

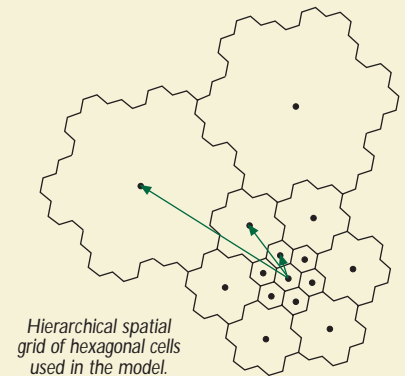
PREDICTING HERBIVORE OFFTAKE ACROSS GRASS/SHRUB MOSAICS

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MODEL

- A model (HOOFS)^{[1][2]} has been developed to simulate animal behaviour at the feeding station level and to determine the factors that lead to the spatial distribution of vegetation offtake by herbivores across grass/shrub mosaics.
- A vegetation map is projected onto a hierarchical spatial grid of hexagonal cells. Each cell contains a single vegetation type and the smallest cell size corresponds with the size of the feeding station for the herbivore under study. Individual herbivores with identical behavioural traits are released into this environment.
- The results of the model demonstrate the influence of behavioural traits, at the level of the individual, on the accumulative distribution of utilization across the vegetation mosaic.

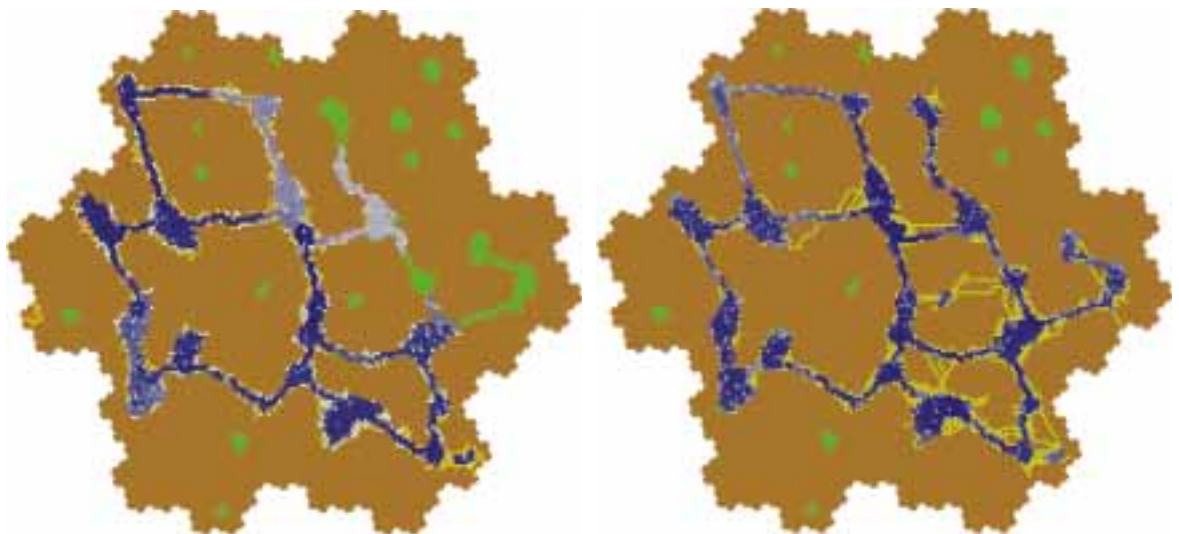


PARAMETERS

The model has been parameterised from experimental data^{[3][4][5]} to simulate the interaction between sheep and grass/heather (*Agrostis-Festuca/Calluna vulgaris*) mosaics.

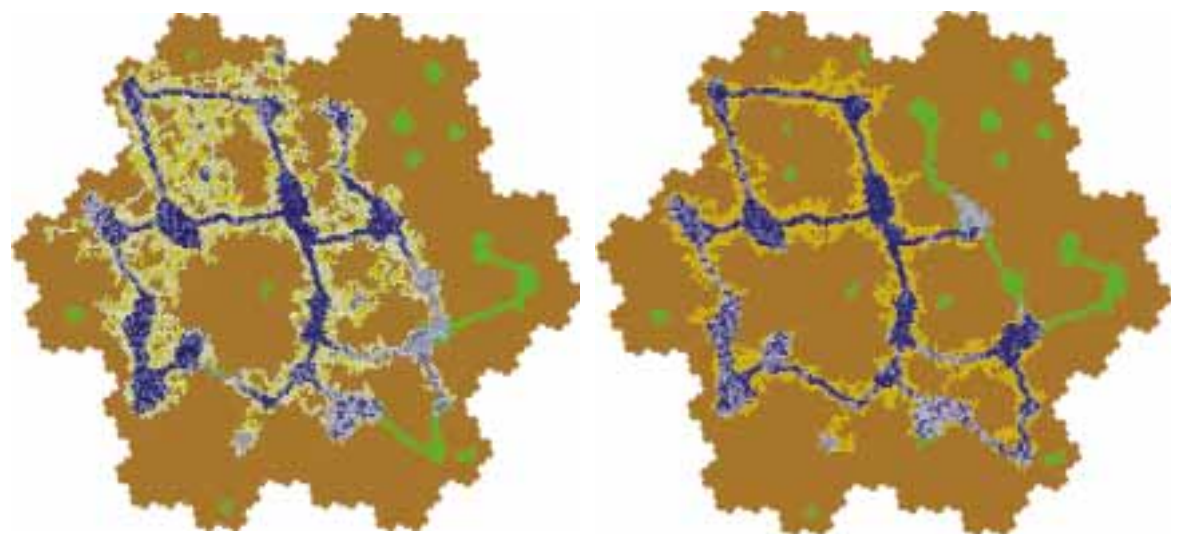
RESULTS

We have selected four extreme scenarios of foraging behaviour based on the following parameters: degree of determinism to eat the vegetation with the highest net intake rate, foraging extent biased towards local or global information on the mosaic, relative resistance of vegetation types.



1. *High determinism and use of local information* → sheep tend to forage on grass, but because of the local foraging extent remain at local minima.

2. *High determinism and use of global information* → sheep are efficient in finding all the grass patches and, because of their determinism, take shortcuts across the heather to forage on the best grass patches.



3. *Low determinism and use of global information* → the foraging distribution is less biased towards the grass patches than in scenario 1. and 2.

4. *Low determinism, use of global information and high relative resistance of heather* → sheep forage more on the grass because of the greater cost of walking through the heather and do not make new paths in spite of global foraging extent.

Vegetation type

Heather

Grass

Vegetation offtake

Heather offtake: High

Heather offtake: Low

Grass offtake: Low

Grass offtake: High

Grass offtake: High

Grass offtake: High

Grass offtake: High

CONCLUSION

This work demonstrates how, in order to understand the way that vegetation mosaics are exploited, there must be an appreciation of the animal decision-making process.

REFERENCES

1. Beecham, J.S. & Farnsworth, K.D. (1998). *Ecol Mod* **113** (1-3): 141-156.
2. Farnsworth, K.D. & Beecham, J.A. (1999). *Am Nat* **153** (5): 509-526.
3. Hester, A.J. & Baillie, G.J. (1998). *J Appl Ecol* **35** (5): 772-784.
4. Hester, A.J., Gordon, I.J., Baillie, G.J. and Tappin, E. (1999). *J Appl Ecol* **36** (1): 133-146.
5. Oom, S.P. and Hester, A.J. (1999). *Bot J Scotl* **51** (1): 23-38.