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Residues of anticoagulant rodenticides in biota in Germany
Pathway of anticoagulants in the food-web

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Background

Anticoagulant rodenticides (AR)

8 licensed substances (biocides) in Germany

prevent blood clotting, delayed death, no bait shyness, Vitamin k as antidote

Small mammals

non target species ingest bait directly

disperse substances in the environment

Predators

ingest poisoned prey and carrion, substances accumulate in the liver

primary exposure

secondary exposure

Project aims

A) AR residues in non-target small mammals

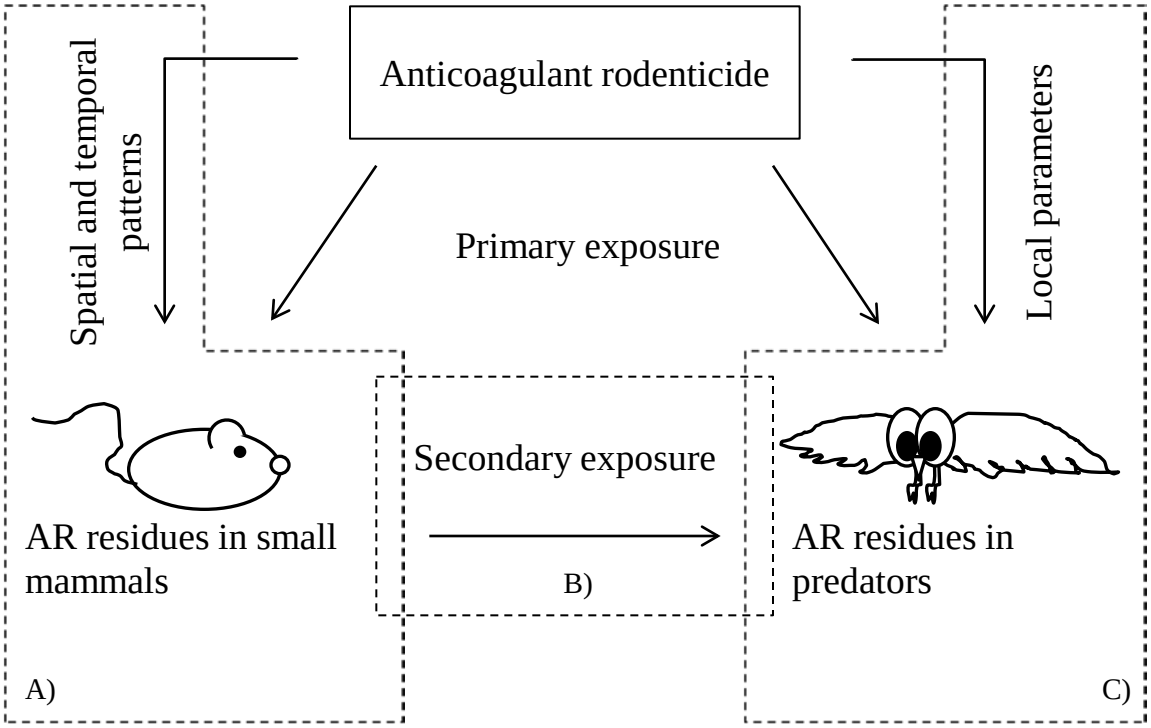
on farms: mice, voles, shrews

B) Exposure pathway prey-predators

risk assessment (prey exposure – predator diet) and tracing of expected pathway

C) Local parameters driving exposure of predators

terrestrial predators (red fox)



A) AR residues in non-target small mammals

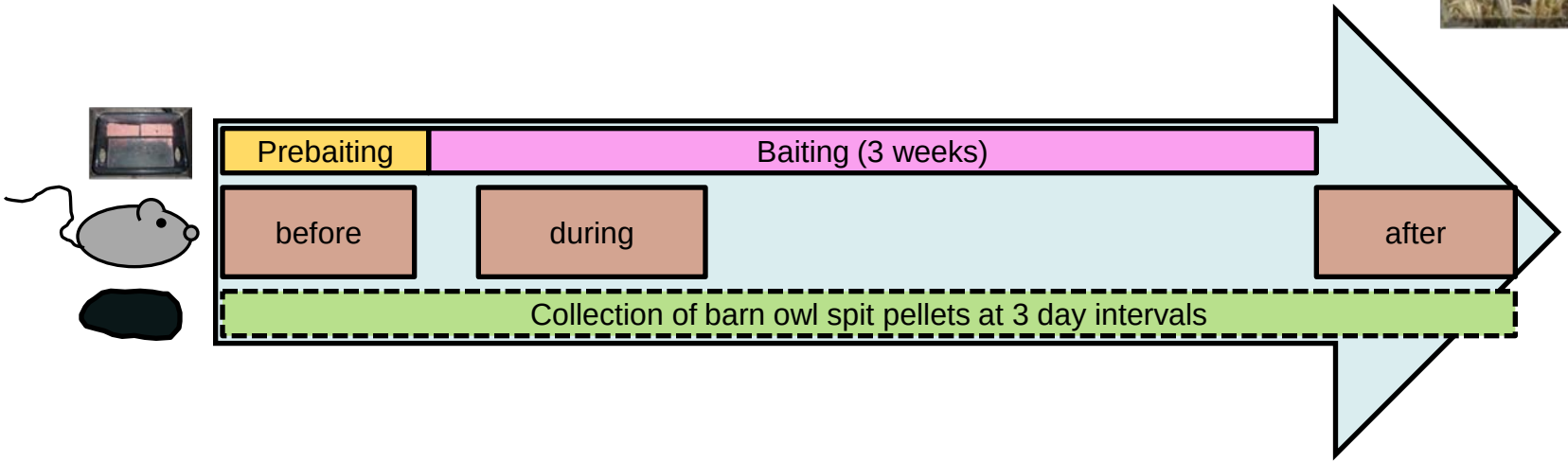
„How are non-target small mammals exposed to anticoagulant rodenticides during/after biocidal baiting?"

- livestock farms-

Sampling period: 2 years
Autumn (October/November)
Winter (February/ March)

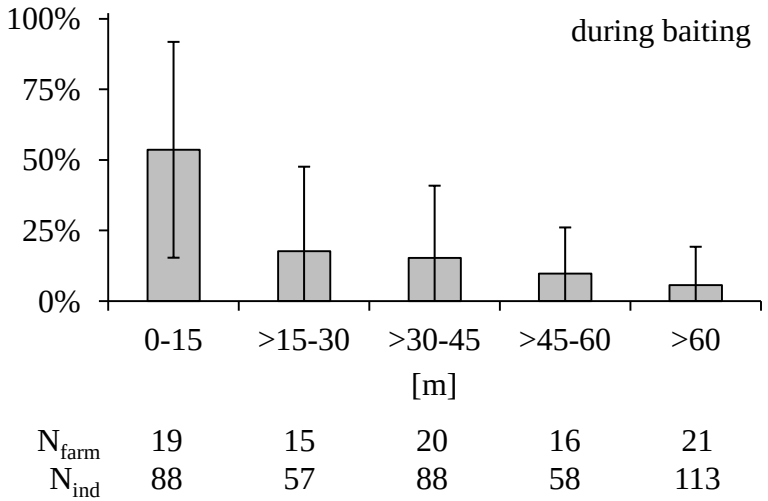
Geduhn et al. 2014

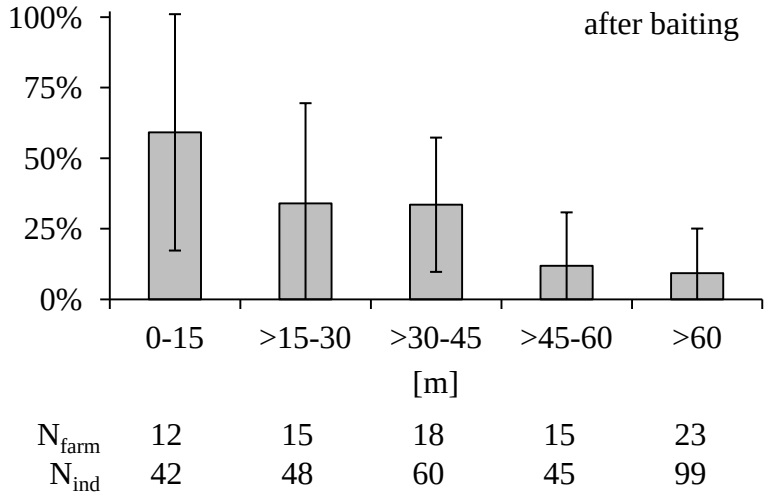
6-9 livestock farms
a total of 1178 small mammals were analyzed for residues of brodifacoum



Geduhn et al. (2014) „Spatial and temporal exposure patterns in non-target small mammals during brodifacoum rat control" Science of the Total Environment 496: 328-338.

A) AR residues in non-target small mammals





Spatial distribution:

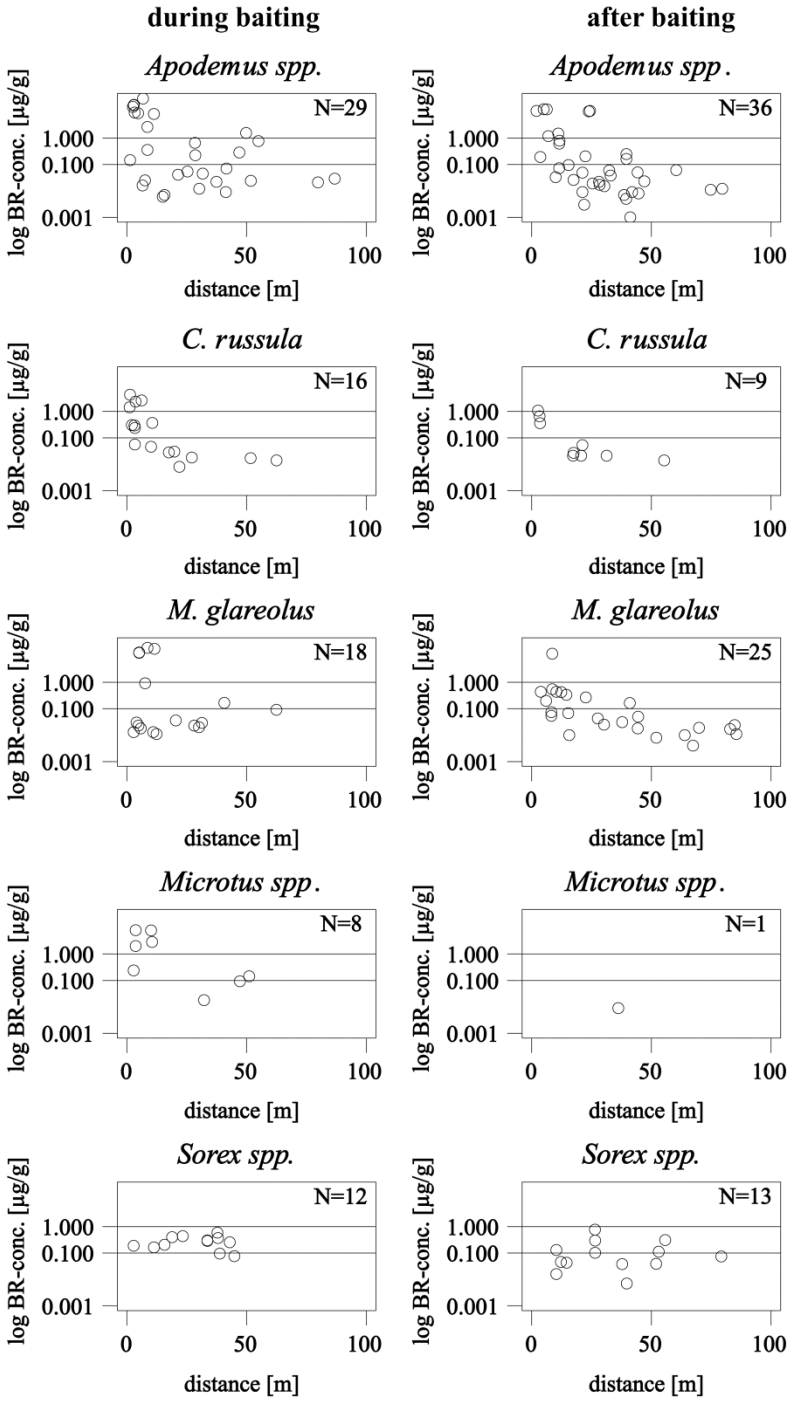
Decreasing percentage of residue occurrence with increasing distance to baiting area

Temporal distribution:

Higher AR occurrence after than during baiting

Geduhn et al. (2014) „Spatial and temporal exposure patterns in non-target small mammals during brodifacoum rat control“ Science of the Total Environment 496: 328-338.

A) AR residues in non-target small mammals



Concentrations in BR pos. mammals:

Conc. above 1 µg/g always very close to baiting

Geduhn et al. (2014) „Spatial and temporal exposure patterns in non-target small mammals during brodifacoum rat control“ Science of the Total Environment 496: 328-338.

A) AR residues in non-target small mammals

Summary/conclusion

- Decreasing occurrence of brodifacoum residues with increasing distance to baiting area
- All non-target small mammal species carried AR residues, but in different proportions and concentrations
- Brodifacoum residues even in shrews
- Non-target small mammals are exposed to anticoagulant rodenticides but occurrence and concentrations are strongly associated to the baiting area

Geduhn et al. (2014) „Spatial and temporal exposure patterns in non-target small mammals during brodifacoum rat control“ Science of the Total Environment 496: 328-338.

B) Exposure pathway prey-predator

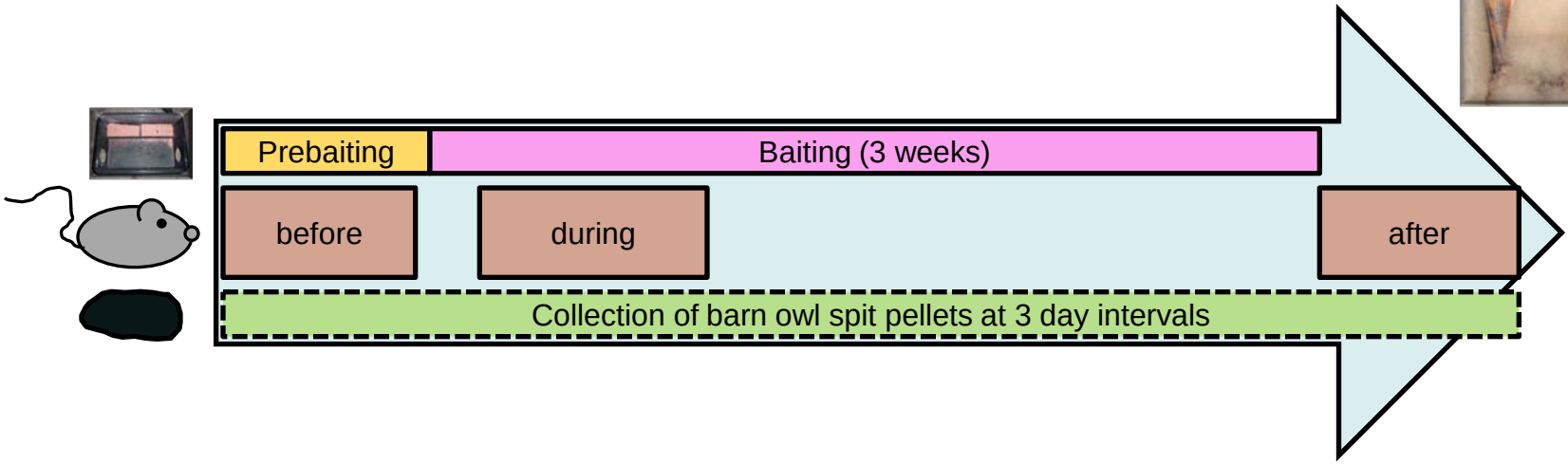
„How do non-target small mammals drive exposure risk of predators (barn owls)"

- livestock farms-

- Residues in non-target small mammals

Geduhn et al. 2014

- Barn owl diet: pellet content analysis
  monthly (2,379 pellets)
  during baiting campaigns



B) Exposure pathway prey-predator

Summary/ conclusion

- Secondary exposure risk is high through *Apodemus* and *Myodes*
- Risk is high especially in Autumn, when barn owls increasingly prey on *Apodemus*
- Seasonal variation in barn owl diet affects risk
  (low in summer, when *Microtus* is cached most often)
- few pellet AR residues but residues in prey substantiate expected exposure pathway
- Furthermore, residues were found most often in predatory birds that are specialized on hunting small mammals

C) Local parameters driving exposure of predators

„How do local parameters drive exposure of predators (red foxes)"

- livestock density and percentage of urban area-

Geduhn et al. in rev.

331 liver samples

Mainly from rabies monitoring

4 federal states
35 administrative districts
14 administrative districts >= 5 samples

Geduhn et al. in rev. „Relation between intensity of biocide practice and residues of anticoagulant rodenticides in red foxes (*Vulpes vulpes*)"

C) Local parameters driving exposure of predators

Summary/ conclusion

- AR residues in red foxes are common (60%)
- Mainly second generation ARs
- Livestock density and the percentage of urban area of a district are good indicators for AR residue occurrence
- Livestock that are kept in feedlots provide a source for AR exposure in non-target predators
- Risk assessment is important in rural and urban areas

Geduhn et al. in rev. „Relation between intensity of biocide practice and residues of anticoagulant rodenticides in red foxes (*Vulpes vulpes*)“

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and

Thank you for your attention!

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