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Shepherding : which know-how and relevance to the present day ?

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Abstract

In industrial countries although sheep farmers often resort nowadays to fencing in grazing their flocks, this technique has not eliminated shepherding. The question is to gain better insight into why sheep farmers are interested in shepherding and into the techniques used by the shepherds. We carried out a study in an area of Mediterranean France where shepherding is still practised. Our work dealt with some 20 shepherds and involved a survey and the monitoring of the flock over a full shepherding day during which the shepherd was able to explain *in situ* the rules he applied. We describe different supervision techniques implemented by men being different in the way they view shepherding but for the most part keen. They mobilise different types of knowledge outcome from animal behaviour's basic rules adjusted to the nature of the environment. With the advent of valorisation of remote areas invaded by scrub and often display a complex topography and cannot be fenced and with the advent of quality animal production, shepherding techniques require careful knowledge. These skills are the roots of a trade and be able to transmit them may be essential.

Introduction

Today, grazing is often suggested as a means of participating in the maintenance of abandoned land. The setting of fences would therefore appear to be mandatory as an effective solution to look after flocks to these areas (Blanchin, 2002). However, there are areas, or periods of the year, where shepherds are still called upon to tend flocks, notably in mountain summer pastures, but also throughout the year in rangelands, piedmont areas and hills where grazing areas are remote, scattered or covered with shrub (DRAF PACA – MRE PACA, (2003). Also, it should not be forgotten that even in present times, there are those who enjoy shepherding and others who volunteer to steer flocks to pastoral areas. But what precisely does this work entail, with techniques so unfamiliar to us, and which accordingly is rarely commended ? By taking the time to watch shepherds at work, it can be seen that they do not simply steer their flock to grazing areas then move from one site to another, nor do they rest in a corner of the pasture, dreaming or reading while the animals graze. Both in mountain pastures and in rangelands, shepherds plan the movement pattern, observe and analyse situations and adjust their approach to best meet the needs of the flock by getting the most from pastoral resources (Landais and Deffontaines, 1988). They possess often poorly understood know-how. Young shepherds rarely set out without seeking a wealth of advice from other more experienced shepherds. As indicated by Mallen and Legeard (1996), this know-how is based on a refined knowledge of the land and of animals, know-how that has been acquired generally in an empirical manner. The aim of this study was to identify this know-how and record shepherding techniques in order to contribute to the promotion of this activity and facilitate its transmission.

Method

This study was conducted in the Mediterranean hinterland with about 20 shepherds each possessing more than 10 years of shepherding experience in varied environments. I focused on their practices and on their overall experience in matters of flock steering to grazing. To do this, I accompanied the shepherds on one or two outings with their flocks and in this way observed their shepherding practices and discussed with them their techniques and the reason behind their different actions (Daget and Faugère, 2003). To investigate their concept of shepherding, I performed a semi-directive interview (Kaufmann, 1996) with each shepherd based on a questionnaire concerning the reasons behind his actions, the manner in which he conceived his role as shepherd and that of his dog, the indicators of ewe and flock behaviour he used, his method of acting on the flock and his consideration of the pastoral area. When possible, observations were made during shepherding routes that took place before the interview in order to create with the shepherd an atmosphere of trust and mutual comprehension based on concrete discussions. In certain cases the situations encountered during shepherding circuits were taken as examples and were discussed during the interview. Since individual interviews were not to exceed 2 hours, it was necessary in a third of cases to continue on a second occasion. The analysis concerned specific points related to the animals, to the type of environment and to the shepherd, and in this manner sought to identify the source of the discriminating elements in shepherding practices.

Results

Data analysis showed that shepherding practices are based on knowledge of the spontaneous behaviour of the flock. These practices are adjusted to fit the special characteristics of different environmental types. They are also largely dependent upon individual objectives and points of view.

I – Shepherd common know-how concerning ewes, flocks and their spontaneous behaviour

Sheep behaviour when grazing is species-dependent. It is related to their biology and also to the context of their livestock farming system and to their experience. This is why behavioural responses are fairly variable. Nonetheless, the animals also show typical behaviours that are expressed spontaneously and regularly, even in different situations. It is these typical behaviours that the shepherds know, take into account and use as a basis to steer their flock when shepherding. It is the individual attitudes of the ewes and the rhythms and collective behaviours of the flock with respect to environmental factors or animals of the same species that are employed as the basic principles to steer a flock.

- **Individual attitudes and typical behavioural reactions used by shepherds as indicators**

- **In pastoral lands, ewes restrict their activities to a certain area by taking account of the relief, the structure of the vegetation and the configuration of the environment, just as much as the nature of the vegetation**

For instance, ewes tend to establish their nocturnal bedding site at high points. When the flock spends the night outside, *the shepherd knows that he has every chance of finding it at these natural bedding sites.*

Ewes on the move find the easiest path by selecting the best contour on slopes, and this generally corresponds to that which is the least steep. When ewes make use of a path or a bounded track, they appear to be drawn forward in their movements, they tend to accelerate in order all the sooner to leave the path which acts a little like a trap where the ewes "become

channelled" and which they leave only when the path opens out into a sufficiently accessible and clear space. *The shepherd prevents the ewes from making use of such paths by placing himself at the intersection and acting as a deflector. But he uses these paths to quickly get on grazing area or come back to the night paddocking or sheep shed.* On slopes, ewes spontaneously place themselves facing up the slope and graze while moving upwards, whereas they prefer to come down with an empty stomach. *In hilly areas, the shepherd steers his flock across the slope but with a slight upward drift so that the animals graze, and he takes advantage of a break in the slope to turn the flock and send it back on another upward curve. In undulating areas with woods or scattered with clumps of scrub forming a labyrinth, the shepherd uses the slope to channel the direction of sheep movements.*

Ewes prefer to graze in open areas and tend to spend more time on high ground. *If such areas are found on the higher slopes of a hill, the shepherd notes these for they are attractive areas he can use to recover all the ewes in the flock.* Ewes also make use of hollows, dales and marshes where the vegetation is more dense and where it remains green for longer. *The shepherd steers the flock into these areas when elsewhere, the less well protected sward is dry. The shepherd uses the moving of the flock from one type of grazing place to another to stimulate grazing interest of the sheep i.e. the intensity of their grazing.*

A grazing flock spreads out. When the contour of the ground presents a concave shape sufficiently vast to contain all the animals, and they can see each other, the flock becomes stable. *The shepherd uses this type of configuration to promote flock deployment and encourage a phase of intense grazing.* Conversely, a convex shape preventing the animals from seeing one another prevents the grazing pattern from becoming stable. If some of the animals now pass over the line where they are out of sight, these may become isolated and cause the flock to divide. *When faced with this configuration, the shepherd takes care that part of the flock is not drawn onto the other side where it leaves his control.* In partially bush covered areas the ewes move from one clearing to another and the bushy vegetation acts as a visual barrier, causing the flock to split. *The shepherd frequently checks that the entire flock is present.* When the clumps of bushes become more dense, the ewes make use of natural breaks or the paths created by wild animals. *The shepherd uses these corridors to gain access to new grazing areas.* When the bush cover increases the vegetation becomes impenetrable and acts as an obstacle, preventing the ewes from passing through. This type of obstacle may constitute *a steering tool for the shepherd that he uses to turn a flock that presents perpendicularly to the obstacle.* If the flock arrives slantwise at the obstacle, the ewes gather together and accelerate their movement along the edge. If the flock arrives parallel to the obstacle, it channels the flock and prevents its lateral deployment on that side. *In the last two situations the shepherd seeks to slow the flock by placing himself in front.*

Ewes need to drink regularly, particularly when grazing rough vegetation. *The shepherd includes in his circuit one daily stop at a watering point, or two in cases of extreme heat. He also uses such event to give a boost to the flock activity.. similarly that he does when he*

Ewes are attracted to cropping areas where they are prohibited. *The shepherd anticipates these deliberate movements of the flock before it reaches such an area. He creates a virtual barrier by placing himself - with or without his dog, or simply by sending his dog - between the flock and the area requiring protection.*

- Ewes remember the routes they have previously travelled

When ewes have already passed through by a particular route, they preferentially select it again; they also know how to locate again the place where they previously found a palatable source of food. Shepherds talk of the ewe's sense of smell as their means of recognising plants, and also as their means of detecting odiferous traces left behind after a previous passage. Ewe orientation therefore results from a combination of odiferous traces and visual

references. *The shepherd uses this spatial recognition capacity when he allows his flock to circulate freely, but opposes it when he seeks to spread the impact of the grazing more evenly and protect the most attractive areas from overgrazing.*

- Ewes seek to remain together

If, in the course of their grazing, certain ewes drift away from the flock, as soon as they become aware of this they cease their grazing, raise their heads, sometime bleat, and try to locate a visual or sound-based signal and run to rejoin the flock. The probability of individuals becoming isolated is higher in undulating country or in shrubland that forms visual barriers or obstacles preventing the ewes from passing through. *The shepherd counts on the ewes' gregariousness to assemble his flock. When the shepherd inaugurates new routes of circulation and new grazing areas, he places himself in front of his flock and calls to the animals; the small number of tame ewes or castrated sheep, called "floucas", follow him and draw forward the rest of the animals.*

- Ewes recognise the attitude and voice of the men and dogs with which they are in regular contact and are fearful of sudden movements and shouting

With their good memories and emotional sensitivity, ewes remember the behaviour of men and dogs. When they raise their ears in response to a sound or visual disturbance, when they shy away from a sudden movement, when they urinate while running away rapidly one behind the other, when they draw away from an unknown person or jostle one another at the approach of a dog, the shepherd knows that they are showing their fear. These wary attitudes lead them to cease grazing. If this situation is repeated several times in the course of a circuit, the amount of time actually spent grazing is substantially reduced for the ewes require some considerable time to resume calm and efficient grazing. *The shepherd takes care to steer his flock in a serene manner without sudden changes by effectively controlling the work performed by the dog. He establishes a coded language comprising half a dozen onomatopoeia words.*

- Ewes react to weather conditions (sunshine, wind, rain...)

In a temperate climate, ewes are more difficult to move during the hottest periods of the day. They graze when it is cool and cease all grazing at the hottest time of midday. Ewes not used to the heat are particularly wary of it. *When it is very hot, the shepherd changes grazing areas during the coolest parts of the day or at night for the ewes follow on more easily.* Ewes always prefer to graze with their heads in the shade, either by turning their backs to the sun or by grazing in the shadow of a neighbour. *The shepherd takes care to steer his flock in such a manner that the ewes have their backs to the sun: he makes the way of the flock towards the west in the morning and towards the east in the evening.* In weak windy conditions, the ewes move face into the wind and that does not raise problem. But when the wind is strong, the ewes turn their back to the wind and seek shelter. *The shepherd chooses a sheltered grazing area and does not lead them too far to come back easily.* A fine drizzle does not prevent grazing, particularly in rangelands where the species are rougher and less fragile. *Rain does not prevent the shepherd from taking his flock to grazing.*

- Ewes possess an internal clock that regulates their activities

Ewes show signs when leaving times are shifted. When they wait in front of the door of the sheep shed, or in front of the gate leading out of their paddock, when they bleat or when their route is shortened, the ewes express their sensitivity to regular hours. Such behaviour is observed within 15 minutes of the regular time. *Most shepherds tend to follow regularly the times at which they take the ewes to pasture. The shepherd in this way takes advantage of the*

ewes' rhythms and habits to send a flock to the edge of an attractive but prohibited area. By taking it here at the close of the evening, he knows that he will be able to turn the flock easily because of the attraction exerted on the animals, at this time, by the nocturnal bedding.

- Ewes graze for 5 to 10 hours daily, depending on the seasons, their needs, on the type of vegetation offered to them and on whether or not they are experienced of the resources available

Ewe grazing intensity varies in the course of the day: in the morning, they whet their appetite by grazing various plants in a tranquil manner and in some cases are willing to browse. But if they are truly hungry, they are nervous and tend to move rapidly or even run rather than starting to eat immediately. It may take half an hour or even an hour for them to calm down. *Here the shepherd's task consists of controlling this hyperactivity by taking the flock to an area that is neither excessively nor insufficiently appetising. In this way, he holds them back. But above all he takes care to ensure that the ewes are always sated at the end of the day so that this difficult situation is avoided on the morrow.* The day is divided into several periods of intense, stable grazing alternating with grazing accompanied by movement, during which the ewes are more selective, and finally a period of inactivity where the ewes rest and ruminate, though this may be absent or of short duration and is only a requirement and prolonged if the day is hot. *As soon as the temperature rises, the shepherd shifts the time at which the flock moves to pastoral area by leaving very early in the morning at dawn. He then leaves his flock to rest at midday and starts off again at the end of the afternoon once the intense heat has abated, to return late as night falls.* Before returning to the sheep shed, and before nightfall, the ewes accelerate their food intake and become less "greedy". *This is why certain shepherds offer the flock a "soupade". This consists of offering the flock a more palatable grazing area where the resources are of a higher quality than those offered in the course of the shepherding circuit in order to cover animal needs. As its name indicates, it is generally given at the end of the circuit for a rapid top-up of the food consumed in the course of the day. In these cases the shepherd takes advantage of the gathering together of the ewes to secure the end of the route. But conversely, other shepherds prefer to satisfy their ewes' greediness in the course of the morning so as to prevent the ewes from spending the entire day waiting, while disdain the vegetation found in the circuit.*

- Ewes always explore a new pastoral area

Ewes show exploratory behaviour when faced with a pastoral area that is new either because it is entirely unknown to them or because it is being grazed for the first time in the season or is being grazed after a period of grazing cessation imposed for purposes of regrowth. When the pastoral area is enclosed and entirely unknown, the exploration initially and mainly concerns its limits, with the flock circulating around the length of the fence. When the flock is shepherded, it advances rapidly and tends to disperse. Regardless of the situation, ewes behave as if they are drawn by the possible discovery of better resources. Ewes show their curiosity and their liking of food, but also have an attitude of mutual leading or even interindividual competition, all behaviours that result in an acceleration of their movements. *The shepherd's task consists of slowing these moving by placing himself in front of the flock and channelling its movement in a single direction.*

- A flock in activity produces shapes that are indicators of the manner in which the route is progressing

The shapes produced by the flock are meaningful for shepherds (Lécrivain et al., 1993). Most shepherds, consciously or not, use these shapes observed during a shepherding circuit and which at all times provide an evaluation of the relationship established between the flock and

the land under the effects of their shepherding practices. In a general manner, shepherd interventions tend to prompt uniform individual behaviours with the objective of obtaining "serene" grazing phases that combine efficient ingestion and optimal use of the pastoral area. The shepherds monitor the change in the activity of a minority of individuals that come alert and cause the entire flock to start off.

All this knowledge of the spontaneous behaviour of ewes and the flock is essential if the flock is to be steered over pastoral territory, but the shepherd must also know the area.

- **Shepherd reading of pastoral area**

It is because the shepherd is familiar with the spontaneous behaviour of the ewes and the flock that he can "read the pastoral area" with the same perception as his animals. Depending on the topography, the relief and the configuration of the land, as well as the heterogeneity of its vegetation, the area intended for grazing is characterised for the ewes and for the flock by a certain polarity that induces flock movements, directions and activities.

Before leaving, the shepherd undertakes a spatial study of these characteristics (land morphology, physiognomy of the vegetation, quality of the herbaceous species and shrubs present on the land) and this serves as a basis for determining possible routes and circuits. Thereafter, he decides on a circuit that he divides into areas of movement and grazing; then in the course of the circuit he continues to "read the situation" in such a manner to anticipate or respond to ewe and flock reactions to the morphology of the land or any reduction in forage resource potential or group integrity. He observes the shape adopted by the flock as a harbinger of gradual grazing cessation, accelerated movements, dispersion or flock division.

- **Steering a flock with a dog**

A dog provides the shepherd with effective assistance, all the more so that it has been trained by the shepherd with which it works. A calm dog is naturally more suitable, but the training it receives is also a determining factor. *The shepherd prefers to train the dog himself. His aim is that the dog does not endlessly run around, that it does not bite, that it is attentive to orders, is obedient and respects the flock.* It is the quality of this training that determines the quality of the sheepdog and shapes simultaneously over time the relationship between the master and his dog. The dog's work consists of helping the flock in its movements, slowing the route, confining the flock to a given space, turning the flock, bringing back - without biting - any ewes that drift away by their "circumnavigation" at a sufficient distance so as not to startle the rest of the flock, and to move in the shepherd's stead. It understands vocal and sign language orders. *The shepherd relies on the quality of the exchange with his dog to obtain effective assistance. He knows that reciprocal comprehension is vital in the conduct of a grazing circuit and the success of his shepherding. The shepherd must ensure that the dog is always sent at the right instant. He makes every effort to give the dog clear orders using an unvarying and limited vocabulary of about a dozen words, and by the use of precise gestures. He uses the dog as "an extension" of his own arm.* The dog gradually learns to supervise a flock and in the end can itself take appropriate initiatives. In such situations, the dog backs up the shepherd's work.

- **A shepherd's know-how is based on knowledge of animal behaviour and the pastoral area, and on the relationship he establishes with his flock and his dog**

This basic knowledge of ewe and flock behaviour and his "informed" reading of the area from the flock's standpoint leads the shepherd to respect their spontaneous behaviour. He wishes to

satisfy the animals as far as is possible, but he has also learnt that this attitude is essential for animal serenity, the smooth conduct of a circuit and the facility of his shepherding work. By respecting the spontaneous behaviour of the flock in response to its environment, not only does he avoid difficulties, but also with time he establishes a sort of exchange based on this mutual understanding. By adopting a clear attitude, consistent behaviour and a coded language, the shepherd establishes a form of dialogue and over time builds a relationship of trust with his ewes and his dog. They show that they are sensitive to him and appear to be reassured in his presence; certain ewes also express their satisfaction or their dissatisfaction by raising their heads or by bleating in the shepherd's direction when they consider that the grazing area they occupy is inappropriate and wish to move to another site. By his manner of steering the flock and his consistency, the shepherd continues the exchange by responding either positively or in a more nuanced manner to ewe requests. The key for the shepherd is to remain consistent in his manner and to respond to the flock and his dog.

- **Control of a route is based on consideration of flock behaviour indicators**

In a general manner, in order to maintain the control of flock movements, the shepherd bases his approach on the constant or periodic monitoring of a certain number of indicators, including animal activity, dispersion, orientation, movement direction and speed, shape of the flock and its deformations. These indicators allow the shepherd to analyse in real time the behaviour of a flock and to anticipate its reactions to characteristics of the physical environment and to diverse events likely to affect flock behaviour. The control of a flock depends directly on the quality of this anticipation and the practices used by the shepherd to "counter", direct or encourage the appearance of predictable behaviours when he considers it impossible to leave the flock to its own devices (Lecrivain et al., 1993).

His position with respect to the flock is also an instantaneous response to each situation. To draw the flock, start a movement or change areas, the shepherd places himself at the front. When he leaves them to their own devices, he is more often than not to one side. To recover the stragglers, he places himself behind the flock. But shepherds are different and do not employ a single attitude or working method.

II - Shepherd attitudes

- **Temperaments and experiences**

Shepherds possess different temperaments and experiences that shape their points of view and their attitudes and acts.

It is with their individual sensitivities and their own assurance that shepherds take charge of a flock. It is also through their patience and the quality of their dialogue that they build a trusting relationship with their dog and with their ewes.

It is with their own assessments of the characteristics and potential of various types of land that they steer their flock over a given pastoral area.

It is on this basis that they combine their knowledge of animal behaviour and the pastoral area and decide in which manner they will steer their flock.

III – Shepherd actions

- **Organising a loop**

To steer a flock, the shepherd bases his approach on the spontaneous behaviour of the ewes and the flock. He seeks a certain harmony between spontaneous flock behaviour and land characteristics in order to detect the natural "time and space harmony" of the flock which determine the probably natural courses followed by the flock. The aim here for the shepherd is obviously to select, according to their final analysis, the probably "best course" to construct a circuit by estimating the time necessary for the flock to reach different grazing areas and return to the starting point. Once this is done, he plans a direction, an area to reach and a way back in a loop. He takes advantage of the diversity of the land and the heterogeneity of the plant cover to avoid animal lassitude or break their habits. The shepherd conserves a margin of manoeuvre within a circuit to cope with the unpredictable reactions of the ewes. He covers the entire area either by every day slightly augmenting the loop or by adding or withdrawing adjoining areas. Not all shepherds exercise the same degree of control over the grazing circuit taken by their flock.

- **Models specific to personal logic**

It is also the shepherd's attitude that governs his conception of shepherding itself. Most shepherds have a preference for shepherding in a particular type of environment rather than another, i.e. where they are more at ease. These are generally the environments where they learnt their trade. Also, they often prefer to shepherd in the manner taught to them by other shepherds. In fact, rather than a single, correct manner, there are several manners of practicing shepherding. The forms farthest apart are "tight" and "loose" shepherding (Dureau and Bonnefon, 1998). They are practised however the type of environment. It is in line with his personal logic that each shepherd prefers a way of practice that is either *loose*, or conversely *tight*. He adapts this as he sees fit, having a more or less close watch on the flock.

Tight shepherding consists of dividing the grazing into precise areas, with or without the use of netting fence. This rationing method allows to run a flock with high stocking density on two types of resource: rough or fresh forage. On rough forage the method is useful for making the ewes to consume a resource not much palatable. On fresh forage, this method is used to manage in time what the ewes would rather ingest ; the flock is regularly offered what the shepherds call "nette", i.e. intact sward that is consumed over several periods: during a first passage, the ewes remove the most attractive part of the shoots, then when passing through a second or even third time, they graze the remaining parts such as the stems. This type of shepherding is applied in areas with abundant herbaceous resources such as natural or artificial pasture, but some shepherds also use it on rangelands where resources are more sparse. The shepherds who use this technique are aiming to draw the most from the vegetation and appear to be satisfied by the control they thus exert over their flock and over natural resources for they find that the ewes "scrape" well the rough forage, do not waste fine forage and move less. With their dog, they regularly "gather" their flock. "soupades" are given with shepherding of this type.

Loose shepherding consists of allowing the flock to spread so that it takes full advantage of the heterogeneous vegetation where quality results from combinations and complementarities between plant species, including shrubs. Here, the shepherd's task consists of giving a direction to the flock, then leaving the flock to its own devices by accepting, to a certain degree, the new directions adopted by the flock which often move towards ungrazed areas the previous days. The limits to the circuit are therefore ill-defined. By providing his flock with as much space as possible, the shepherd meets a need for liberty that he considers essential for

ewes to graze serenely and efficiently. With the help of his dog, the shepherd controls only the limits he considers it unwise to exceed and intervenes only rarely to "gather" his flock. With this type of practice the shepherd controls the location of grazing impact, not on a one-day scale, but over several days of grazing or over several routes.

IV – Shepherding a flock requires special abilities

The shepherds themselves say they have a great fascination for shepherding, generally from childhood. Also, they don't count their hours. To acquire the basic knowledge of ewe and flock behaviour, and learn to "read" a landscape earmarked for grazing, shepherds show special qualities and abilities such as:

- punctuality to take the flock out regularly; serenity to steer without stress; patience to help the flock feed to satiety at its own rhythm while taking account of flock composition and animal experience, and to teach a sheepdog.
- attention and alertness to anticipate ewe and flock behaviour, avoid danger, modify or shift a circuit, ensure that resources are sustainable and that the impact of grazing is evenly distributed,
- observation, the ability to listen, analyse and synthesize to observe, hear and understand individual and collective animal reactions, and to respond,
- curiosity to find new grazing areas and steer the ewes where they do not tend to go naturally,
- courage to shepherd willingly for many long days, irrespective of the weather,
- a love of nature to shape the grazing routes to fit the topographic, fodder and weather conditions,

Contrary to popular belief, it is not solitude that shepherds seek, but serenity. Their work is neither easy nor calm. Neither are they unsociable people, they communicate in a subtle manner with their ewes and are perfectly willing to share their knowledge and know-how and discuss their work.

V – Relevance of shepherding in the 21st century

Over the last 10 years, the countryside in the Mediterranean hinterland has become the subject of fresh interest. Firstly, by landscape managers who are seeking to protect it from fire, conserve the flora and fauna of ecological interest and render rural life more dynamic. Secondly by sheep farmers who, after enlarging their flocks, have redeployed their grazing into pastoral areas while simultaneously taking advantage of maintenance bonuses. The participation of sheep, by their grazing, in the maintenance of large areas in these landscapes was rendered possible by the construction of many fenced enclosures (DRAF PACA – MRE PACA, 2003). However, the grazing of enclosed areas is not as well controlled as when it is conducted under the crook of a shepherd who can avoid overgrazing of zones or certain plant species. In addition, with the enlargement of wolf territories to extend outside the confines of the Alps and their inevitable arrival in hilly areas (Garde, 2002), the maintenance of flocks in enclosures, particularly in the most remote rangelands, poses a problem. By contrast, shepherding has been suggested as an effective means of protecting the flocks. The shepherd's presence in the field allows him to monitor the flock almost continually and intervene if necessary. In this context, the shepherding of grazing flocks can no longer be considered as an antiquated activity belonging to the past, quite the contrary. But the task needs shepherds who care for their flock's well-being, who are able to harmonise their behavioural aptitudes with

the characteristics of the environment, who are capable of shepherding in undulating landscapes that in some cases contain considerable shrubland, who are capable of obtaining assistance from dogs trained for shepherding and who are convinced of the practical usefulness of their practices. But insufficient shepherds are available to meet current demands, which could well increase in the near future, and not all are ready to shepherd in hilly countryside with dense shrubland or woods without acquiring more knowledge of shepherding techniques. In this context, our observations show that although the personality of each shepherd opens the road to several different manners of steering a flock, some essential basic knowledge is necessary and this must also be adapted to put effective know-how into operation. Shepherding a flock is not a lazy job and in certain situations is a useful and irreplaceable task.

Conclusion

This study provided the opportunity to shed light on shepherd know-how. It also helped to understand the reasons behind their actions and identify the factors they use as the basis for their work. They are familiar with those specific particularities of sheep that govern the animals' behaviour, e.g. their rhythms, their gregariousness, their fear of noise and sudden movements, their sensitivity to heat and sunlight, their olfactive competence, their capacity to detect visual references, their emotional capacity and their ability to remember. They are also familiar with the characteristics of spatial areas that are meaningful for sheep in that they configure, polarise and direct their behaviour, e.g. relief, topography, shape of the land, physiognomy and structure of the plant cover, and the nature and distribution of plant species. When constructing a circuit, the shepherd selects the best harmony between the animals, the time and the spatial area, plans to set off in a particular direction, estimates the time necessary for the flock to reach a given area by passing through a sequence of complementary areas, and a return in a loop. When moving through the circuit, the shepherd uses many elements or natural configurations as essential steering assistance, e.g. obstacles, corridors, edges and relief. He controls circuit progress by monitoring animal behaviour indicators such as their activity, their dispersion, their orientation, the speed and direction of their movements, the shape of the flock and its deformations, as well as the sheep's satiety marked by the roundness of their belly. The shepherd reacts and intervenes by often prompting participation from his dog. The synchronisation of this knowledge allows shepherds to steer their flocks with intelligence, take advantage of animal capacities, make the most of the forage resource available and ensure its sustainability.

Above and beyond this common know-how and these common techniques, shepherds have very different ways of shepherding, differences that stem from their temperament, their experience and their personal logic. Some tend to shepherd in a "*tight*" manner and others in a "*loose*" manner, both methods being applied indifferently in areas that are open or closed, flat or undulating. While the first method is reassuring, the second surprises and sometimes worries observers. Shepherds tend to apply one rather than the other, but some combine the two. These are two manners of conceiving shepherding work and it should not be imagined that one is better than the other. The essential point is that the circuit accomplished by the shepherded flock is not the result of "haphazard" drifting, but is the outcome of a controlled choice.

Regardless of the method used, shepherding is a way to maintain remote or scattered grazing areas and safeguard plant and animal diversity. It is also a way of using and making the most of heterogeneous resources rich in terms of synergy for sheep and participating in high quality

sheep production. Contrary to grazing in enclosures, the shepherding of flocks provides precise management of the environment.

But, shepherding is complex and demanding because of its duration. Most experienced shepherds nevertheless say that shepherding is more a pleasure than a constraint. Indeed, when they manage to harmonise flock behaviour with the pastoral area, they derive great satisfaction from a useful job well done and a certain complicity with the animals that brings them serenity and peacefulness. When we recognise that in the near future, sheep farmers will have to protect their flocks from major predators such as the wolf, shepherding - as an effective means of monitoring flocks - is destined to assume a major role. This occupation, beyond the constraints it generates, warrants more attention and respect.

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