

Extensive sheep farming in Central France : diversity of husbandry objectives in relation to savings of concentrates, product marketing and labour availability. Consequences for grazing organisation.

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Summary

The practices used in the extensive management of 13 flocks (stocking rate lower than 1 Livestock Units (LU)/ha) in the region of Montmorillon (central western France) were analysed with reference to three determining factors of the farming objectives: the desire 1) to be self-sufficient in fodder resources (farming based on grass), 2) to cope with the market requirements (more sales of lambs in the first half of the year), 3) to simplify the technical management (increasing labour constraints). Three management types were identified, laying the emphasis on minimum use of concentrates, on early sales at the beginning of the year, and on both at the same time. In the most self-sufficient situations, savings in concentrates were achieved not only on the feeding of the lambs, but on maintaining the mothers as well. Simplicity of management, identified by a stable grouping of the ewes, was obvious in situations where the farmer was working on his own (4 cases out of 6). Gross margins per ewe were roughly equivalent whatever the management type. Each combination of mating dates and type of lambs produced define a particular chain of seasonal key periods for grazing. Farm case studies illustrate how the management of the main seasonal key periods refers to 1) the adjustment of stocking rate to available grass resources during the winter, 2) the seeding of temporary pastures and topping (mowing), 3) the diversity of feed requirements (multiple mating seasons), 4) the grouping practices.

Introduction

Many studies have been carried out on the operation of extensive management systems since the late 1980s (CIFAR, 1990 ; AFPP, 1992; Beranger, 1995; Keane & Pflimlin, 1996; Journet, 1996). Most authors agree that a low stocking rate is not a technical aim in itself, but rather the consequence of other technical and economic priorities, and that it may even be just the prolongation of a historical context on the farm. Many reasons have been put forward which justify or are associated with the extensive character of the farms observed: to reduce production costs, to have greater flexibility as far as forage is concerned to make it possible to manage a large flock simply, to take advantage of the available land at low cost, to benefit from the enhanced value of products with a "natural" image (fed on grass), to obtain subsidies. The diversity of extensive livestock management observed in these studies, would seem at first sight to be explained by the differences in husbandry objectives.

Our aim was to analyse the diversity of flock management in extensive conditions, from the study of farms in the "Montmorillonais" extensive sheep farming network (Vienne department, France). In this region of grasslands in the west central France, management choices depend on three types of concern: the desire for independent fodder resources (grass-based farming), satisfying the demand of operators further down the supply chain (regular deliveries of meat lambs), and simplicity of livestock management (as a part of a sustainable work load: Dedieu, 1993).

Origin of the data

The ways in which the extensive sheep network of the Montmorillon was constituted, the monitoring methods, and the general features of the farms have been described elsewhere (Dedieu & Chabosseau, 1994). Thirteen sheep farms, with a stocking rate lower than or equal to 1 Livestock Units/ha of main fodder area were selected and monitored for three years (1993-1995). Only the data for 1994 are presented here.

Information gathering focused on farming practices, management of land, and the establishment of farming results. The collection aid for all the flock management practices is the batch scheme suggested by Ingrand & Dedieu (1996a) , which shows the evolution over time of the animal groups (ewes, lambs) managed by the

farmer. Data analysis relied on the processes and concepts of the systemic approach applied to the operation of livestock farming systems (Landais & Deffontaines, 1989; Gibon *et al.*, 1996). From the description and understanding of management practices, the husbandry objectives were identified. We envisaged the effect of these practices on technical and economic results and analysed the consequences of the husbandry objectives on key grazing periods management.

Sheep farming practices

In all but one farm the ewes were all from non-fixed crosses of grassland breeds (Vendéen, Texel, Charollais, Suffolk, Charmois, etc.). The breeder rams were also from a variety of genetic types.

Reproduction management.

In all cases, some lambings took place between February and April. The date when winter lambing began and the existence or not of autumn lambing enabled us to identify three types of reproduction management:

1. Lambing in autumn **and** in January (start of lambing between 1 and 12 January). Six farmers used this system, with more than one quarter of ewes lambing between September and January (from 25 to 61 %). The lambs born in this period, whether raised indoors or grass-reared (January births) could be marketed without any difficulty during the first half of the year, when prices were usually more favourable.
2. Lambing in autumn and winter, with winter lambings only starting on 25 January at the earliest (mean of 1 February). Less than 20 % of the ewes lambed in the autumn (from 10 to 19%). This type applied to five farms.
3. No out of season lambing season and none in early January. The single winter lambing period began at the end of January (one case) and at the end of February (one case).

The ewe lambs' reproductive management was not different in the three types: in all cases they were born in winter, and mated at 8-9 months of age for a first lambing at the end of March or April.

Over-wintering and feeding of the ewes

Ewes lambing in the autumn were kept indoors during the last two weeks before the presumed start of lambing and usually were not let outdoors before the lambs were weaned (at two and a half months of age on average). Practices were more varied in winter. Only two farmers, with less than 450 ewes, over-wintered all of their ewes at the same time. On the other hand, two others using the outdoor system only brought their ewes in to supervise lambing and to confirm that the ewes accepted their lambs (two to four days on average). As for the rest, the size of the buildings meant that only part of the flock could be housed at any one time. The length of time spent by the ewes indoors was therefore from one to two months.

Because of the short over-wintering period, the feed for the ewes was, of course, based mainly on pasture. Three concentrate feeding regimes were distinguished:

1. 7 to 45 kg per ewe per year on the three farms using an outdoor system and/or having only winter lambing, as well as in two farms where suckling ewes went out to pasture every day during the autumn and winter lambings.
2. 104 kg per ewe per year on the farm where ewes were in-wintered for more than four months
3. 50 to 82 kg per ewe per year in the seven other farms, where ewes spent one to two and a half months indoors for the winter lambing, and with autumn lambing.

Lamb rearing

Lambs born in the autumn were reared indoors. Lambs born after the beginning of January were grass-fed, with one exception. Practices for rearing lambs indoors differed little, but they were diverse for grass-fed lambs, except for health practices (monthly routine management).

The lowest quantities of concentrates given to the lambs (from 0 to 20 kg per lamb sold during the year) were observed in two types of situation: 1) a single production of grass-fed lambs, where additional feed (concentrates) was either non-existent or limited to the suckling period, 2) the production of grass-fed and

indoor fattened lambs, where the grass-fed lambs were given no additional feed. In all the other situations this quantity of concentrates was between 35 and 55 kg per lamb. Concentrates were either given to the winter-born lambs in the field in summer and autumn or these lambs were finished indoors after the summer. In addition, there was production of autumn lambs exclusively for rearing indoors.

Grouping of ewes

Two types of approach for splitting ewes into groups could be identified:

1) a simple stable approach, in which the groups present at turn out to grass were only slightly rearranged before the following winter lambing period. More than half of the groups remained the same between two consecutive winters. The number of grouping operations at pasture where the farmers changed the composition of the groups was lower than or equal to two. Frequently, the ewes which lambed in winter were gathered according to their lambing date (early, late). But in two cases, grouping only depended on the age of the ewes.

2) a complex approach, in which the number of grouping operations was between 5 and 8 and less than a third of the groups had a stable composition throughout the season. The aim of these grouping operations was to rebuild the groups of ewes after drying off and/or to prepare for mating (separation of the thin ewes from those which were in good body condition; adjustment of the composition of groups to the characteristics of the rams). The new groups of ewes at turn-out to grass were formed mainly according to whether they were suckling single or twin lambs.

Diversity of husbandry objectives

The characterisation of husbandry objectives (Table 1) was carried out in two stages, the details of which can be found in a previous paper (Dedieu *et al.*, 1997). The aim of the first stage was to clarify, by analysing the details of the practices carried out, the choices made between the desire for self-sufficiency in fodder (resorting to concentrates as little as possible) and the desire for a better sales distribution (higher percentage of lambs sold in the first half of the year). The second stage dealt with simplicity of flock management.

Table 1 : Rearing objectives, between self-sufficiency and commercial demand

	forage self sufficiency or nothing		high level of forage sufficiency with early sales			preferably a good spread of sales							
	no out of season lambings no January lambings		some lambings in autumn some lambings in January			out of season lambings, concentrates for the lambs after weaning wintering of the ewes (more than one month and a half)							
	outdoor rearing short wintering		daily turn out to pasture outdoor rearing			with January lambings				without January lambings			
	no concentrates to the lambs		no concentrates to grass-fed lambs conc. before weaning selective conc. after										
Farm N°	12	16	4	13	17	5	9	6	8**	7	14	2**	13
concentrates (1) (kg/ewe/year)	7	47	41	64	59	156	101	95	143	105	117	89	94
% sales during January-June	13	20	51	28	45	28	45	28	20	25	46	32	41
batching	complex	simple	complex	complex	simple	complex	simple	simple	complex	simple	complex	complex	complex
Perma. workers	2	2	2	3	1	2	1	1	2	1	1	2	2
Other activities			beef cattle				crops		crops		beef cattle		crops
Nb ewes	365	748	406	911	795	605	375	577	293	560	433	480	441
stocking rate LU/ha MFA	0.79	0.78	0.8	0.61	0.75	1	0.76	0.89	0.91	0.91	1.17	1	0.61
MBFO (F) /ewe/year (2)	533	487	635	392	652	452	435	562	384	397	567	564	426

* January lambings : the lambs are fattened indoor
 ** instable situation, due to a recent illness of one farmer
 (1) total concentrates, for ewes and lambs
 (2) Gross Margin

Between forage self-sufficiency and commercial demands

Three main management types could be identified:

1. *Forage self-sufficiency* (n = 2): this system is similar to traditional sheep rearing systems in the Montmorillon region (lambings only in winter, lambs never fed on concentrates).

2. *a combination of high level of forage self-sufficiency with early sales* (n = 3): This aim for early sales relied on autumn and January lambings. In two farms, the aim to be self-sufficient meant that the lambs were fed on grass (no concentrates, except for the very late lambs at the end of autumn) and the ewes were systematically turned out to pasture every day during the indoor suckling period. This last case showed an original approach to outdoor management: lambing began in mid-December, the lambs received some supplementary feed during the suckling period and very selectively (only the biggest lambs) in early summer.
3. *not concerned with self-sufficiency: preferably a good spread of sales* (n = 8): the management systems adopted had three points in common: autumn lambings, cheap over-wintering of ewes lambing in winter and feeding grass lambs with concentrates after weaning. Four of the farmers added the out-of-season lambing to lambings in early January and/or additional feed for the lambs while they were suckling.

The two first management types, with a “self sufficiency” objective were associated with the lowest stocking rates (0.6 - 0.8 LU/ha). For the third, the stocking rates were higher on average (0.9 LU/ha).

Simplicity of management

The approach to grouping expresses the degree of sophistication in management over time of the different types of the animals which make up the flock. Grouping was our indicator used to evaluate the simplicity/complexity of the flock management system. The two approaches were split equally among the three types of management identified above. The simple approach was more frequent in the case of farmers working alone (4 farmers out of 6) than in situations with two or more permanent workers (1 out of 7).

Farming results

Spreading the sales of lambs

Five of the farmers put on the market more than 40 % of their lambs during the first six months of the year (grass-fed lambs less than 6 months of age and housed lambs, not counting hoggets). Two of the three “self-sufficiency + early sales” farms were among these, as well as three “well-distributed sales first” farms (Figure 1). At the opposite end of the spectrum, three of the farmers sold less than 20 % of their production of young lambs during the first half of the year, including the two “self-sufficiency ” farms.



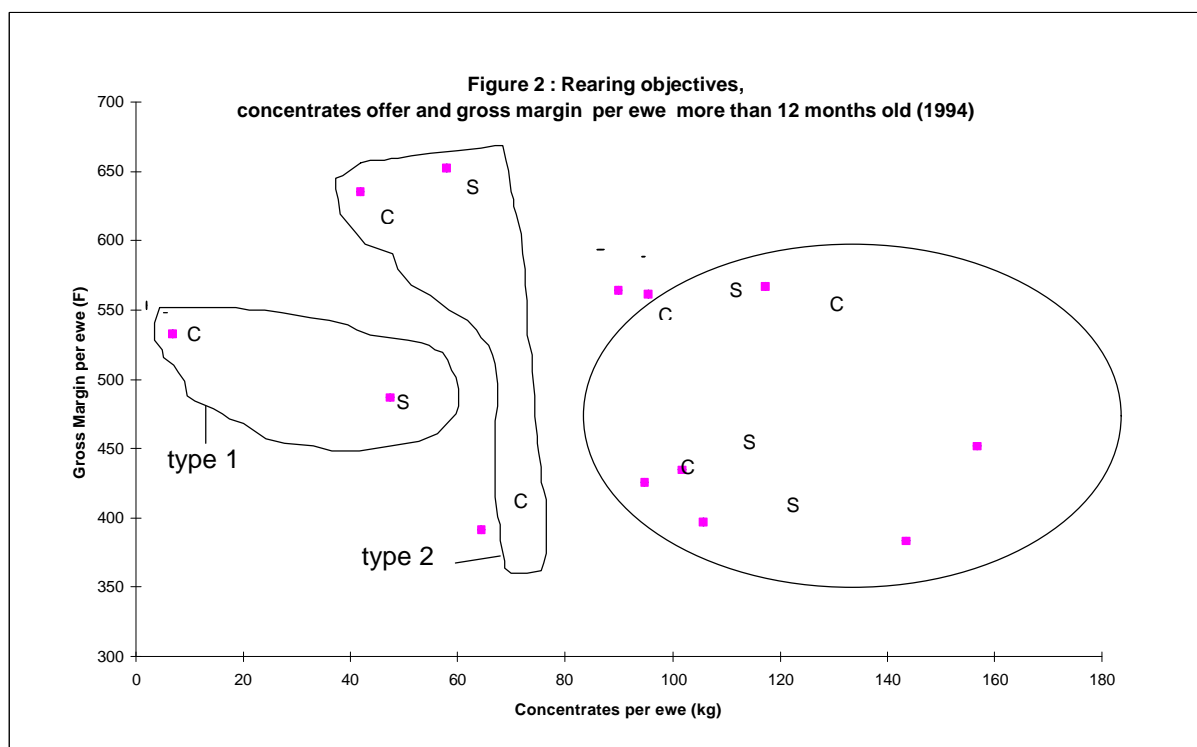
The percentage of grass-fed lambs born in the winter and sold by 1 July varied from 0 to 45 %. Two types of practices were associated with the highest percentages (more than 22 %): i) the feeding of concentrates to the lambs before weaning, and ii) the practice of lambing in early January, even without giving the lambs

additional feed before weaning (one exception). On the other hand, the lowest percentages (less than 15 %) were associated with lambings which started at the end of January with no additional feed during suckling.

Technical and economic results.

Annual productivity (number of weaned lambs per female more than 12 months old) varied from 100 to 141 % (119 % on average). The type of management system (deciding between self-sufficiency and market forces; simple or complex grouping) did not appear to be a source of variation in reproduction performance (fertility and prolificacy of ewes and mortality of lambs). The total quantity of concentrates fed to the flock varied from 7 to 157 kg per ewe per year (86 kg on average). The final sheep gross margin (MBFO) varied from 58.5 to 99.7 €/ewe more than 12 months old in the sample to give an average of 76 €/ewe.

The distinction between the first two groups (an exclusive “desire for self-sufficiency” element or not) and the third group was fairly clear as to the quantity of concentrate fed. On the other hand, in each group, the levels of MBFO were variable (Figure 2). Each type of husbandry objective seemed to have some merit from the economic efficiency point of view. But variations within the MBFO reflected the more or less good management of the other elements influencing this gross margin: animal productivity, carcass quality and main fodder area charges. Thus, if nitrogen fertilisation is low on average (13 U. per ha), seeding of temporary pastures may be important and cause differences in main fodder area charges (Chabosseau & Dedieu, 1997).



Husbandry objectives and main seasonal key periods for grazing.

The soil and climate context of the Montmorillonais region define two main risk periods for grass production: summer, with a regular drought that can be very severe one year in four, and the winter. Permanent snow is scarce (one year in six or seven, for one or two weeks), but its threat is always present on the farmers’ minds. The lamb sales distribution objective is linked with a given choice of combinations of mating dates and lamb rearing methods. This choice is connected with a particular profile for a succession of critical periods associated with distribution of the nutritional requirements of the flock (ewes, ewe lambs, fattening lambs) during the year and to the consequences for grass production of the climatic conditions. The difference between the flock nutritional requirements and the fodder availability is adjusted for by concentrates. Each combination of these two components of the husbandry objectives define at the end the main seasonal key periods for grazing

organisation (Girard *et al.*, 1996). Three farm cases which refer to the three objectives will illustrate the diversity of these seasonal key periods and some of the ways the farmers manage for them.

A) “self-sufficiency and early spring sales” scheme: we will take the example of Farm n° 17, with outdoor rearing, lambings from mid- December to April, and all the lambs reared on grass. Weaning begins in May and ends in July. Forty-five % of the lambs are sold before 1 July. The stocking rate is low (0.7 LU/ha). Winter is the main critical period in the grazing programme: ewes lambing in January have to get the main part of their diet from grass (saving on concentrates) and grass-fed lambs have to grow quickly in order to be sold rapidly. The creation of available resources to ensure that this period passes off well is therefore an essential objective. The farmer manages the winter key periods with: 1) the preservation of paddocks from mid-November to make provisions of grass for the winter; 2) the maintenance of sufficient stocks of hay (one to three years old as hay-making is not regular) to cover in the event of snow; and 3) the systematic offer of concentrates to the lambs so that they will be prepared for late growth of the vegetation. As a consequence of early lambing and early lamb sales in a low stocking rate situation, summer is not a difficult period for the farmer in regard to ensuring sufficient grass. Concentrates are given only to the heaviest grazing lambs, to finish them quickly. The summer key period is more about the quality of grass, especially for the fattening lambs and the ewe lambs. Pasture topping carried out from mid-May provides good quality regrowth for summer.

B) “Forage self-sufficiency or nothing”. In Farm n°12, the flock is also reared outdoors. It is characterised by February-April lambings. Thirteen percent of the lambs are sold before 1 July and weaning starts at that time. The stocking rate is low (0.8 LU/ha). The main critical season is the summer, with the maximum number of animals (ewes and lambs) still on the farm. There is no particular decision made to face the critical summer period in this case. The main decision is how to deal with the consequences of the summer grazing conditions. If the summer is too dry, the lambs will be sold as “thin lambs” to be fattened elsewhere. If the summer is good, fattening will take place on the farm, on grass. The second critical season is the winter, with the risk of snow and of a late start to vegetation growth. Hay-making offsets these risks.

C) “Preferably a wide spread of sales” : the case of Farm n° 6 is characterised by a January - April lambing (indoors) plus an out-of-season lambing in October for 15 % of the ewes. The stocking rate is 0.9 LU/ha. Fifteen percent of the winter lambs are sold before 1 July. The main critical season is, as in the previous case, summer with many weaned lambs to be fattened. Management in the summer key period is based on three types of measure:

1. As the ewes are wintered, regular records of feed stocks are made. The early making of haylage allows early regrowth of pastures before the drought, which is used by the lambs. These stocks are made on temporary pastures and mainly one- or two-year-old temporary pastures, which have high grass production.
2. Some of the sowing of new pastures is carried out in spring, which also provides quality grass for the lambs in summer,
3. The distribution of concentrates to the fattening lambs is systematic, and can substitute for the lack of grass. The second critical season is the early autumn if there is a severe and long drought in summer. This can have harmful consequences on lamb fattening, the nutrition of out-of-season-lambing ewes in late pregnancy, and the preparation of ewe lambs for mating. The ewe lambs graze the best quality pastures (temporary leys), the fattening lambs still receive concentrates and, if there is a shortage of grass, the pregnant ewes can be housed earlier, before the beginning of lambing.

Discussion

Our study, based on a small number of farming enterprises, has no claims to be representative of the general situation. It confirms the diversity of husbandry objectives associated with extensification. This diversity could be re-qualified in terms of the different issues surrounding the management of grazing on the one hand, and the practices and techniques to be mobilised for this management on the other. The seeding of temporary pastures, pasture topping, early mowing, preservation of grass for the winter, fodder stocks and concentrate distribution appear as various tools to manage the risk periods for grazing. The adjustment of the stocking rate to the winter availability of forage is a more structural one (HFRO, 1979). It can be more precisely defined by taking into account the exact number of the ewes mated to lamb in the early winter, especially when they are reared outdoors.

The main seasonal key periods focus primarily on risk periods for the flock and secondly from a grazing point of view. As far as other farming operations and labour are concerned, other seasonal key periods can be identified, and may be of greater or lesser importance to the farmers. In addition, taking into account the decision-making process leads to another approach for the seasonal key periods: the management of one season refers to anticipative decisions and just-in-time decisions. The seasonal chain of farmers decisions and the notion of “risk period” for decision processes (due to the coincidence of anticipative and just-in-time decisions) can have a quite different profile to that of the key grazing periods (Dent *et al.*, 1994, Girard & Hubert, 1996).

Key grazing period management does not only refer to the provision of grass (quantity and quality) to the flock by the preservation of paddocks, seeding and mowing. Grazing organisation refers also to the grouping of ewes and to the grazing route of the groups that can help control the dynamics of the vegetation and manage grazing during the risk periods and at other times. For example, the practice of having a second mating season, whilst responding to market incentives, also enabled the farmer to have ewes with different feed requirements at all times of the year. At any time, out of season ewes are managed together in specific groups. This helps in managing the diversity of grassland resources, as shown by the reproduction periods adopted in experiments on extensive sheep rearing (Thériez *et al.*, 1997). Understandably, these reproduction choices appear strategic, for not only do they pursue husbandry objectives, but they also have consequences for appropriate management in particular of grazing resources.

The dividing up of the flock into almost independent groups over the year as a goal to simplify management has been observed in other situations with working restrictions, notably in the management of suckler cows (Ingrand & Dedieu, 1996b). Limiting grouping is to deprive oneself of a tool for adjusting the different fodder requirements of the animals to those of the fodder resources: grouping is the structuring element in the organisation of pasture rotation. Management based on the principle of keeping stable groups throughout the season means that other means must be used in order to regulate the growth and quality of the grass, such as mechanical mowing with a pasture topper.

In these case studies, the farmers manage between 7 to 15 groups simultaneously in summer (when there is the maximum number of groups of grazing lambs) and between 4 to 10 groups the rest of the year. The organisation of sophisticated rotations which would aim to produce good quality resources for the next period appears difficult to achieve with such a high number of groups. The flock is therefore as far as management is concerned much more a consumer of the available grass than a tool to control the quality of the offered grass.

Conclusion

The extensive system represents a context in which farmers can plan a variety of husbandry objectives, depending on decisions based on constraints caused by the farm itself (size, labour, and agronomic suitability) and external constraints (CAP, agri-environmental measures, and market forces). These decisions are not entirely specific to sheep farmers: their management of reproduction (earlier lambings, second seasons) is not very different from that adopted in other production systems. On the other hand, the opportunity to develop husbandry objectives based essentially on grass is made easier in the extensive situation because the stocking rate can suit better the difficult periods of the fodder calendar (winter and summer). The reduction in feed costs can affect not only the rearing of grass-fed lambs (Prache *et al.*, 1990) but also the feeding of the ewes.

Diversity of husbandry objectives has a double consequence for the management of extensive systems: the various choices of lambing times bring about considerable differences in the chain of seasonal key periods, either for flock management or grazing. Notably, it raises difficulties in managing the wintering at pasture of animals with high fodder requirements. In addition, practices and techniques used to manage the land will differ from system to system. The diversity of requirements of the animals at a given moment, made possible by lambing at different times is not available in an extensive system, neither are the forms of adaptation of the organisation of pasture by frequent re-grouping of flocks. These considerations militate against integrating knowledge about the diversity and content of farming objectives in the formulation of scientific, technical and organisational questions about extensive systems.

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