

Home range and habitat use of the brown hare (*Lepus europaeus*) on organic farmland

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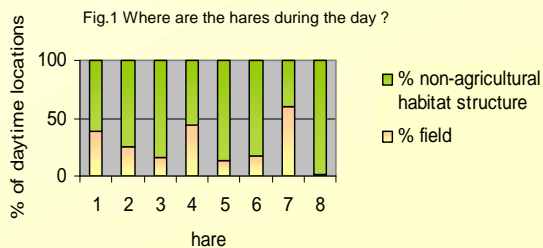
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The European brown hare has become rare in many parts of Europe. There is substantial controversy about the factors considered responsible for the dramatic decline, e.g. climatic changes, increased predation, spread of new diseases, habitat fragmentation and intensification of agricultural land use.

Study site: Demeter Farm "Ökodorf Brodowin" in the Schorfheide-Chorin Biosphere Reserve. The farm covers an area of 1.237 hectares and is one of the largest organic farms in Germany.
Methods: Radio-tracking twice a week during the day and once a month for four days at night and day; duration: 2-7 months



Aim of the study:
To study the effect of agricultural practice on habitat use of brown hares.



Habitat use: In the present study hares used predominantly non-agricultural habitat structures like groves, reeds and forests during daytime (Fig.1):

27% of day locations on fields versus 73% in other habitat structures.

(Mann-Whitney test, $p < 0.0001$)
This suggests that hares prefer, if available, places with good shelter to open fields for daytime resting, while they use fields mainly for nocturnal feeding.

Home range size:

We found: - a mean home range size of **69 ± 25 ha (1 SD)** estimated by 100% MCP method (Tab1)

- no significant difference between males and females
(Mann-Whitney-Test, $p=0.11$)

- no significant difference between day and night time ranges
(paired t-test, $t_p=0.67$, $p=0.52$)

Other studies show a broad range of home range sizes (28-149 ha). Radio-tracking studies on conventional large-scale farmland using methods similar to ours and with a comparable hare density of 10-20 hares/ km² (Marboutin 1997, Reitz & Léonard 1994) yielded significantly larger ranges.

(Bonferroni-corrected one-way ANOVA: this study MCP vs. Marboutin MCP, mean difference: -53 ha, $t=3.6$, $p<0.01$; this study MCP vs. Reitz MCP, mean difference: -40 ha, $t=2.4$, $p<0.025$)

The underlying reason for smaller home range sizes in Brodowin could be the different farming practices, i.e. **organic land use** (e.g. 25-30 %-share of **legume-grass-forage** which is preferred by brown hare, good usability of grain crops for brown hare until late summer due to a **less dense crop structure** and a high share of **non-crop-plants, plant cover** on more than 90 % of the farmland all the year round) and the more **diverse habitat structure** (e.g. availability of extensive non-crop-structures).

Tab1: N^o of locations per individual and home range size estimated by Minimum Convex Polygon (MCP) and Kernel smoothing (KC) method using different proportions of fixes (50, 95, 100 %) and day and night ranges based on the 100% MCP

ID	sex	N ^o of fixes	MCP 95%	MCP 100%	KC 50%	KC 95%	MCP 100% night	MCP 100% day
1	f	108	58	70	15	69	44	59
2	m	103	65	85	4	41	50	74
3	m	173	75	94	4	49	82	42
4	m	33	39	48	15	60	17	47
5	f	178	39	49	8	37	29	47
6	f	166	50	50	4	27	35	47
7	m	166	77	110	9	48	101	81
8	f	118	44	47	4	35	14	20
mean		131	56	69	8	46	46	52

