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Summary

Wild cattle were a part of the native fauna of the forests, grasslands and marshes of post-glacial Scotland. Domestic cattle arrived with the first human colonists about 5000 years ago and from these was developed the Kyloe of the Highlands and western Islands - the breed stock of Highland cattle. A transhumant cattle economy developed which reached its heyday in the nineteenth century when 150,000 cattle per annum were taken across the drove roads from the west to the markets in the east. The ecological effect of this pastoral economy must have been dramatic.

The ecological importance of European livestock rearing systems has been underestimated until relatively recently when the failure of management policies on nature sites and the losses in biodiversity on farmland both pointed to the decline of pastoralism as the major influencing factor. The historical importance of interactions between the land and pastoral-based economies in shaping the biological and physical characteristics of the European countryside is becoming more widely recognised. However there tends to be a very narrow view of the role of grazing animals, especially amongst "conservationists". So often the animals, the management practices and their effects on the vegetation are seen outside of the context of the pastoral farming systems within which they evolved. In many places grazing by domestic animals is regarded simply as "a management tool" - its new environmental justification isolated from its agricultural and cultural origins. Such an approach is not sustainable because there is not a balanced relationship between ecological, social and economic goals.

Practical experience on the Hebridean islands of Mull and Islay, illustrates that it is possible to develop a more integrated, self-sustaining agricultural land management; one which is rooted in the traditional regional pastoral system but with the objective of meeting modern needs. The wider application to the Scottish LFA of the approach is discussed together with the effects of past and current agricultural policy and proposed policy reforms.

Introduction

Much of the current debate about the future of agriculture in the EU tends to be centred around a few key issues; namely, removing production support, farming at world prices and giving greater emphasis through policy to the environment and to forms of integrated rural development. For some of these issues we have more details than others; in the UK agricultural officials believe there will be a need to “restructure” agriculture but there are few details other than that farming will have to be more competitive, farms will get larger and the number of farmers fewer. It is widely predicted that 30% of Scottish farmers will be driven out of farming by the current crisis in UK agriculture and that these will be the “inefficient” small farmers. Yet at the same time policy makers and government officials are making it clear that there will have to be greater environmental benefits if farmers are to continue to receive direct agricultural support. So in both a Scottish and a wider EU context this raises a fundamental contradiction because generally

biodiversity (and environmental or nature value) is highest on farms with low inputs and low outputs and where farming practices are to a greater degree shaped by the constraints of the natural environment. These systems we have termed low-intensity (Bignal & McCracken, 1996).

But most traditional low-intensity types of grazing management have been or are in the process of being replaced by modernised systems; resulting in a polarisation of agricultural landuse with industrial types in favourable locations and abandonment of farming in unfavourable locations e.g. see Goss *et al.,*, 1998). So despite the development, after the 1992 CAP reform, of agri-environment schemes the message from agricultural and farming industry advisors continues to be that farmers should intensify production in order to overcome economic difficulties (e.g. MLC, 1998; IGER, 1998; and see Lovelace, in press for review). This separation of economic and environmental goals contradicts the basic principal of sustainability, or self-sustaining agriculture.

Sustainabilty and cultural landscapes

At a general level it is understandable that improved economic performance receives higher priority amongst farmers and their advisors than farmland biodiversity, but if we are serious at the policy level about developing a more sustainable European agriculture we have to find practical ways to introduce this concept. Today the term sustainability tends to refer to a balanced relationship between environmental, social and economic goals (Bauer & Mickan, 1997), shown in Figure 1 as the shaded area where all three aspects intersect. In most modern agricultural situations the linkages between these three aspects has become increasingly tenuous with each acting in a more isolated way under influences which are external to the farm; economic viability is rarely influenced in a positive way by environmental quality (e.g. biodiversity) and industrialisation has taken much of the culture out of agriculture. Indeed the demise of many of the low intensity livestock systems that we belatedly value for their environmental importance has come about not simply because of economic or technological pressures, but because the cultural traditions have been lost, are no longer attractive or have become socially unacceptable or stigmatised. As a result attempts, through policy measures or by management, to reintroduce low intensity types of landuse often fail because they neglect the intangible, functional and social components of these cultural landscapes (Plachter, 1996). It is interesting that environmental, social and economic goals are also central to the objectives of the LFA Directive (EEC Directive 75/268) and have also recently been developed by COPA in their promotion of the "European Model of Agriculture", through which they describe the multi-functional role of agriculture in three main ways, through production, territorial and social aspects (COPA/COGECA, 1998).

However, the LFA Directive has had limited direct effect in maintaining either the social or environmental characteristics of pastoral farmland and the European model of farming is a dangerously vague term which may be used to justify the preservation of just about any farming system, structure or practice, whether or not these are good or bad for the environment or for rural society. In fact the "European model" has prevailed through the last decades during which time there has been loss of biodiversity, species, habitats and features, and the creation of a wide range of pollution problems. At the same time multi-farm, highly mechanised agri-businesses have expanded at the expense of the family farm and the rural labour force. Just as with the term sustainabilty there is a need for better definition of what we mean by, and expect from, the "European model" so that the concept can be translated into practice. The example described here, the extensive rearing of Highland cattle, attempts to do this and in the process raises a number of issues.

The ecological importance of livestock rearing in the Scottish LFA

Open habitats and herbivores

There has been a widespread assumption that forests are the natural vegetation cover in western and central Europe and that open spaces, mostly grasslands of various types, were always very rare; being maintained by large herbivores, beavers and natural catastrophes such as fires, landslides, snow slips etc. (Ellenberg, 1986). This stems from the conventional palaeo-ecological view that in post-glacial Europe forest spread northward in the wake of the retreating tundra until it clothed the landscape from the Mediterranean north to the limits of climatic tolerance. However such a large proportion of Europe's wildlife is morphologically or behaviourally adapted to open habitats that this reconstruction is plainly flawed (Tubbs, 1996). To persist and evolve, the plants and animals of open habitats (grasslands, plains, wood pastures etc.) would demand more than the rare open spaces envisaged by Ellenberg. Accordingly, other authors (e.g. Van Dijk, 1996; Tubbs 1996, 1997a, 1997b; Vera 1997) all suggest that the open component of the European landscape was far more important than supposed so far, as has been the role of large herbivores, some of which are now extinct.

The history of cattle in Scotland

Wild cattle, the aurochs, *Bos primigenius*, colonised Scotland between the Ice Ages and when the ice retreated it became a resident species; its remains have been found northwards to Caithness (see Dennis, 1998). When Neolithic and Bronze Age people colonised Scotland (5000 years BP) they introduced domesticated Celtic shorthorns or long-fronted ox (*Bos longifrons*) and the wild and domesticated cattle may have existed together in places until the 9th or 10th century when the aurochs became extinct in Scotland (it became extinct in Europe in 1627 in Poland). The original domesticated Celtic shorthorn became the Kyloe, the cow of the Highlands and Western Islands – small, hardy black cattle, they were described by Bishop Leslie in 1578 as "*not tame….like wild harts (deer)…which through certain wildness of nature, flee the company or sight of men*".

The following description of the cattle of Argyll is taken from John Smith in 1798 "*the most profitable breed of cattle, and that which is found to be best suited for Argyllshire is the true West Highland breed. It was for some time considered as an improvement upon this breed to cross it with cattle brought from Sky. But from superior breeding, and greater attention in rearing, the native breed of Argyllshire is now of much greater size than that of Sky. The form most wished for is, to get them short in the legs, round in the body, straight in the back, and long in the snout. They are of various colours, black, dun, branded and brown; but the black is the most common, and the most run upon. When in good condition, and from three to four years old, when they are commonly sold off, the carcass may weigh from 360 to 400 lb avoirdupois. But such as are brought to better pasture as in England, may be brought to weigh 560 lb or more. The price is generally according to the size and shape, but occasionally varies according to the demand. They are not wrought, nor supposed to be well calculated for working, as they are too light for that purpose…*"

The total number of cattle in Scotland in early times is not known but the Exchequer Rolls for 1378 show the number of hides exported as being nearly 45,000. In the early sixteenth century Major reported that many men possessed as many as 10,000 sheep and 1000 cattle (Haldane, 1997). During the 13th, 14th, 15th and 16th centuries cattle were the main form of transportable wealth. By the end of the 16th century the beginnings of a well organised trade in cattle began which involved the movement of large numbers annually from the distant pastures to the main markets in central Scotland and from there to England. This trade in cattle persisted into the 19th century. In 1777, 90,000 head were sold in Falkirk and by 1850 this had risen to 150,000 per annum (Dennis, 1998).

Cattle rearing from the earliest times was based on local transhumance with cattle moving to summer pastures in areas wherever land was underused and population density was low. It still prevailed on low-lying land in the 12th and 13th centuries and probably continued to operate on moors, marshes and seasonally flooded land until late medieval times; in the Hebrides low-lying shielings existed until recent times, but generally by the 17th century the substantial areas of grazing needed for transhumance were on the hills and mountains (Bil, 1989). The earliest surviving written documents referring to transhumance date from the 12th century (Barrow, 1981) and this pastoral-based agrarian economy persisted through the 17th and 18th centuries gradually being replaced by more sedentary livestock rearing and cultivation and permanently inhabited farmland. Historical records show that much of the agricultural land which is today regarded as being of high biodiversity, has its origin in a pastoral agricultural practice dating back for over 700 years. In many areas these practices only began to decline less than a century ago and in some places they still survive in a modified form to the present day.

<u>The ecological impacts of cattle rearing</u>

The ecological effects on the Scottish Highlands and Islands of seven centuries of pastoralism clearly must be quite profound, especially during the 19th century when the pressure of large numbers of domestic livestock and a large rural population must have placed excessive pressure on the natural environment. For example the human population in Islay in 1831 was just under 15000 and in 1846 it was said that there were 5000 people on Islay facing impending starvation (Murdoch, 1850). However, it is not until modern times that the negative effects were documented (e.g. Fraser-Darling, 1955) and it is only more recently that the positive effects have become more fully appreciated (e.g. Tubbs, 1996; Dennis, 1998).

During the early years of the UK nature conservation movement grazing was regarded basically as a problem, even though in many situations it was not the grazing but the associated management activities (particularly burning, fencing and fertilising) that was responsible for changes in vegetation communities. Accordingly very often the first management action on nature reserves was to remove the domestic grazing livestock that had been responsible for the creation and maintenance of the communities justifying nature reserve designation. For example, on the Island of Rum cattle were removed on its designation as a National Nature Reserve in 1957 and were not reintroduced (on nature conservation grounds) until 1971. Ironically in the EU the recent resurgence of interest in extensive grazing and rare and regional breeds of domestic livestock has mostly come from conservation managers responsible for small relict sites left in areas of intensive land management, for example in the UK (Henshilwood *et al.,* 1997) and the Netherlands (see

Kampf, 1998). In these situations, where there is little or no livestock farming, no grazing animals remain and where obtaining suitable graziers is difficult or impossible, the ecological effects of cessation of grazing are clear.

A notable exception is a recent report by Dennis (1998) which highlights the ecological need for widescale cattle grazing to enhance woodland biodiversity in the Scottish Highlands. Many of his points are equally applicable to open habitats in the hills and islands. Essentially if we start from the assumption that large herbivores, including cattle, are a natural component of the ecosystem and that most present day "natural" habitats developed under their influence, logically it is unrealistic to try to perpetuate these habitats and all their functional components, without grazing animals. In woodlands the cattle can create structural diversity and in grasslands, heaths and marsh they encourage conditions which favour floristic diversity and the micro-habitats needed by invertebrates, mammals and birds. Essentially they introduce small scale perturbations to the vegetation resulting in an increase in biodiversity (see Kampf, 1998). Their herd behaviour can introduce seasonal and cyclic pressures which are virtually impossible to produce in any other way – not only through their unselective grazing but through their trampling, dunging and resting and ruminating in favoured places and selecting foraging areas in relation to the seasonal availability of herbage. For instance on the heathlands of the New Forest the social behaviour of the free ranging animals is an important factor in determining the pattern and structure of the heathland vegetation (Webb, in press). Recent studies of the effects of large-scale cattle grazing in the eastern foothills of the Ukrainian Carpathians in creating the patchy habitat mosaics needed by two butterfly species (Elligsen *et al.,* 1997) is an example of a growing interest amongst biologists and landscape ecologists in maintaining extensive cattle rearing systems where these still survive as part of a cultural landscape, rather than as small relict sites.

The problem is that few modern cattle systems utilise primitive breeds or raise livestock at densities which mimic the impact of the aurochs; indeed few cattle in the UK now graze in harmony with biodiversity interests. However low-intensity grazing is increasingly used in nature conservation because many nature reserves and special sites have relict vegetation communities from a former pastoral landscape. These areas can provide an opportunity to study and quantify the effects, for example a 10 year study of free-ranging cattle (0.2 LU/ha) at "Wolfhezerheide" in the Netherlands (Bokdam & Gleichman in prep.) found that cattle did not impair *Calluna* growth and that trampled *Calluna* recovered from seed and vegetatively; the cattle acted as the driving force for cyclic vegetation succession in which species richness increased, some rare species established and no species disappeared.

So the question for us has been whether it is possible to connect the apparently opposing objectives of a free ranging cattle system of ecological value with economic viability; and if it is can it be sustainable (by the definition above)?

Highland cattle on Islay and Mull

Highland cattle rearing and ecology

The kind of free-ranging management system which are used today by most Highland cattle breeders in the west of Scotland is very different to the historical systems of cattle rearing in this area. Traditionally cattle would be moved to summer pastures (transhumance) and closely herded during which time the best of the lower land would be cultivated. This pattern of landuse segregation was typical of small farms and crofts with common pastures and created a patchy mosaic of pastures, meadows and crops both in the hills and on the low ground. Few animals other than the breeding stock would be kept over the winter and the annual production of calves and lambs would be sold in the autumn. Cattle rearing in the Highlands and Islands during the past decades has changed markedly with commercial cattle herds using mostly continental breed bulls and larger suckler cows that need better nutrition and more supplementary feeding than the traditional breeds. Farms have become more specialised with many former mixed livestock farms now keeping only sheep. Even the more traditionally managed cattle farms in remote areas changed their management practices, often using as pasture land that was formerly cultivated and forsaking the hill pastures. Many former pastures are now coniferous tree plantations because afforestation is generally a component of the intensification and polarisation of landuse which has occurred during the past twenty years.

But in some places suckler herds of first-cross Highland and Galloway cattle survive as well as folds of commercial and pedigree Highland cattle. The reasons why they survived include:

[1] Hill farmers valued the effect their grazing had on improving the quality of the hill pastures for sheep; either crossing the females with the Whitebred shorthorn bull to produce the x-Highland suckler cow or breeding pure for the pedigree female market.

[2] Pedigree breeders, not necessarily on hill ground, specialised in producing females for the society sales and the export market.

[3] Contrary to the recommendations of agricultural advisors, crofters continued to keep these cattle for their regional characteristics. The following quote written almost 200 years ago (MacDonald 1811) illustrates that these pressures to change are not new:

"*Strangers, on visiting the Western Isles, cry out against the folly of the people in keeping cattle of a small breed; when by changing it for the Irish, or the Lowland Scotch, they might greatly enlarge the carcasses of the their stock. But this is often a rash opinion. The great question in Hebridean grazing and rearing is, what breed will best answer the land and climate, and what size can be most easily and securely raised at the smallest expense? Heavy cattle cannot seek their food in bogs and marshes, leap over ravines, rivers, and ditches, or scramble through rocks, and in the faces of cliffs and precipices, like the present breed, which is almost as active and nimble as a Chamois goat; nor can the Hebridean tenant afford to breed any stock which is not proof against the inclemency of his rains and storms all the year round. It is infinitely safer for him, therefore, in the present imperfect state of his agriculture, and perhaps even at all times, and in all circumstances of his country to rear too small, than too large a breed of cattle; and to improve his indigenous, hardy, excellent species, than to import from other districts such breeds as may be indeed profitable for their circumstances and climate, but, which would probably perish in the Hebrides, without more attention being paid to them than, in his situation, he can conveniently afford. A moderate size is accordingly preferred by all skilful graziers, i.e. bullocks or stots, which, fattened at the age of five weight 30-36 stone avoirdupois, and heifers which weigh, at the same age, 24-30 stone*".

This, "farming within the ecological constraints of the land" is a fundamental distinction between traditional systems and modern systems; the latter emphasise changing the character of the land (or the domesticated animals) to suit the system.

[4] A firm favourite with tourists, many land owners kept them for "landscaping" their Highland estates.

Free ranging grazing produces a different type of vegetation compared with systems in which animals are herded or removed from the pastures at night and since many shielings were also cultivated small scale diversity must have been greater in the past. Nevertheless for maintaining the vegetation communities of the west Highlands cattle grazing is becoming recognised as being an essential element in influencing species composition, sward structure and vegetation dynamics.

The farmland of Mull and Islay (see Figure 2) is typified by a mix of grassland and cropped land, moorland and heath, marsh (bogs and fens) and upland and coastal grassland as well as scrub and woodland. A study of land use, bird habitats and nature conservation on Islay (Bignal *et al.,* 1988) concluded that the island held an exceptionally high proportion of semi-natural vegetation despite (perhaps because) of being managed almost everywhere for some form of pastoral agriculture or sporting interest. Over 30% of the island is bog vegetation and 33% of the land is dominated by undulating rocky moorland and rough grazings. Only 8% is under cultivation, rotational grassland or older in-bye pastures. Of particular note is the survival of marsh and wet meadow vegetation, once much commoner throughout the British Isles. Importantly in that study we concluded that the vegetation and land types of Islay strongly reflect the over-riding influence of extensive stock rearing utilising pastures of natural vegetation. The diversity of land types result in Islay having one of the richest and most diverse bird communities in the UK (see Bignal & McCracken 1996) including 10 protected species on Annex 1 of the EU Wild Birds Directive. In a functional context the eight land types described interlink in different combinations to provide the "functional unit systems" (Tamisier, 1979) needed by species to fulfil their social and behavioural needs as well as providing their physical requirements at different times of the year and at different stages of their lives (e.g. see Bignal *et al.,* 1997) . In this context the interplay between the "in-bye" land, where crops of hay, silage, cereals and roots are grown, and the extensive pastures grazed by cattle and sheep are grazed throughout the year is of paramount importance.

On the pastures themselves the vegetation is the typical mosaic of the Atlantic west coast with grasslands dominated by *Molinia caerulea* but also including more species rich grasslands (over limestone), acid grassland (*Festuca, Agrostis, Nardus*), dry heath (*Calluna vulgaris - Erica cinerea*) and extensive areas of dry heather moor (*Calluna vulgaris*). Without the pressure of grazing cattle plant biomass production is reduced because seasonal growth is not removed, dead material accumulates and grasses (particularly *Molinia*) become impalatable to sheep. Thus the long established practice of grazing cattle with sheep (and horses) to optimise plant biomass production. Exclusion of grazing by cattle diminishes the vitality of the ecosystem (Dennis, 1998) and when followed by frequent burning, a common management practice to remove the accumulated grasses, leads to biological impoverishment.

By affecting the composition and structure of this kind of vegetation cattle grazing also plays a fundamental role in creating the conditions needed by many invertebrates, especially butterflies. Of particular importance and interest on Islay is the marsh fritillary *Eurodryas aurinia* which has declined across Europe in the last 150 years (Warren, 1993) . The butterfly breeds in the damp acid grassland where the main food plant is the devil's bit scabious *Succissa pratense*. The caterpillars live in colonies and are in the larval state for 10 months, the colony moving between plants as each is consumed. The vegetation composition and height (usually between 5 and 14 cms) is crucial and colonies are often found alongside cattle tracks and on the edges of grazed areas. Local core populations of butterflies consists of many sub-populations (metapopulations) which occur in different places in different years because suitability varies between years depending both on external factors (grazing pressure, weather, parasites) and the impact of the caterpillars themselves on the food plant.

A key point about the extensive cattle pastures in Islay and Mull is that they provide the ecological context within which natural processes can operate; they provide suitable conditions for a range of species (often with particularly volatile populations) which are susceptible to habitat fragmentation and isolation. This can apply equally to plants, birds and invertebrates and although some places may appear to the human eye to be unsuitable (and "badly managed") it is more important to retain the integrity and biological potential of the cultural landscape than to compartmentalise management. Referring to the marsh fritillary butterfly Warren (1998) comments " it is undoubtedly one species that requires habitat conservation at the landscape level, on a scale that traditional conservation measures have yet to tackle". The cattle pastures producing Highland cattle on Mull and Islay are big and they are stocked at low densities with a primitive breed that graze unselectively. On Islay our stocking density is 0.19 LU/ha and Dennis (1998) considers that a stocking rate of 1 cow per 20 ha, or 0.05 LU/ha is the optimum for enhancing the nature conservation interest of his hill farm (in Abernethy Forest). But optimum stocking rates will vary considerably from site to site; for example on Islay stocking rates that may be highly suitable on sheltered sites away from the west coast can be far too high on the exposed west of the island. There is a need to define "limits of tolerance" within which the pressures of grazing cattle and sheep can fluctuate rather than setting tight, prescriptive levels. Indeed it may well be that, over time the optimum stocking rates on sites will change as the vegetation responds to management (but see Kampf, 1998 for discussion).

Examples of two extensive management systems

E. & S. Bignal, Islay - Kindrochaid fold of Highland cattle, Islay
The fold currently consists of 30 breeding cows ranging over 470 hectares of hill pastures of grassland, moor, coastal heath and sand dunes and Machair (grassland on shell sand). During the winter the cows are in-calf and they are given a daily ration of oats in the sheaf (one sheaf per cow per day) as well as free access to mineral buckets. They calve naturally during the spring and summer often miles from the farm. Over the same area there are 300 blackface ewes and 60 blackface hogs. The calves are weaned at 8 months. The steers are wintered on in-bye fields where they are given some supplementary feed of home grown oats and barley (bruised) and ad-lib hay. The females are out-wintered on the in-bye and have access to stalls where they are haltered whilst being fed in order to get them accustomed to being handled. In their second year the steers range over a hill park of 235 hectares of upland and coastal pastures (at around 0.06 LU/ha) with some supplementary hay or sheaves in winter depending on the weather, as well as free access to minerals. Because of the current BSE regulations the steers have to be slaughtered before 30 months of age by which time they weigh between 450 and 550kg. Were it not for the 30 month rule the steers would be better slaughtered rather later, in which case they could be given less (or possibly no) winter feed. When mature the steers go directly to the abattoir from the farm in our own transport; the whole operation takes about an hour. Kindrochaid is EBL accredited and a member of the SQBLA farm assurance scheme.

A. & M. MacKay - Carnach Clach-na-Gruagach fold of Highland cattle, Mull
Ardalanish farm comprises 615 ha, with approximately 18 ha of in-bye reseeded and permanent grassland, 80 ha of hill parks of mixed rough grazings, heather and sea shore, and 500 ha of extensive hill grazings of heather, dry heath, bog and scrub woodland rising to 126 m above sea level. The rocky coastline of the peninsula is about 4.5 km. The fold comprises 35 breeding cows, calving in March and April in the hill parks. The bull runs with the cows from June to August. Cows and calves run extensively on the hill from August through to December or January depending on the weather. Calves are weaned in December, although bull calves are castrated at 6 months of age whilst still running with their mothers. Cows and calves are fed 3-4 weeks prior to weaning with a mixture of distillery draff/beet pulp/dark brewers grains to teach the calves to feed. Throughout the winter the cows have access to extensive hill grazings and are fed once a day with a mixture of 1.5 kg of beet pulp/dark grains and 5 kg draff and 3 –4 kg hay of haylage. Cow feed is increased prior to calving to 3 kg beet pulp/dark grains and 4 – 6 kg hay of haylage. A seaweed based mineral is added to feed.

Weanling calves are kept on in-bye fields with access to rough grass and knolls for shelter. They are fed twice daily. In the spring when the grass comes, they are turned out to the hill for the summer grazing, coming in around October to go to a finishing unit in central Scotland. There they graze the river banks of the Earn river and are finished on grass. The steers are then taken to a nearby slaughter house at 30 months. Heifers are mainly kept at Ardalanish for replacement

cows and potential breeding stock. Ardalanish farm is currently in organic conversion, seaweed and manure is used to fertilise fields, and it is anticipated that in the long term stock will be finished on Mull, organically, with the steers slaughtered locally. The removal of the 30 month rule would help considerably in achieving this aim. Ardalanish is in the RSPCA monitored Freedom Foods Scheme as well as SQBLA.

The economics of extensively reared Highland cattle.

Highland Drovers : an initiative from Mull

Marketing

Marketing extensively reared native beef breeds needs organisation. A few individuals and small groups have tried with limited success mainly due to inconsistencies in the supply chain. On the Island of Mull in the years up to 1991, pedigree Highland steers from Glengorm Estate were marketed by sale to hotels and private houses locally by the owner. There was also a considerable sale of beef through the farm shop, which was run by the gardener and his wife, primarily for garden produce and had a very short season. However sales were met with universal approval with many repeat orders and much acclaim. During 1991 a market opened up for Highland Beef in Holland to high quality restaurants and other catering markets. The animals were killed in Scotland, the killing process being supervised by a respected fieldsman of the Highland Cattle Society and the price offered gave a premium over the average other breeds price for the period so this represented an imminently satisfactory deal.

During the 1994/5 season increasing concern in continental Europe about BSE lead to this market closing. Attempts were started to devise an alternative system of marketing that did not entail the sale of store cattle through livestock markets at prices that reflected the unfashionability of the breed rather than the saleability of the product and did not entail the repeated movement of the animals through different owners/dealers. In the early months of 1995 Glengorm branded Highland beef was marketed to butchers in London and more locally to a butcher on the Island of Mull. It was obvious that this single farm approach had very major drawbacks for the development of the market. It was also obvious that there was an immense marketing opportunity for a more professional approach using the same individual farm identity on the beef but cooperating with other farms to spread the cost of promotion and to be able to give a better continuity of supply.

During the summer of 1995 an approach was made by other farmers who were starting out producing Highland Steers and who had the vision to want to develop a market at the same time as they were developing their production. Agreement was quickly reached that some joint marketing effort would be initiated. At this time the Argyll and the Islands Enterprise Company (the LEC) were interested in promoting their food marketing initiative for the whole of Argyll and contact was established which led to a consultant being engaged into the Glengorm business.

This consultancy looked first at the business of Glengorm to gauge the effect that such a marketing initiative would have for an island hill farm and to examine if there were alternatives which would be satisfactory. The SWOT review of Glengorm concluded that such a marketing initiative would be financially rewarding for a hill farm and therefore another review was instituted to take the process further and look at options for starting a marketing business or a cooperative. It was decided that such a marketing initiative would require the involvement of at least four farms to be viable and after a deal of thought once the individual farms had been identified it was decided that it would be easier to keep to the original principles and vision if a company was formed rather than a democratic cooperative. A company called Highland Producers Ltd was formed and began trading on the 1st August 1996 and was registered with Companies House on 31st December 1996.

Current Situation

The qualities of Highland beef with low fat and cholesterol does help in the marketing of the product to the lifestyle market but the welfare aspects policed by the RSPCA and the environmentally friendly ways the animals are produced along with the superb flavour and quality are undoubtedly the main marketing assets. Selling whole carcasses to butchers as a main marketing thrust has some major flaws in it. The expected problem that butchers would require more hind end than fore has not proved to be the problem as long as the butcher does not try to replace all his throughput with Highland Drovers. The problem has been and is likely to remain that of exactly synchronising the supply and the demand. Whilst the steers are sourced in advance, preferably as much as a year and a half in advance, the butchers order once a week. The current 30 month rule has been a major factor in our problems. This inevitably leads to occasional surpluses of steers which we either have to dispose of at a loss or we would have to renege on our commitment to individual feeders with the resulting loss of creditability. The effect of a slight imbalance in the steer supply and demand is excessive compared with our margin at present and cannot be tolerated long term.

When it was recently decided to cut beef into primal cuts and supply the same steer to different butchers a decision was taken to change the marketing strategy from that of just supplying whole steers to butchers. This was a wise decision as butchers more and more are becoming retailers and less interested or skilled in handling whole carcasses. In addition, investigations have been made into the possible development of a product or products such as smoked beef, and adding value by manufacturing and selling direct to consumers through mail order or box systems. Obviously there are risks attendant in contracting out our requirements with the resultant loss of control, and as a consequence Highland Producers have decided to take on the full marketing role with the proposed opening of a production centre to cut and package Highland Drovers Branded Beef (see Figures 3 and 4).

The motivation for the commitment that Directors of Highland Producers Ltd is:

1. To show that there can be appropriate environmentally positive agricultural development in the fragile areas of the Scottish LFA that returns the added value of the product back to these fragile areas.

2. To encourage improved welfare conditions and improved and appropriate management for Highland cattle.

3. To demonstrate that the Highland cattle breed can make a considerable contribution to the Highland economy and demonstrate that Highland cattle have an income earning potential that has been largely ignored.

An example of the economics

Highland Steer Calves – costings based on one breeder's system 1997

Cost of calf	£180-£200	average £190	
Veterinary/medicine	£10 per year	£20	
Grazing cost	£0	£0	
Feed first year	150 days at 2.72 kg	£50	Beet pulp £106 & DDG £134 (delivered bulk 1997 prices)
Feed 2nd winter	4 kg for average 150 days	£72	
Bank interest etc.		£20	
	TOTAL	**£352**	

Therefore cost of taking steer to 500 kg average weight at October/December is		£352
Steers on Glengorm quality for BSP and extensification (new '97 figures) Allowing for scaleback		£242
Average value of first 78 steers from 17 folds sold through HP Ltd. to-date		£595
	GROSS INCOME	**£837**
	COSTS	**£352**
	MARGIN BEFORE OVERHEADS	**£485**

Three other options (see Figure 5)

	COSTS	**INCOME**
OPTION 3		
Sell steer calves for £190	£10 commission etc.	£190
	Gross margin	**£180**
OPTION 2		
Keep steer, send to contract grazing		
Wintering/stockwork per year	£250	
Subsidies including extensification		£242
Sale of 500 kg steer		£595
	Gross margin	**£587**
OPTION 1		
Keep steer on hill ground - feed straights		
Feed/vet/med/interest costs 2 years	£165	
BSP+Extensification		£242
Margin on keep		+£77
Selling price		£595
	Gross margin	**£672**
COMPARISONS		
Option 3	**Margin**	**£180**
Option 2	**Margin**	**+£407**
Option 1	**Margin**	**+£492**

Isle of Islay Guaranteed Pure Highland Beef: Kindrochaid Highland cattle.

The re-introduction of Highland cattle to northwest Islay was motivated primarily by the belief, based on the 1988 research report (Bignal *et al.,* 1988) that extensive cattle grazing would be beneficial, even essential for maintaining the range of nature conservation value of the area. The farms (Kindrochaid, Braigo and Smaull) include SSSI land as well as being designated or proposed as SPA, SAC (Natura 2000) and under the Ramsar Convention. At the outset little thought was put into the subsequent marketing that would be needed to sell the steers at a reasonable price, although neighbouring farmers made it clear that "you will get nothing for them" at the local livestock mart and that the potential high prices for females were obtained only by a small band of pedigree breeders who showed their animals. However when the Highland Cattle Society launched the Guaranteed Highland Beef marketing initiative it opened the possibility for selling the branded beef on Islay. Islay is fortunate in that it still has a small-throughput slaughterhouse which is operated by one of the local butchers (G MacTaggart). In both 1997 and 1998 all the steers have been slaughtered in Islay and most have been sold direct to MacTaggart. The beef is sold over the counter as Guaranteed Pure Highland Beef with the 4-generation pedigree of the animal displayed in the shop. MacTaggart also sells prime cuts direct to hotels and restaurants which advertise when "local Highland beef" is on the menu. This year, with several steers having to be slaughtered over a short period due to the 30 month rule, experimental direct sales of 10 kg boxes of vacuum packed beef were instigated both on the island and to distant purchasers. Figure 6 shows the difference in equivalent deadweight prices. Essentially this follows Option 1 of Highland Drovers, using local facilities to process and pack the meat and marketing it from the farm.

The wider picture

How applicable is the approach to the Scottish LFA?

Clearly, farming extensively with free ranging Highland cattle is not applicable everywhere; neither is it necessarily desirable from an economic or environmental perspective; for example on Islay biodiversity is enhanced by the mix of farmland types. Many LFA suckler cow herds form an integral part of much more intensive systems (some mixed, some specialist) and the majority of "commercially" produced beef will come from these farms and specialist finishers. The farmland on which these animals are reared is rather different to that described above for Islay and Mull, which are at the extreme end of the low intensity scale. Even on Islay there are systems for which changing to Highland cattle would hardly be appropriate (nor acceptable to the farmers). Different cattle rearing systems will have different costs and benefits for the environment and periods of different pastoral regimes will favour or deter different wildlife. Generally when the density of large herbivores is high, numbers of small mammals and thus of their avian and mammal predators are suppressed (see Tubbs, 1997a); when densities are low or removed altogether shrubs, scrub and woodland are favoured at the expense of the animals of open habitats. We want this kind of spatial and temporal diversity in the landscape – the challenge is to develop policies which perpetuate the farmland matrix without being over prescriptive. Also, in the wider context of the Scottish LFA there are other initiatives, notably grass fed Aberdeen Angus and there are other breeds which would meet the environmental needs in suitable locations, for example the Galloway cattle.

The point the initiatives above make is that it is possible to enhance the economics of extensive systems so that they can become more attractive to farmers and can meet the aims of developing a more sustainable agricultural base in rural areas. Both marketing initiatives outlined above show that it is possible to "internalise" the system so that more economic benefits are felt locally. Importantly, the kind of extensive systems that we have outlined above, although rather different from the traditional system they replace, do contain many of the traditional elements and gives to the land a continuity of management which many other proposals for the LFA do not.

Do current policies support extensive production?

CAP livestock support comprises three main measures:

[1] Market support – generally raising prices above world levels

[2] Direct subsidies – usually headage premia

[3] Production, stocking density and/or premium limits – to limit expenditure on the above measures.

The measures felt directly by farmers are the direct payments and the limitations. The premiums operate at producer level and have an important effect on incomes. Those currently available to beef producers include the beef special premium (BSP), the suckler cow premium (SCP), the extensification payment and compensatory payments for producers in LFA. The details of these premia have been reviewed elsewhere (see Goss *et al.,* 1997) but the salient point in the context of this paper is that although extensive producers are supported in the same way as other cattle producers, there

is no special incentives to encourage, or reward extensive production. Indeed, since the BSP limit is set at 90 animals per holding and there is no limit (other than through the tradeable quota held) on SCP the purely economic incentive must be to stock as close to the stocking density limit as possible. This is set at 2.0 LU/ha. Even the extensification payment limits of 1.4 LU/ha and 1.0 LU/ha would be difficult for many Scottish LFA farmers to reach; so it neither rewards the truly extensive producers nor acts as an incentive for more intensive producers to reduce their number of cattle..

Potentially there is support for environmentally sensitive farming under the Agri-environment Regulation 2078/92 which might help more extensive systems but since these measures generally run counter to the mainstream support outlined above, they do not offer a big enough incentive to encourage take-up. The UK is one of two EU countries (the other is Denmark) which choose not to take up funding for rare and traditional breeds of farm animals under Regulation 2078/92.

Current Objective 1 and Objective 5b and LEADER II programmes are important potential pump priming resources for traditional livestock systems and projects which could use them for multi-purpose rural objectives including tourism, local markets and habitat enhancement. The experience of Objective 1 and 5b in the UK, especially the MAFF administered agricultural measures in England, is that these programmes are far from 'user friendly' for any but large organisations or very persistent applicants. Farm based projects with environmental outputs are notoriously difficult to get past the selection criteria (Lovelace, in press and personal experience)..

How are proposed policy reforms for beef likely to affect extensive production?

The draft regulation covers Beef Special Premium (BSP), Deseasonalisation premium, Suckler cow premium(SCP), Stocking density, Extensification payment, Dairy cow premium supplement, Additional payments and reductions in price supports. The details are:

- BSP is increased from 2000 rising by 2002 to ECU 220 (+63%) for bulls and to ECU 340 (+56%) for steers (in two payments)

- SCP is increased from 2000 rising by 2002 to ECU 180 (+24%)

- Beef support prices are cut by 30% over 3 years

- A stocking density ceiling applies to BSP and SCP claims. This is set at 2.0 LU/ha and includes all cattle sheep and goats for which premia are claimed and dairy cows needed for the producers milk quota.

- Extensification payment added to BSP and SCP headage payments increases to 100 ECU (+177%) to be paid for stocking densities less than 1.4 LU/ha

- Dairy cow premium supplement is introduced as an additional payment for each "virtual cow" eligible for premium (see dairy proposals below). The supplement varies between Member States and rises to a maximum value in 2002.

- Additional payments, "national envelopes", are introduced which may be paid either as headage payments on male bovines, suckler cows, dairy cows or heifers or as area payments (both subject to stocking limits). Maximum payment levels per head or per hectare are set for each year between 2000 and 2002 and include any dairy regime area payments.

Major economic effects

- Where the net effect of the proposed changes is largely neutral (i.e. the increased headage payments plus funds provided through national envelopes are roughly equivalent to the decreased revenue from price support), there will be little structural impact and no particular tendency to favour intensive producers. In fact, as the more intensive producer is usually better placed to maximise his returns from the market, the shift towards guaranteed headage and area payments should, if anything, favour the smaller, "less efficient" producer.

- Where there is a significant net decrease in support (e.g. a producer with more suckler cows than he has SCP quota), then this may lead to the more marginal producers (generally the more extensive producers) going out of production.

- Net increases in support are likely to come through the targeting of national envelopes, where important economic effects may yet emerge.

- The decreased role of intervention buying should make production more responsive to market demand, in terms of quantity, quality & timing.

- The shift of support towards direct payments will make the limits on these (SCP quota and the 90-head BSP limit) more strongly binding and so make production structures more rigid.

- The significant increase in the rate of the extensification premium will create quite a strong incentive to stock as close to 1.4 LU/ha as possible; as the majority of cattle are stocked at lower rates than this, it will more often function as an "intensification premium" than have its desired effect.

The proposed compensatory increase in headage payments will further increase the incentive for farmers to stock as heavily as possible, largely irrespective of environmental considerations. This incentive towards higher stocking rates is one of the implicit problems with headage payments, thus the proposal to allow Member States the option of paying the 30% "national envelopes" on an area basis is much to be welcomed. For the first time, this makes a significant amount of money (nearly 2 billion ECU) available to develop this alternative system of providing livestock support. Stocking density limits for national envelope payments are to be set be individual member states and these could provide a mechanism for discriminating in favour of "super extensive" producers, whether paid per head, per area or a combination of both. For example if the national envelope stock density limit were to be set at 2.0 LU/ha (the same as that for SCP) and the payments were to be made as area payments per hectare, then:

[1] The industrial farmer with 100 ha and 200 LU (i.e. the maximum of 2 LU/ha.) has no land which qualifies for national envelope area payments.

[2] The intensive farmer with 100 ha. and 100 LU (i.e. 1 LU/ha) has 50 ha available for area payments.

[3] The extensive farmer with 100 ha and 20 LU (i.e. 0.2 LU/ha) has 90 ha on which he could receive national envelope area payments.

Adjustments to the specific stocking density requirements could be used by member states to favour certain production systems and national and regional circumstances – including of course the intensive beef finishing systems (which might be over the 2LU/ha limit for BSP payments) if this were seen as a national priority.

Naturally, there will be some problems to be overcome in developing such a new system which includes area payments, particularly where grazing systems rely heavily on common land (e.g. parts of the UK, Ireland and France) and the use of stubbles, seasonal grazing and transhumant pastures (e.g. France, Spain and Greece). The easy solution for administrators in these countries would be to continue paying support on a headage basis, and indeed, where the majority of cattle are kept in these conditions, that would be an appropriate response.

The combination of substantial headage payments and the limits imposed by suckler cow quotas and the extensification premium will result in very inflexible farming systems, where the farmer's most profitable level of production is frequently determined by CAP limits, rather than by local and seasonal carrying capacity or market demand. Analysis of the rates and limits (Goss pers. comm.) suggests that the proposed higher Extensification Premium of 100 ECU/head will act as a powerful magnet, drawing farmers towards a stocking rate of 1.4 LU/ha. Within a relatively narrow band of 1.4 to about 1.7 – 1.8 LU/ha this "magnet" will act to decrease stocking rates and thus function as a genuine extensification premium; however, the supplement is not large enough to encourage any reduction in stocking rates on intensive systems using maize or grass silage. Most importantly from the stand point of extensive producers, the Extensification Premium will work in the opposite direction, and encourage producers to keep more stock so as to obtain more premium payments (where not already capped by SCP quota or the 90 head limit for BSP). Even viewed in a wider EU context, all the continental, mediterranean and mountain zones (see Goss *et al.,* 1997), home to 53% of the EU's cattle, the average stocking density is well below 1.4 LU/ha.. The removal of the 1.0 LU/ ha. "super extensification payment" may encourage intermediate producers to increase stocking rate to 1.4 LU/ha.

What new policies reforms would help extensive systems?

The problem of premiums encouraging higher stocking rates, and therefore discouraging or not rewarding extensive producers, is an inherent part of headage payments. A shift to area payments would address this problem and there is provision within the National Envelopes for area payments. It would however be a much more substantial failure of policy if higher stocking rates resulted from an "extensification" scheme supposedly designed to benefit the environment. If the extensification payment were paid as a flat rate per hectare to all producers who do not exceed the 1.4 LU/ha limit it would not encourage already extensive producers to intensify – but it would have budget implications. A payment rate of 140 ECU/ha would ensure that there were no losers but could considerably increase total budgetary expenditure. Thus a rate of something around 100 ECU/ha might be appropriate to remain within current expenditure. Farmers who stock below 1.0 LU/ha would benefit at the expense of those at 1.0 – 1.4 LU/ha which would seem to be entirely in keeping with the spirit of an extensification scheme. Logically it would be better to pay higher rates for lower stocking densities in areas where this is appropriate for the environment. This shift from headage to area would begin to target, and pay for, how the land responds to farming rather than how many livestock are kept. This would be in keeping with the forthcoming GATT and WTO discussions which seem likely to expect further moves away from production support whilst accepting that environmental payments are permissible.

How alternative systems of livestock support might be introduced which benefit the environment, maintain farm incomes and do not increase budgetary expenditure is the question that all policy makers would like an answer to. In a recent study for DG XI (Goss *et al.,* 1997) a Forage Area Payment Scheme (FAPS) was proposed which developed a unified system of area payments for all the livestock sectors. This provided a much more robust basic level of support upon which further levels of environmental measures could be applied without fundamental contradiction. It is not appropriate to go into the details here but the advantages of the system proposed in that study were:

[1] area payments offer the potential of relatively production neutral support;

[2] support payments would be linked to objective agricultural parameters (the land and land use) and would not be a radical departure from current support systems;

[3] area payments are already used in other CAP regimes and the IACS could potentially be developed to administer it;

[4] importantly from our viewpoint, area payments would facilitate greater integration of environmental objectives by moving emphasis away from the livestock towards the land, thus providing a sound basis on which to develop further environmental measures.

[5] it would provide a way of avoiding the large winners and losers that would be inherent in any direct conversion from headage to area payments.

In farm interviews, farmer response to the FAPS proposal was positive in virtually all cases. They liked the greater flexibility that it could introduce, which in most cases would lead to the lowering of livestock numbers or the abandonment of current plans to increase. There are a number of other potential actions at the policy level which might assist extensive production systems (see Lovelace, in press) such as using agri-environmental schemes for regional livestock breeds, reallocation of national reserve SCP quota to benefit regional breeds in appropriate locations; the Structural Funds and the proposed rural development measures in Agenda 2000 could be used to provide the infrastructure needed to produce (e.g. communal handling facilities), slaughter, process and market products from extensive systems. The philosophy should be to make systems more sustainable by internalising their activities and by developing linkages between the natural value of the land and the economic product.

Discussion

The theme of this paper is that there is a strong case from a nature conservation viewpoint for maintaining extensive grazing systems in the Scottish LFA and that this general principal is widely applicable across much of the LFA in Europe. Purely from an ecological perspective it is probably true to say that for many plants and animals, viable populations will only survive where land can be managed at the landscape scale. In this respect we need policy to influence agricultural management decisions at this scale. To a great degree this will involve the CAP but many of the changes to traditional farming systems, and the cultural landscapes that they produce, are through changes in available technology, markets and social attitudes. Technological developments have made it possible for farmers to produce more per cow, per hectare and per man, rising expectations for standards of living and less difficult working conditions have encouraged the adoption of new technologies, and the CAP support has often rewarded this. But despite all the well documented problems associated with the modernisation of European farming, the CAP production support policies

have played an important role in maintaining livestock farming in difficult and remote regions. Although there are some potential problems with the Agenda 2000 proposed reform it does provide some new and better targeted opportunities. The proposed rural development measures, with farming at their centre, could help considerably with the production, processing and marketing initiatives needed to adapt traditional systems for modern needs.

There can tend to be a very narrow view of the role of grazing animals, especially amongst conservation managers. Often the animals, the management practices and their effects on the vegetation are seen outside of the context of the pastoral farming systems within which they evolved. In many places grazing by domestic animals is regarded simply as "a management tool" - its new environmental justification isolated from its agricultural and cultural origins. Such an approach is not sustainable because there is not a balanced relationship between ecological, social and economic goals.

The cattle rearing system outlined in this paper illustrate it is not impossible to develop farming methods which have a strong element of sustainabilty and which work within the natural carrying capacity of the land. There are many similar examples from across Europe and ways are needed to encourage their survival where they still exist and be more widely adopted where this is appropriate. With the probability of further farm amalgamation in most EU countries, perhaps in the coming years a free-ranging herd of regionally distinctive cattle could be adopted more widely as one enterprise on mixed farms. From a conservation management viewpoint, and in the context of maintaining cultural landscapes, this seems much more likely to be sustainable than segregation and polarisation. Regulation 2078/92 has made some important steps towards this objective but most would agree that it has not reached its full potential. Equally most would agree that we have the concept right but that it is not well enough integrated with mainstream agricultural support and that the measures tend to be too prescriptive. Action is needed at the scale of the cultural landscape working within broad limits rather than to tight outputs. Policies must be flexible because it is the local and regional diversity of farms – matched to local environments and working within the carrying capacity of the land – that gives rise to high value cultural landscapes, biodiversity, traditional products and quality of life. The experience of Highland Drovers is that, with good promotion, the public are prepared to pay a premium for a product which is produced in an ethical and sensitive way. If managing land for nature conservation and high biodiversity can be reflected in the economic value of the final product the production system will be less sensitive to changes in external financial support and in the long term, in theory at least, more sustainable.

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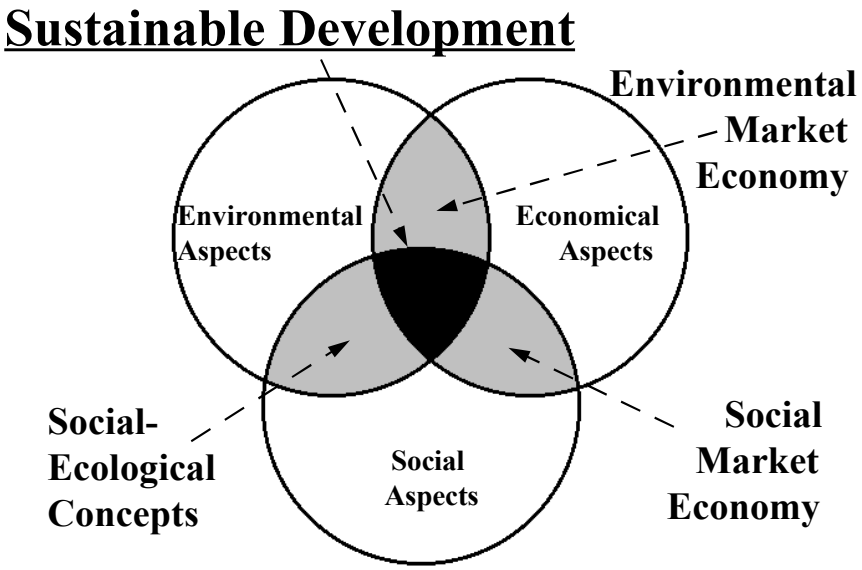

Figure 1: Aspects of sustainability (from Bauer & Mickan 1997)

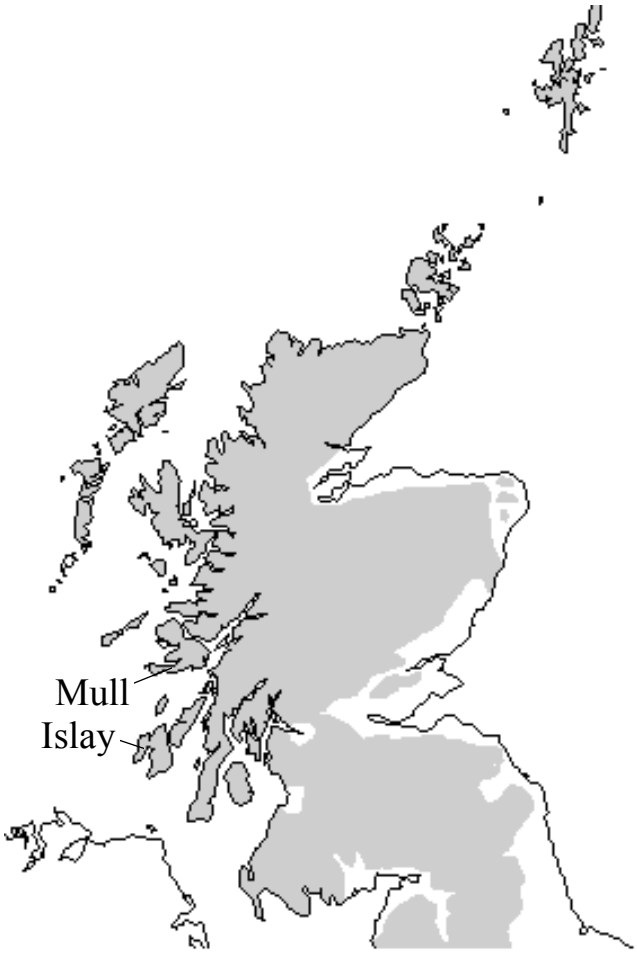

Figure 2: The extent of LFA in Scotland

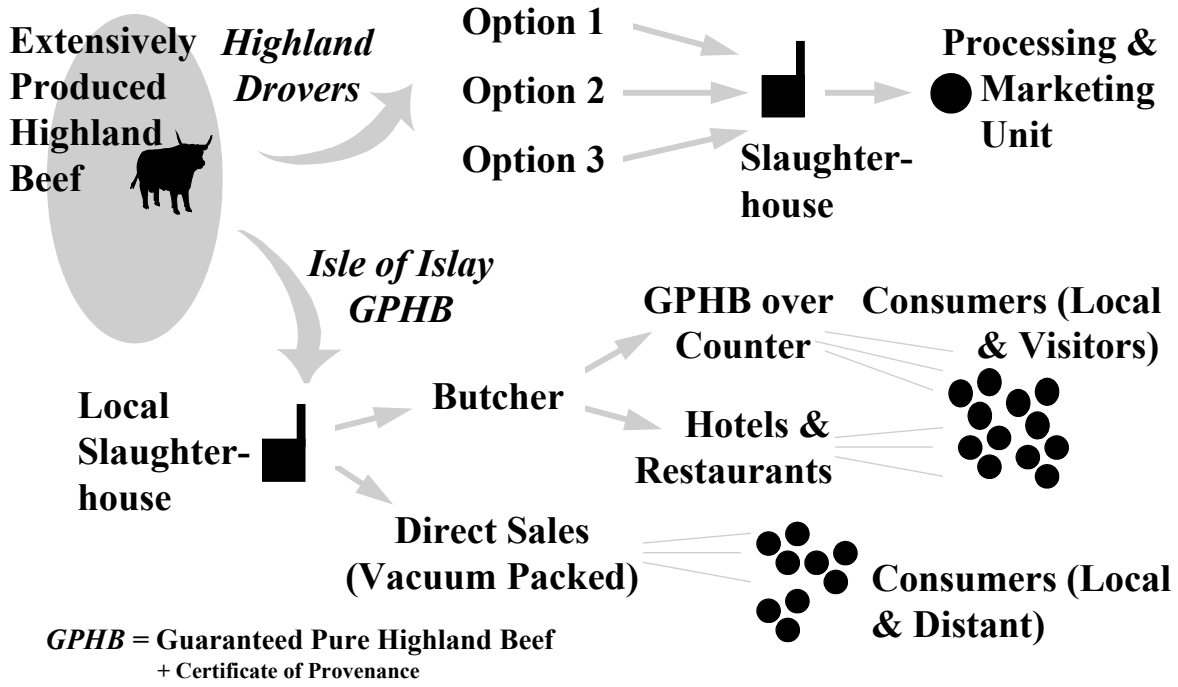

Figure 3: Highland Beef marketing channels

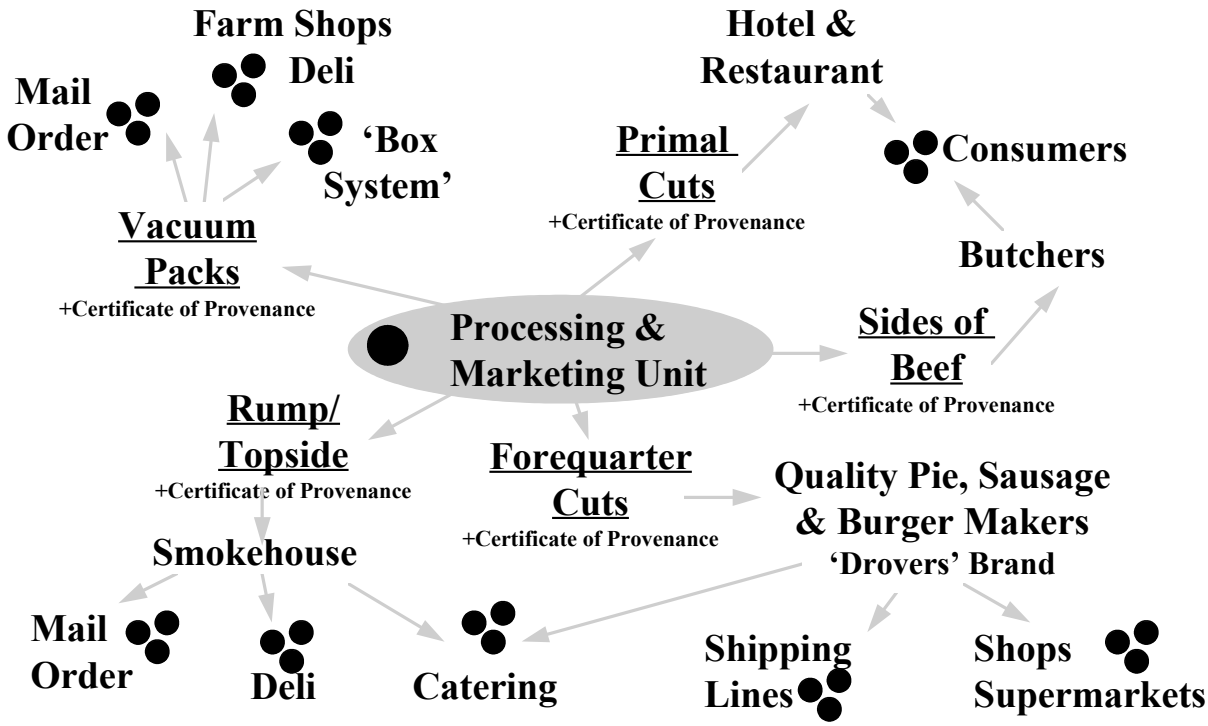

Figure 4: *Highland Producers Ltd*

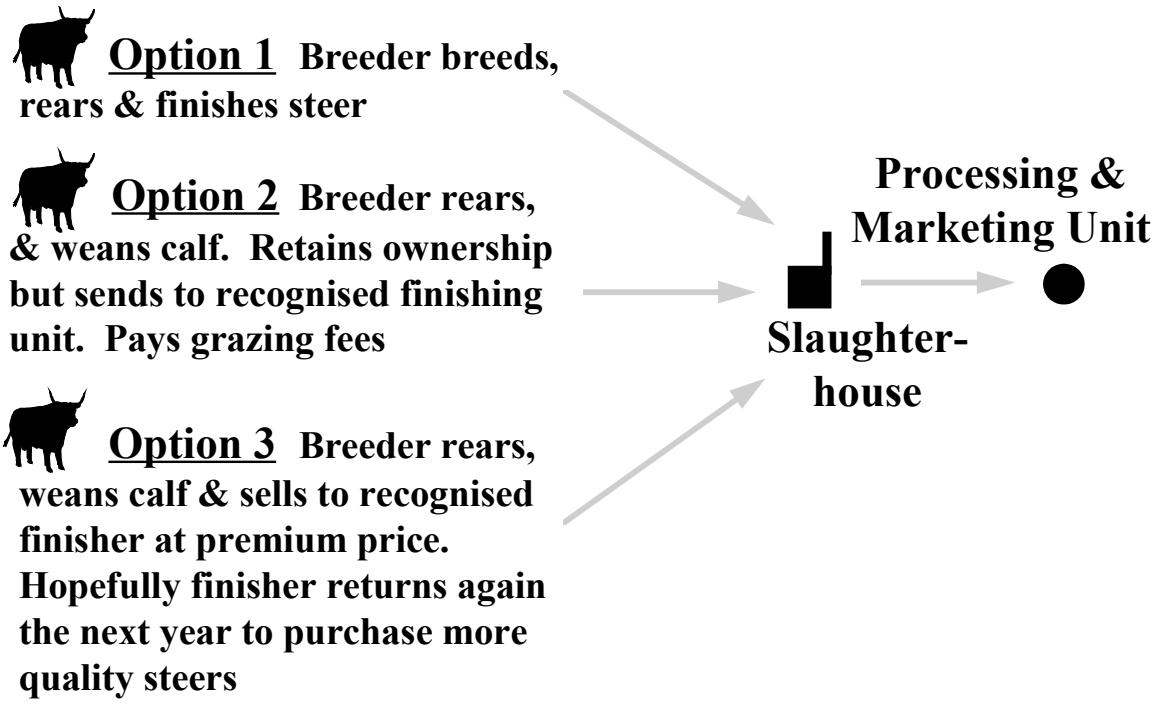

Figure 5: Highland Beef marketing channels - three options associated with *Highland Producers Ltd*.

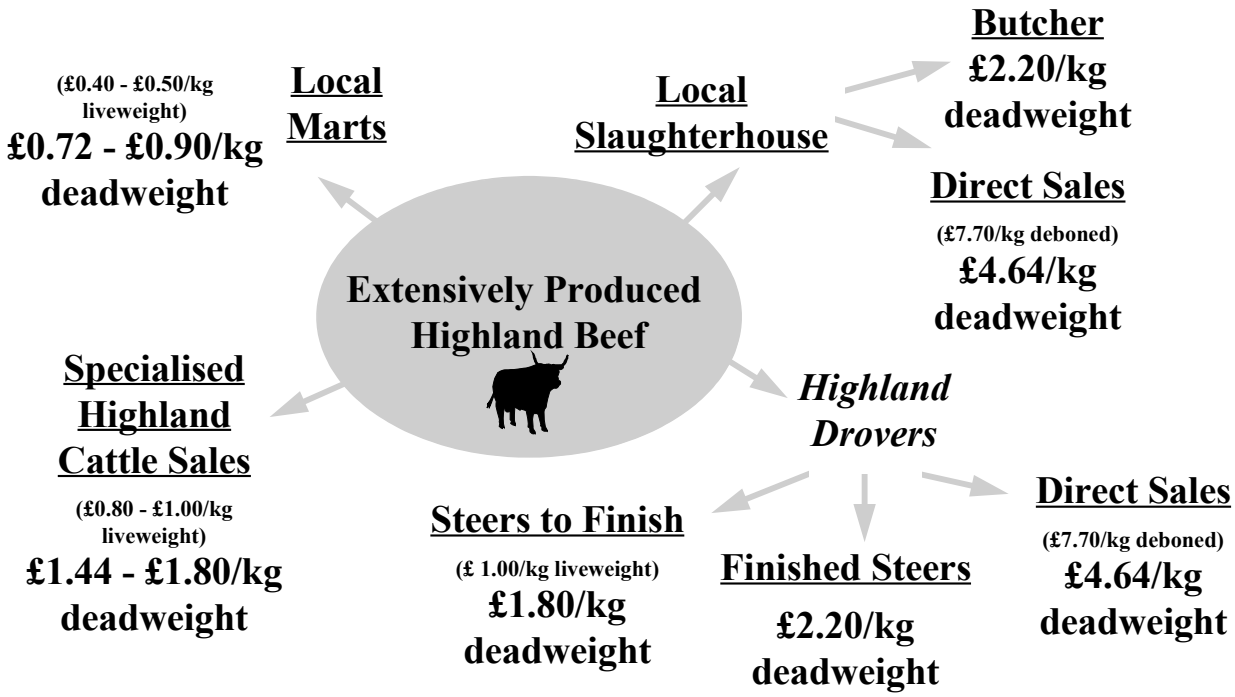

Figure 6: Prices from different markets

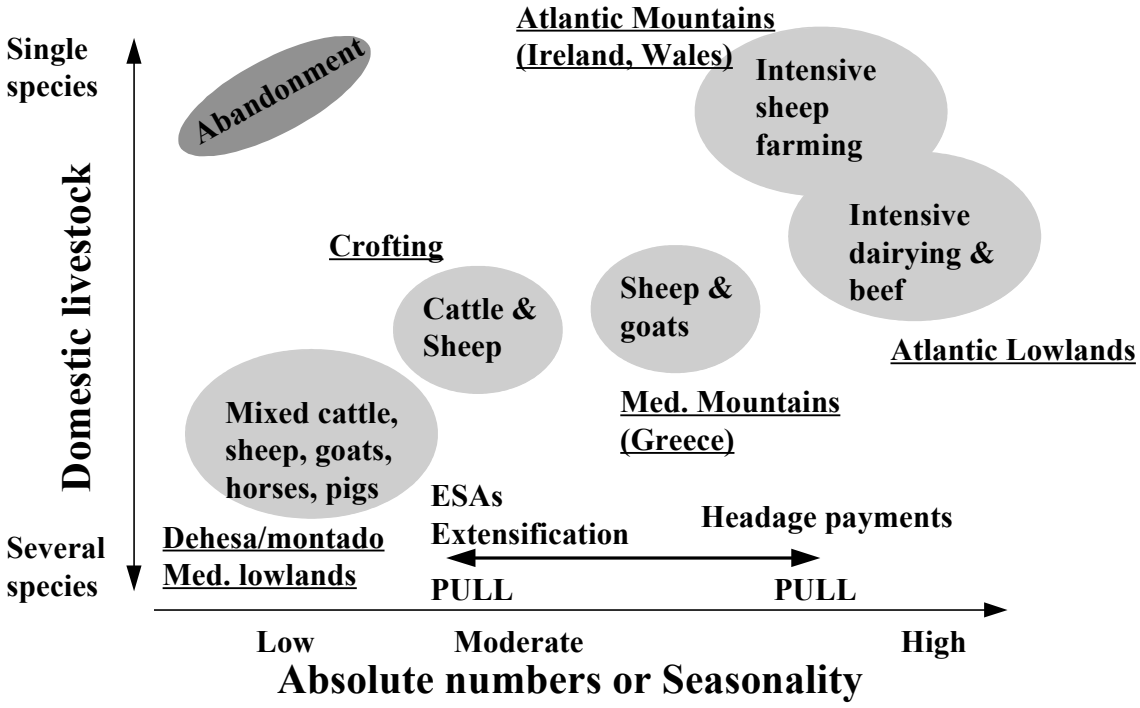

Figure 7: Livestock grazing systems (from Goss *et al.* 1997)

1. **Current Policy and 1992 Reforms**
   Market support; Direct subsidies; Production/stock density and/or premium limits
2. **Agenda 2000 Proposals**
   Moves to decouple price support from production; National envelopes; Area payments possible; Extensification payments; Horizontal measures & Rural Development
3. **Other Options for Future Reforms**
   Remove all headage payments; Introduce FAPS; Remove all limits and quotas; Introduce tiered scheme based on FAPS; Establish 'Agri-environmental Zones; Review future of price support

Figure 8: EU agriculture policy and extensive livestock systems