GRAZING SYSTEMS RESEARCH IN THE FALKLAND ISLANDS

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ABSTRACT
Conceptual models of both the metabolisable energy (ME) balance of sheep in relation to the environment and the effects heavy grazing on vegetation and soils will form the basis for the development of a sustainable grazing system for wool production in the Falkland Islands. Research which integrates plant community ecology, agricultural meteorology, sheep energetics, grazing systems and socio-economics is described.

KEYWORDS
Cortaderia pilosa, Falkland Islands, grazing, metabolisable energy, sheep, topography, utilisation, wind-chill

INTRODUCTION
The grasslands of the Falkland Islands are used almost exclusively for ranching sheep to produce wool. Sheep growth rates and fertility are poor and losses are high (Davies et al., 1971). Recently, sub-division of land and its transfer to owner-occupiers brought about improved wool production, through increased numbers of sheep and improved weights of wool per sheep (Summers et al., 1993). If the improvements are to be sustained then grazing systems which improve sheep survival, minimise damage to the rangeland due to the heavier stocking and which are profitable to the farmers need to be developed and tested.

This paper outlines current research, which for the first time in the islands, integrates plant community ecology, agricultural meteorology, sheep energetics, grazing systems and socio-economics. The aim of the research is to model both the metabolisable energy (ME) balance of the sheep in relation to itís environment and the effects on vegetation and soils arising from increased grazing pressure. When combined with information on current grazing systems and wool economics, a sustainable grazing system can be developed.

Current systems. A farm survey (Davies et al., 1971) found that sheep were mainly set-stocked and only a few farms 'spelled' paddocks or conducted rotational or alternate grazing. Information is needed on the grazing systems in current practice. A survey of farmers will provide data on where, when and why flocks of sheep are stocked on a range of farms across the islands. Data on paddock areas, flock sizes, fencing costs and the labour used will also be collated.

ME requirements. No data is available on the ME requirements for sheep in the Falkland Islands. In the cool and windy climate, little shelter is available from the almost constant wind-chill. This combined with greater foraging distances for small amounts of high quality feed in the large paddocks (typically 400 - 4000 ha) (Davies et al., 1971) mean that ME requirements may be much higher than those estimated using standard guidelines for energy allowances for ruminants (MAFF, 1987).

Research will calculate the seasonal variation in wind-chill from the available records of air temperatures, wind and rainfall. The ME requirement for wool production in wether (castrated male) sheep and the effects of wind-chill on heat loss and hence on ME requirements for shorn and unshorn sheep will be reviewed. The distance sheep forage daily under a range of topographical variables and seasons will be determined in a field trial.

The relationship between topography and exposure to wind-chill will be reviewed and automatic weather stations may experimentally confirm the expected variation in wind-chill with topography. From these studies paddocks could be classified and mapped on the basis of topographic exposure of sheep to wind-chill. A model of the seasonal ME balance for sheep in the range of topographic environments and vegetation will be devised and enable sheep managers to optimize the ME balance of their flock through improved fencing and management.

Utilization. Oceanic heath is the dominant vegetation (Moore 1968). Under the extensive grazing systems and sparse fencing patterns its grazing value is limited by unbalanced utilization by herbivores. More specifically, utilization of the most productive and better quality vegetation i.e. short green pasture (Greens), is limited by its small area and high utilization (Kerr and McAdam 1993). In contrast that of the least productive and poorer quality Whitegrass (*Cortaderia pilosa* (D'Urv.) Hack) is limited by its large area and low utilization (Davies et al., 1990).

Increased utilization of Whitegrass during summer improved agronomic performance and species composition the pasture (Davies et al. (1989). However the paddocks used were much smaller (3 ha) and more uniform than those stocked normally. They usually contain mosaics of different communities associated with varied topographies. Thus the response of Whitegrass to heavy grazing in a range of vegetation mosaics and landscape types may be different. To study this the condition of Whitegrass areas of known grazing history will be surveyed. Additionally, in a grazing trial the changes in species composition under a range of heavy grazing frequencies and timings will be monitored. The data will be combined to develop a conceptual model of how Whitegrass heath changes due to heavy grazing. This should help managers predict the impact of changes in stocking pressure on the future carrying capacity of Whitegrass pasture.

Improved systems. McAdam (1986) proposed research into grazing systems which would prevent the accumulation of dead herbage and simultaneously minimize the nutritional penalties to sheep. More specifically Kerr (1996) recommended that the location and scale of paddocks should match spatial variation in vegetation types and topography and that the timing of flock movements match seasonal variation in the grazing value of the vegetation and severity of wind-chill. Thus the sheep would utilize the grasslands in a more balanced and sustainable way. Correspondingly, less ME would be required for maintenance and more would be available from 'spelled' pasture and through beneficial changes in pasture composition and structure. The improved ME balance would sustain the increased stocking densities.

CONCLUSION
The comparative response of sheep and pasture to set-stocked and rotational grazing systems for extensive rangeland will be reviewed. A trial will compare pasture utilisation, changes in vegetation composition, ME values of the pasture and sheep performance between sequence and set-stocked grazing systems so that the models can be validated.

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