

# Eating Biodiversity: an investigation of the links between quality food production and biodiversity protection

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## Project Objectives

This project is examining the links between biodiversity in grassland sites and the nutritional value and eating quality of lamb, beef and cheese produced from them. Improvements in quality associated with botanical distinctiveness can not only add value to animal product chains but can also be linked to the protection and enhancement of these sites. Furthermore, the project is examining the socio-economic benefits for producers and rural communities of these high-value production chains.

## Phase 1 Research (Jan 05-Jan 06) Quality Lamb Production on Biodiverse Pasture

In order to trace the relationship between biodiverse pasture maintenance, agricultural practice and food quality, lamb-meat food chains were examined from 'pasture to plate'. Sample farms, where stock are grazed on salt marshes, moorland and heather moorland (all significant natural landscapes) were investigated. Botanical surveys were undertaken, farm management practices and farm businesses were studied (and their relationship to nature conservation prerogatives) and meat samples analysed (against a control) for factors affecting meat quality, including health, taste and shelf-life.

### Botanical results

The semi-natural pastures selected are key examples of important biodiverse habitats in the UK which have been produced and sustained in a delicate balance with agricultural practices. In recent decades significant amounts of biodiversity loss has occurred on these and other semi-natural pastures as agricultural practices (and subsidy patterns) have changed (a quarter of heathlands were lost in England, Wales and Scotland between 1947 and 1980).

Botanical data collected demonstrates that grazing management is producing pastures of high botanical quality

Heathery dominated vegetation exhibits three predominant community types:

- i) *Calluna vulgaris*, *Galium saxatile*, *Rhytidadelphus squarrosus*, *Agrostis stolonifera*, *Deschampsia flexuosa*, *Vaccinium myrtillus* dominant (NVC H10 *Calluna vulgaris* - *Erica cinerea* heath).
- ii) *Trichophorum cespitosum*, *Erica tetralix*, *V. myrtillus*, *Sphagnum capillifolium*, *Narthesium ossifragrum* dominant (NVC M15 *Trichophorum cespitosum* - *Erica tetralix* wet heath).
- iii) *V. myrtillus*, *D. flexuosa*, *Polytrichum commune*, *G. saxatile*, *Potentilla erecta* dominant (NVC H18 *Vaccinium myrtillus* - *Deschampsia flexuosa* heath).

Moorland dominated vegetation with two predominant community types:

- i) *Eriophorum vaginatum*, *D. flexuosa*, *C. vulgaris*, *V. myrtillus*, *Rubus chamaemorus*, *S. capillifolium*, *Empetrum nigrum*, *G. saxatile* dominant (NVC M19b *Calluna vulgaris* - *Eriophorum vaginatum* blanket mire, *Empetrum nigrum* sub-community).
- ii) *R. squarrosus*, *N. stricta*, *G. saxatile*, *Luzula multiflora*, *Agrostis vinealis*, *D. flexuosa*, *F. ovina*, *V. myrtillus*, *P. erecta* dominant (NVC U5 *Nardus stricta* - *Galium saxatile* grassland).



### Farm practices and land use management

All the quality lamb production systems studied have been set up within the last 7 years motivated by; fall in agricultural incomes, 2001 FMD outbreak, business opportunities for local, quality food products, integrating farming and nature conservation.

Size of enterprises ranges from small part-time businesses to substantial businesses with on-farm meat processing plants. All sell lamb at added value, supported by claims of highest product quality. Specific claims are made about links between the biodiverse pastures and the quality of the finished product. Increased profits have 'made a difference' to farm business sustainability.

The lamb production is often part of wider farm business matrices including farm based tourism, game shooting, and is geared in complex ways with nature conservation designations such as SSSIs, National Parks, ESAs, CSS.

A range of retail strategies are employed (box sales, farm gate, farmers markets). Location (e.g. proximity to urban centres) affects this. Set up costs, branding, and retailing are major hurdles.

Some farms have changed production practices (e.g. to breeds more appropriate to grazing these pastures, reducing stock numbers to maintain pasture biodiversity). Others are recognising the potential added-value in existing production practices.

Evidence of rural development gains.

**Pastures and their biodiversity now being sustained through new production practices**

### Meat quality: Health

Lamb produced on both "heathery" and "moorland" pastures was found to contain high levels of omega 3-polyunsaturated fatty acids and Vitamin E which are both considered to be important components of the human diet and presently too low according to nutritionists. Lipid oxidation, which causes rancid flavours at a high level, was at the low end of the scale, perhaps due to the high antioxidant (Vitamin E) concentrations in grazing lambs.

Pasture	Omega-3- fatty acids			Vitamin E (mg/kg)
	C18:3 (%)	C20:5 (%)	C22:6 (%)	
Heathery	1.67 ± 0.14	0.97 ± 0.11	0.36 ± 0.09	6.52 ± 0.47
Moorland	1.66 ± 0.39	0.98 ± 0.20	0.34 ± 0.06	7.32 ± 1.00
Controls	1.37 ± 0.48	0.45 ± 0.13	0.15 ± 0.05	4.48 ± 0.95

### Meat quality: Taste

Testing by a trained taste panel at Bristol of grilled loin chops from lambs taken from surveyed farms showed higher 'liking scores' than the control samples.

	Lamb flavour	Overall liking
Heather	33.3	42.6
Moorland	38.8	36.3
Controls	27.2	23.3



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