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AranLIFE: sustainable management of the priority terrestrial habitats of the Aran Islands



Key external stakeholders:

Policymakers
 Agri-environmental researchers and NGOs
 Farmers in High Nature Value farming systems

Practical implications for stakeholders:

- The AranLIFE project demonstrated effective management techniques to conserve priority habitats in favourable condition.
- Results indicate that mineral supplementation is essential for livestock agriculture on the Aran Islands; however, feeding of protein and energy supplements can be minimized through optimal management of the forage resource.
- These results may be of value to other livestock farming systems that rely on semi-natural vegetation that varies seasonally in forage quality.

Main results:

THE AranLIFE project demonstrated effective management techniques to conserve priority habitats in favourable condition. Two predominant pasture types were identified on the Aran Islands; winter-grazed pastures, and summer-grazed pasture, with the former being more botanically species-rich. Forage quality varied seasonally, and was dependent on the pasture type. Daily intake levels and forage energy content within an average winter-grazed pastures was insufficient to meet the daily energy requirements of suckler cows during late pregnancy. Although feeding of protein and energy supplements can be minimized through optimal management of the forage resource, results indicate mineral supplementation is essential for livestock agriculture on the Aran Islands.

Opportunity / Benefit:

The suckler enterprise and low-input year-round grazing system is a highly efficient livestock production system on the Aran Islands. Winter grazing management in particular is vital to the maintenance of biodiversity within semi-natural calcareous grasslands of high conservation value. Mineral supplementation is essential for productive agriculture on the Aran Islands. The AranLIFE project trialled the development of customised mineral licks on participant farms. The mineral composition of this supplement is designed to balance the trace mineral deficits and imbalances identified during this study. These results may be of value to other livestock farming systems that rely on semi-natural vegetation that varies seasonally in forage quality.

Collaborating Institutions:

Institute of Technology, Sligo
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
Department of Agriculture, Food and the Marine
The Heritage Council
Fáilte Ireland
Galway County Council

Teagasc project team: Dr Daire Ó hUallacháin
Dr John Finn

External collaborators: Dr James Moran (GMIT, formerly Institute of Technology, Sligo)

1. Project background:

The Aran Islands (Inis Mór, Inis Meáin and Inis Oírr) are an extremely important site for a number of priority terrestrial habitats. Under the EU Habitats Directive (92/43/EEC), 76% of the land surface of the Aran Islands is designated as Special Area of Conservation (SAC) which includes priority habitats such as Limestone pavement (8240*), Orchid-rich calcareous grassland (6210*), and Machair (21A0*).

The main threats to the habitats on the islands are land abandonment, undergrazing, inappropriate management practices, as well as loss of traditional farm knowledge and skills. Despite the wealth of information on the natural history of the islands there has been no targeted conservation effort in the project area.

The AranLIFE project is a demonstration project that will contribute to the implementation of the objectives of the Habitats and Birds Directives, as required under LIFE+ Nature. This LIFE project represents the only large-scale, action-based nature conservation initiative ever to have been planned for the Aran Islands. Teagasc funded a four-year Walsh Fellowship that contributed to AranLIFE.

2. Questions addressed by the project:

The overall objectives of AranLIFE were as follows:

- To demonstrate best management techniques to both maintain, and bring sites to favorable condition.
- To improve the conservation status of 1,011 hectares of priority habitats comprised of 218 hectares of Limestone pavement (8240*), 78 hectares of Orchid rich calcareous grasslands (6210*), 686 hectares of Limestone pavement (8240*)/Orchid rich calcareous grasslands (6210*) mosaic and 29 hectares of Machair (21A0*).
- To enhance understanding, appreciation and engagement of all the key stakeholders with the conservation of priority habitats on the Aran Islands.
- To recommend appropriate support mechanisms for farming on the Aran Islands that address the issues that threaten the status of the priority habitats of the islands.

Within AranLIFE, the Teagasc Walsh Fellow focused on vegetation types and forage quality for livestock, and we focus on presenting that work here. The aims of the study were to:

- Identify the principal grassland communities within a representative sample of semi-natural farmland habitats across AranLIFE monitor farms,
- Determine the nutritional status of the forage resource within these vegetation types across sampling dates, and
- Relate the observed nutritional status of the forage resource to livestock requirements.

3. The experimental studies:

Sampling for forage quality was performed on 50 randomly selected sites, i.e. two land parcels from 25 randomly selected AranLIFE monitor farms across the three Aran Islands (Inis Mór, Inis Meáin, and Inis Oírr). Forages were collected from homogeneous stands of vegetation over 10 sampling dates between March 2015 and January 2017. Sample locations were located using a GPS and approximately 500 g of forage were cut using grass clippers to ground level. A total of 369 forage samples were collected over 10 sampling occasions between March 2015 and January 2017. Samples were analysed for oven dry matter (DM), N (Dumas method), crude protein (CP) (N x 6.25), ash, acid detergent fibre (ADF), and neutral detergent fibre (NDF) (Van Soest analysis) at the Agri-Food and Biosciences Institute, Northern Ireland.

Annual above-ground net primary production (ANPP) was quantified using the moveable cage (1 m x 1 m x 0.4 m) method, across eight representative sites. Forages were cut to ground level within a 0.5 m x 0.5 m quadrat and oven-dried to constant weight (60°C for 48 hours) to determine percentage dry matter.

Botanical surveys were carried out between June and July 2016. The vascular plant species in 2 m x 2 m

quadrats at each sampling site were recorded and their cover estimated using the Domin scale. These data were used to accurately assign each sampling location to a vegetation type using two way hierarchical cluster analysis (PC-ORD) with indicator species analysis used to provide a quantitative and objective point to prune the cluster analysis dendrogram.

4. Main results:

Two predominant pasture types were identified on the Aran Islands; ‘winter-grazed pastures’ (WP), and ‘summer-grazed pastures’ (SP). The SP community group is subject to more intensive grazing management. It is grazed up to two, and sometime three, times per year. It is less diverse than winter-grazed pasture and the sward contains the highest proportion of grass cover. In general, WP are grazed once after the growing season in the winter months (between late-October and Mid-March/April). Grazing in this grassland type does not usually occur after the start of May with the exception of some sites where a light ‘flash graze’ during the summer months occurs. These grasslands are less agriculturally productive than summer-grazed pasture, but they have a higher plant species-richness.

The vegetation community types identified exhibit community-dependent temporal variation in forage quality. For example, seasonal analysis of the forage quality highlighted that summer pasture (SP) consistently had higher crude protein concentrations than WP. Crude protein content in SP peaked in the winter months and was lowest in summer. Crude protein content of WP forages were lowest in March, and levels reached their highest in May. Following the peak in May, crude protein levels show a steady decline through August and the winter months. Crude protein concentrations within summer pastures were significantly higher than in winter pastures for all sampling periods except during May. In addition, forage was seasonally deficient in phosphorus, copper, zinc, selenium and cobalt.

To best suit the forage supply throughout the year, the suckler beef grazing management system developed by farmers on the Aran Islands involves a cyclic pattern of body condition loss and gain (the cows gain weight on SP when feed quantity is abundant and quality is relatively higher, and slowly lose weight on WP when forage quantity may be limited and quality is lower). Daily intake levels and forage energy content within an average winter-grazed pastures is insufficient to meet the daily energy requirements of suckler cows during late pregnancy.

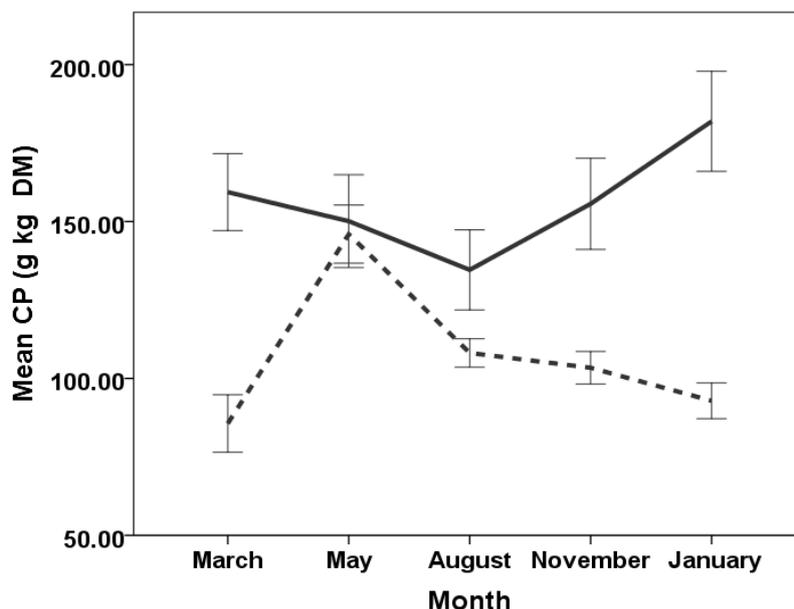


Figure 1. Seasonal variation in mean (\pm SE) levels of crude protein measured in summer-grazed (solid line) and winter-grazed pastures (dotted line) on the Aran Islands.

Matching correct stocking rates to the annual forage availability of a farm would ensure that the nutritional requirements of livestock are met and minimize the requirements for supplementary feeding. However, supplementary feeding may be required during February and March depending on the physical condition of

in-calf suckler cows during late pregnancy. Existing supplementary feeding practices with hay do have the potential to provide the additional source of protein required to support digestion of WP forages during March, however closer monitoring of these practices in combination with body condition scoring would be required before further conclusions can be drawn. Although feeding of protein and energy supplements can be minimized through optimal management of the forage resource, results indicate mineral supplementation is essential for livestock agriculture on the Aran Islands.

5. Opportunity/Benefit:

The suckler enterprise and low-input year-round grazing system is a highly efficient livestock production system on the Aran Islands. Winter grazing management in particular is vital to the maintenance of biodiversity within semi-natural calcareous grasslands of high conservation value.

Mineral supplementation is essential for productive agriculture on the Aran Islands. The AranLIFE project trialled the development of customised mineral licks on participant farms. The mineral composition of this supplement is designed to balance the trace mineral deficits and imbalances identified during this study.

These results may be of value to other livestock farming systems that rely on semi-natural vegetation that varies seasonally in forage quality.

6. Dissemination:

The methodology and outputs from this project were presented to various stakeholders at several seminars and conferences. The project outputs and reports are available at: www.aranlife.ie

Dissemination has been achieved through brochures, public noticeboards, posters, newsletters, layman's reports, information sheets, best practice guides, radio and television interviews (20), newspaper and magazine articles (11), public information events (91), a project website and through social media.

Main publications:

Final report of the AranLIFE project. (2018) <https://www.aranlife.ie/reports-and-publications>

Popular publications:

Duignan, L., Moran, J., Finn, J. and Ó hUallacháin, D. (2018) Forage Quality of Aran grasslands. AranLIFE Conference, September, 2018.

Duignan, L., Ó hUallacháin, D., Finn, J.A., Browne, A., McGurn, P., & Moran, J., (2018) The agronomic and biodiversity value of semi-natural grassland types under different grazing management. European Grassland Federation, Cork, Ireland.

Duignan, L., Moran, J., Ní Chonghaile, G., McGurn, P., Browne, A. Finn, J. & Ó hUallacháin, D. (2016) Forage production and quality from semi-natural calcareous grasslands of the Aran Islands. 1st Ecology and Evolution Ireland Conference, Institute of Technology, Sligo, November 2016.

Duignan, L., Moran, J., Finn, J. & Ó hUallacháin, D. (2015) The sustainable management of priority farmland habitats on the Aran Islands. 25th Irish Environmental Researchers' Colloquium, Institute of Technology Sligo, April, 2015

Duignan, L., Moran, J., Finn, J. & Ó hUallacháin, D. (2015) The sustainable management of priority farmland habitats on the Aran Islands. 25th Irish Environmental Researchers' Colloquium, Institute of Technology Sligo, April, 2015

Duignan, L., Moran, J., Finn, J., and Ó hUallacháin, D. (2018) Forage quality of semi-natural grasslands of the Aran Islands. AranLIFE project (LIFE12 NAT/IE/000995), Department of Culture, Heritage, and the Gaeltacht.

Duignan, L., Ó hUallacháin, D., Finn, J., and Moran, J. (2018) Agricultural practices and the quality of calcareous grassland habitat of the Aran Islands. AranLIFE project (LIFE12 NAT/IE/000995), Department of Culture, Heritage, and the Gaeltacht.

Duignan, L., Moran, J., Finn, J., and Ó hUallacháin, D. (2018) An assessment of scrub management practices on the Aran Islands. AranLIFE project (LIFE12 NAT/IE/000995), Department of Culture, Heritage, and the Gaeltacht.

7. Compiled by: John Finn