issue: will beef production succeed in preserving grassland landscapes and their high biodiversity?

To progress on this second ecological point, we led farm surveys on eighteen farms in an upland region of the north-eastern Massif Central to capture and analyse changes in grassland management practices over the last decade since abandonment of milk production.

II – Materials and methods

The studied area is the Livradois-Forez (LF) region, in a Regional Natural Park on the eastern border of the French Massif Central. It is a 322,000 ha upland area culminating at 1630 m, under a sub-continental climate. In 2010, this area counted 2224 farms and a 96 780 ha total farm area, which equates to a mean farm area of 44 ha (versus a 55 ha national average). In this region, agricultural land-patterns are particularly complex, with lots of small fields in areas mixed with forest, grasslands and crops, rivers and wetland patches. As in all French mountains, milk quotas policy (1986) hit this traditional milking area hard, and a major share of small milk farms have gone out of farming. Since 2010 (the last agricultural census), there are as many specialized suckler farms as specialized milk farms, although dairy cows still outnumber suckler cows (23,951 and 20,666 cows in 2010 respectively). The maintenance of opened landscapes and biodiversity are the main environmental issues involving livestock farming.

Our aim was to identify and survey farmers that have recently (i.e.: not more than 10 years) abandoned milk production to specialize in beef. Consequently, we first surveyed five local experts from territorial and agricultural organizations so as to obtain a wide sample of farms in terms of professional profile and trajectory (farmers for 5-37 years), age (26-59 years in 2013), farm size (11-315 ha) and location (350-1100 m farmstead altitude). The final survey sample counted eighteen beef farms: average size was 110 ha Utilized Farm Area (UFA), 102 Livestock Units (LU), and 1.6 Work Units (WU), and average time since abandoning milk production was 4 years (Beyle, 2013).

The farm survey questionnaire tackled three aspects: (i) motivations and conditions behind the recent conversion to beef; (ii) global trajectory of farm structure and management from installation to today (area, labour force, cattle, land-use patterns); and (iii) post-conversion changes in land-uses and practices (grazing and cutting, mineral and organic fertilization).

As the analysis had to handle and mine a very broad set of qualitative data collected on change and heterogeneity of changes between farms, we opted to mobilize the visual tables of Bertin (1977) in order to distinguish the different types of farms according to farm structure, land use and livestock practices changes. Each group was then further characterized in terms of change in grassland use and management.

III – Results and discussion

The first main finding concerns farm-size changes (area, labour, cattle) since conversion to beef: a large majority of farms maintained a similar Utilized Farm Area (UFA) and Work Units (WU) In our sample, while 45% of farms increased total Livestock Units (LU) count, only 25% increased UFA and 10% increased WU. In short, conversion to beef in the LF region does not frequently entail farm-size variation. However, there are differentiable variations in farm structure (see Table 1): group 1 (G1; 4/18) farms increased area and cattle; group 2 (G2; 3/18) farms only increased

cattle; group 3 (G3; 5/18) farms maintained similar area, cattle and work units; group 4 (G4; 3/18) farms decreased work units only; group 5 (G5; 3/18) farms had “mixed” trends that are difficult to characterize.

Table 1. Main characteristics of farm changes since conversion to beef and of current situation (2013)

Group of farms (number of farms)	All (18)	G1 (4)	G2 (3)	G3 (5)	G4 (3)	G5 (3)
BUFA variation	9 ha	41ha	0ha	0ha	2ha	-3ha
UFA 2013	110 ha	151 ha	84 ha	108 ha	101 ha	93ha
LU variation	15	42	19	2	0	14
LU 2013	102	142	77	85	118	88
WU variation	0	0,60	0	0	-1	0,3
WU 2013	1.6	2.6	1.3	1.2	1	1.8
Grass/UFA variation	4%	5%	0%	7%	1%	5%
Grass/UFA 2013	90%	92%	80%	98%	82%	93%
LU/Fodder Area (FA) variation	0	0	0.3	-0.1	0	0
LU/FA 2013	1	1	1.2	0.8	1.3	0.8
Farmstead altitude	733 m	840 m	450 m	914 m	492 m	817 m
Average age of the farmer	48 years	39 y	46 y	54 y	47 y	50 y
Average age of milk abandonment	4 years	5 y	2 y	3 y	5 y	4 y

The second main finding concerns grassland use. All groups slightly increased the percentage of grasslands in the farm area (+4% of UFA), except G2 which maintained the same percentage of grassland. All groups conserved the same stocking rate [0.8-1 LU/FA for G1, G3, and G5, and 1.3 LU/FA for G4], except G2 which significantly intensified stocking rate (+0.3 LU/FA, i.e. from 0.9 to 1.2; see Table 1). Since the conversion to beef, one farm abandoned silage maize cultivation whereas six farms continued to cultivate it but on a smaller area than before. Area used for cereal did not change significantly.

The third main finding concerns grassland management. Globally, each farm maintained the same type of fodder system, which continued to vary between the farms studied: 30% with maize silage and other grass fodder, 20% with only hay, 50% with various grass fodders. In terms of grazing management, 30% of farms extended the grazing period (regardless of farm groups) and 50% of farms changed the location of cow batches (not exclusively near the stalling). In terms of cuttings management, 56% of farms reduced nitrogen fertilization on cut grassland (essentially in G3 and G4) and 10% of farms cut the grass later on, at the end of spring. There was no change in manure use.

These three main findings show five types of conversion to beef linked to change in grasslands use. The first type (G1) concerns large farms (151 ha, 2.6 WU, 141 LU) with average stocking rate (1 LU/FA); farmers have frequently less than 50 years (3/4) and are located in higher zones of the LF region (3/4 farmsteads above 750 m.). The second type (G2) corresponds to average-size farms (84 ha, 1.3 WU, 77 LU), with high and increased stocking rate (1.2 LU/FA), limiting the extension of grassland in the farm area; they are located in the lower zones of the LF region (3/3 below 750 m.). The fourth group (G4) corresponds to larger farms with lower labour force than G2 farms (101 ha, 1 WU, 119 LU), with a significantly high stocking rate (1.3) on a decreasing area of permanent grassland; farmers have frequently less than 50 years (2/3) and are located in lower zones of the LF region (3/3 below 750 m.). G4 farms reduced nitrogen fertilizer on cut grasslands. The fifth group (G5) concerns farms with no significant change in grassland use; farmers have frequently more than 50 years (2/3) and are located in higher zones of the LF region (2/3 farmsteads above 750 m). The third type (G3) corresponds to large farms (108 ha, 1.2 WU, 85 LU) with an average stocking rate (0.8); farmers have frequently more than 50 years (4/5) and are

located in the upper zones of the LF region (5/5 above 750 m). G3 farms had reduced nitrogen fertilizer on cut grasslands.

The majority of post-conversion trends in practices can be qualified as favourable to soil, water and biodiversity preservation according to grassland scientists (Marriott *et al*., 2004; Huyghe, 2009) and agro-environmental experts (INRA, 2013), i.e. more grassland in the farm area, maintaining a moderate stocking rate, less maize silage, less nitrogen fertilizer on cut grasslands, cow batches more scattered over the farmland. However, this result has to be balanced against some farmers' practices on hedgerows and trees, as we also found several cases where G1 farms regularly removed these natural habitats.

IV – Conclusion

Looking at the changes in farm practices and structure following conversion from dairy to beef, our survey indicates that the different patterns of conversion create globally favourable conditions for preserving grassland and extensive farming in these areas. The main issue for the preservation of grassland landscapes and their biodiversity in temperate mountain areas will be the capacity of new suckler farms to sustain in the long term and to increase the currently-low levels of farmer income.

Acknowledgments

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