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Restocking extensive mountain areas with young ewes—does origin matter?

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ABSTRACT

Recent renewed drives to maintain farming activities on extensive areas have been encouraged at the EU level, which previously had witnessed a phenomenon of partial abandonment and reduction in flock sizes. Successful restocking with naïve animals from outwith the farm is a challenge, as these animals are not familiar with the landscape and may lack the social interactions and 'hefting' qualities their homebred counterparts develop. This paper presents results from an experiment where young ewes from different origins (homebred and bought-in) were reintroduced onto a mountain range grazing area. Focal animals of both types were monitored using GPS tracking collars over a one year period whilst performance was recorded for the whole flock over a two year period, to gauge whether or not their origin had an influence on ranging behaviour and performance. Although initially the bought-in animals developed their own home range and interacted little with the main flock, after one summer grazing period they appeared to learn from and socially interact with their homebred counterparts, developing a knowledge of the grazing landscape. Despite initial weight change differences, later performance results of the animals were not affected by their origin. Provided that animals are encouraged and given opportunity to socially interact with the main homebred flock, this study indicates that it is feasible to restock extensive farms with animals from different origins.

1. Introduction

European mountain areas have witnessed a phenomenon of agricultural abandonment in the last decade (Bernués et al., 2011; Chatellier and Delattre, 2005; MacDonald et al., 2000; Morgan-Davies et al., 2012). This phenomenon can be explained by several varied reasons; the impact of European agricultural policies (Morgan-Davies et al., 2012; Royal Society of Edinburgh, 2008; SAC Rural Policy Centre, 2008); the impact of disease outbreaks such as the Foot & Mouth disease outbreak in the UK in 2001 (Thompson et al., 2002) but also by social elements linked to the changing expectations from livestock farming lifestyle (Madelrieux and Dedieu, 2008). This period of decline of agricultural activity in the mountain areas has however recently been followed by a relative increase in prices for agricultural products, in particular sheep, leading to a renewed interest into this sector (SAC Rural Policy Centre, 2011). This is most likely due to an increase in lamb prices, better rate exchanges between the Sterling and the Euro, and a tightening of supplies (Quality Meat Scotland, 2013). The latest European agricultural policy, with its proposal of recoupling some support with production in geographically challenged areas is also anticipated to encourage farmers in mountain areas to maintain or increase their level of young animals for replacement (Matthews et al., 2013; Scottish Government, 2015). As a result, in areas where mountain grazing had been underused and where flock sizes had declined dramatically, there is now a drive for reintroducing animals and to increase flock sizes.

Sheep bred in a particular environment are thought to have a unique knowledge of their grazing areas and adhere to a "home range" (Hunter, 1964). This term describes an area of land that the grazing sheep are familiar with. This 'familiarity' allows for efficient use of forage and water resources (Provenza and Balph, 1987). In the UK, the process of establishing a home range in mountain sheep is often referred to as "hefting" (Defra, 2008), which is defined as the

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instinctive nature of extensively managed breeds such as the Scottish Blackface to remain and graze in a relatively small local area (the heft) and to pass on this knowledge of local area to offspring.

Conversely, bought-in animals, unaware of local conditions, may have difficulty in locating areas of good grazing and establishing such home range. This may lead to risks of malnutrition or extreme ranging (Provenza, 1995; Warren and Mysterud, 1993). As such, the performance of homebred sheep has long been considered superior to that of bought-in sheep. Knowledge of the pasture is thought to be passed from ewe to lamb (Defra, 2008; Hunter and Milner, 1963; Lawrence, 1990), so that she shapes food and habitat selection of her offspring and increases their likelihood of survival (Provenza, 1995). In addition, Blakesley and McGrew (1984), as well as Nelson and Mech (1991) found lower rates of predation associated with this familiarity of the land.

Whilst there are considerable drawbacks into introducing naïve animals into an extensive environment, buying-in breeding stock remains one of the most viable options to increase flock size rapidly. Where and how these newly introduced animals will choose to stay and forage is therefore important to determine. A number of studies (Dumont and petit, 1998; Edwards et al., 1996; Hewitson et al., 2004) have shown the ability of sheep to use spatial memory to enhance their foraging behaviour and determine feeding-sites selection. This becomes essential when resources are sparse with no visual cue available, such as on extensive mountain ground (Dumont and petit, 1998). Sheep are also extremely social animals and their social behaviour will dictate how they spread across pasture when foraging (Dumont and Boissy, 2000; Sibbald et al., 2005). In some circumstances, social bonds can be as important as food preference in determining diet selection in lambs (Scott et al., 1995). A lack of social interaction between newly introduced animals and existing animals may disrupt the ranging and grazing behaviour of the whole flock.

Warren and Mysterud (1993) monitored the location of newly introduced animals using radio transmitters. However, such devices often present considerable error (Bevan and Hibbins, 2008), which may reduce reliability. More recently, Global Positioning System (GPS) technology has been used to monitor the ranging and locational behaviour of livestock (Asher et al., 2014; Bevan and Hibbins, 2008; Falzon et al., 2013; Taylor et al., 2011; Trotter et al., 2010). GPS tracking collars can be fitted around the neck of most livestock, and can be programmed to record up to 6 location points per minute, with a positional accuracy of approximately 5 m (Blue Skye Telemetry, 2008). Bevan and Hibbins (2008) successfully utilised GPS technology to determine movements, and consequentially the grazing behaviour of cattle. Likewise, Umstätter et al. (2008) used similar sensors to study sheep grazing behaviour in mountain areas in Scotland. Grazing behaviour obtained from GPS tracking collars can also be used to identify diet selection and diet quality (Umstätter et al., 2009), both of which are major determinants of animal performance. Although the study of a whole flock dynamic would required each and every animal to be fitted with a GPS collar, Trotter et al. (2010) suggested that 'mob monitoring' (or tracking flock movement) may only require a small number of collars fitted on strategic animals. Likewise, Taylor et al. (2011) argued that 'focal' animals (GPS collared) are not behaviourally independent from the rest of the group, and consequently small numbers of GPS collars can still provide a sufficient means to observe animal behaviour and environment utilisation.

This paper addresses the issues of restocking an extensive mountain area with young animals. It presents results from an experiment conducted on a mountain research farm in Scotland, where young ewes from different origins (homebred and bought-in) were reintroduced on a mountain range grazing area. Focal animals were monitored using GPS collars over a one year period. Regular weighing and performance was recorded for the whole flock over a two year period, to gauge whether or not their origin had an influence on ranging behaviour and performance, and thus ascertain the potential challenges of restocking a mountain farm with young replacement animals.

2. Materials and methods

2.1. Location/farm environment

The research was carried out at a mountain research farm, situated in the North West of Scotland (SRUC's Hill and Mountain Research Centre, Kirkton and Auchtertyre farms). The farm has an area of 2,200 ha and has the capacity to carry up to 2000 ewes. It is composed of two sub-units—Unit A (Auchtertyre), which carries at present 380 ewes managed extensively, and Unit B (Kirkton), which carries 900 ewes. The Unit A flock was reduced in 2008 following a health issue which resulted in 800 ewes being cleared from its mountain pasture. One hundred and fifty ewes remained and since 2009, the flock has been slowly built up with homebred replacement young ewes. In 2012, Unit A carried 380 ewes. The restocking study was carried out on Unit A mountain pasture (Fig. 1), which rises to over 1000 m above sea level and is predominantly made up of unimproved grassland or rough grazing (1320 ha). The rest is a combination of woodland (298 ha), species rich grassland (212 ha), wetland (219 ha) and bracken patches (30 ha).

Both Units A and B are exposed to the typical oceanic climate of western Scotland. Summers are generally cool and moist, while winters are commonly wet and windy. This typically wet weather is evident by the average annual rainfall measured between 1991 and 2010 of 2528 mm (Holland, 2014).

2.2. Animals

The restocking project began in 2012, when young ewes were brought into an existing ewe flock of 380 sheep.

A total of 230 animals from four different origins were introduced, to compare different strategies involved in restocking extensive mountain areas:

1) 110 young ewes came from the existing in-situ ewe flock grazing Unit A extensively (Homebred extensive: HB-Ex)
2) 40 young ewes came from an adjacent ewe flock grazing a better quality mountain pasture ground (Unit B) and managed semi-extensively (Homebred semi-extensive: HB-SE)
3) 56 young ewes were purchased from two semi-extensive farms (Bought-in semi-extensive: BI-SE)
4) 24 young ewes were purchased from an extensive farm (Bought-in extensive: BI-Ex)

These varied origins allow for the restocking comparison between homebred or bought-in animals, and from extensive or semi-extensive managed flocks. The difference between extensive and semi-extensive flocks was mainly due to pasture and soil quality, as well as altitude. All animals were of the Scottish Blackface breed.

2.2.1. Management

The bought-in animals were purchased and brought to Unit A in October 2012. Homebred and bought-in animals were then sent to their winter grazing locations (wintering off farm) at three different farms (Inverness; Buckie; Torbex), as is customary with extensive farms, and in line with the practical management of the flocks at the Research Centre. The division of the animals between the winter grazing farms was as follows: Inverness: 24 BI-Ex, 30 BI-SE; Buckie: 110HB-Ex, 26 BI-SE; Torbex: 40HB-SE.