Oikos

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Koivisto, E., Huitu, O., Sundell, J. and Korpimäki, E. 2007. Species-specific limitation of vole population growth by least weasel predation: facilitation of coexistence? – Oikos 117: 6–12.

Appendix 1

Model 1

Statistical model equation for random regression coefficient analysis of vole population density:
$density_{ijkt} = \mu + \alpha_i + \beta_j + \gamma \times time_t + (\alpha\beta)_{ij} + \lambda_i \times time_t + \varphi_j \times time_t + (\lambda\varphi)_{ij} \times time_t + a_k + b_k \times time_t + \varepsilon_{ijkt}$,
where:
μ = grand mean
α_i = effect of species i (fixed factor)
β_j = effect of weasel predation j (fixed factor)
$time_t$ = time (covariate)
γ = slope of time
$(\alpha\beta)_{ij}$ = species i × weasel j interaction (fixed factor)
λ_i = effect of species i on time (fixed factor)
φ_j = effect of weasel j on time (fixed factor)
$(\lambda\varphi)_{ij}$ = effect of species i × weasel j interaction on time (fixed factor)
a_k = effect of enclosure k (random factor)
b_k = effect of enclosure k on time (random factor)
ε_{ijkt} = error term

Model 2

Statistical model equation for logistic regression analysis of vole survival using binomial error distribution and logit link function:
$y_{ijl} = bin\ (n, p_{ijl})$,
$logit\ (p_{ijl}) = \mu + \alpha_i + \beta_j + \delta_l + (\alpha\beta)_{ij} + (\alpha\delta)_{il} + (\beta\delta)_{jl}$,
where:
n = "trials" (number alive prior to weasel)
p = "events" (number of survivors)
μ = grand mean
α_i = effect of species i (fixed)
β_j = effect of weasel predation j (fixed)
δ_l = effect of sex l (fixed)
$(\alpha\beta)_{ij}$ = species i × weasel j interaction (fixed)
$(\alpha\delta)_{il}$ = species i × sex l interaction (fixed)
$(\beta\delta)_{jl}$ = weasel j × sex l interaction (fixed)

Model 3

Statistical model equation for random coefficients regression analysis of vole body mass:
$mass_{ijklt} = \mu + \alpha_i + \beta_j + \delta_l + \gamma \times time_t + (\alpha\beta)_{ij} + (\alpha\delta)_{il} + (\beta\delta)_{jl} + \lambda_i \times time_t + \varphi_j \times time_t + \theta_l \times time_t + a_k + b_k \times time_t + \varepsilon_{ijklt}$,
where:
μ = grand mean
α_i = effect of species i (fixed)
β_j = effect of weasel predation j (fixed)
δ_l = effect of sex l (fixed)
$time_t$ = time
γ = slope of time
$(\alpha\beta)_{ij}$ = species i × weasel j interaction (fixed)
$(\alpha\delta)_{il}$ = species i × sex l interaction (fixed)
$(\beta\delta)_{jl}$ = weasel j × sex l interaction (fixed)
λ_i = effect of species i on time (fixed)
φ_j = effect of weasel j on time (fixed)
θ_l = effect of sex l on time (fixed)
a_k = effect of enclosure k (random)
b_k = effect of enclosure k on time (random)
ε_{ijklt} = error term

Model 4

Statistical model equation for generalized linear mixed analysis of vole reproductive parameters (sex ratio of all individuals, proportion of young animals among all individuals, proportion of lactating females of all adult females, proportion of gravid females of all adult females) using binomial error distribution and logit link function:
$y_{ijkt} = bin\ (n, p_{ijkt})$
$logit\ (p_{ijkt}) = \mu + \alpha_i + \beta_j + \gamma \times time_t + (\alpha\beta)_{ij} + \lambda_i \times time_t + \varphi_j \times time_t + a_k + b_k \times time_t$,
where:
n = "trials" (e.g. number of all pups)
p = "events" (e.g. number of male pups)
μ = grand mean
α_i = effect of species i (fixed)
β_j = effect of weasel predation j (fixed)
$time_t$ = time
γ = slope of time
$(\alpha\beta)_{ij}$ = species i × weasel j interaction (fixed)
λ_i = effect of species i on time (fixed)
φ_j = effect of weasel j on time (fixed)
a_k = effect of enclosure k (random)
b_k = effect of enclosure k on time (random)