

A KNOWN THREAT

Zoonoses are a global concern, with **bovine tuberculosis (TB)** posing major economic and social challenges in Europe.

Tuberculosis transmission is facilitated by the **shared use of space** and contaminated resources among hosts.

The study of host behavior is critical in identifying some species with higher transmission risk in multi-host systems

In this study, we used **12 months** of camera-trap photo data to investigate **wildlife and cattle behavioral patterns** in a southwest Iberian landscape:

19 control sites



16 water sites



OUR AIMS

1ST...

Identify wildlife hosts with the highest temporal overlap with cattle

— across sites with and without water access, forests with herbaceous understory versus shrub-dominated, and between wet and dry seasons.

2ND...

Evaluate species' overall behavior patterns

Frequency of *Foraging*, *Drinking*, *Resting*, *Moving*, *Wallowing*, *Drinking*, *Scent Marking*

3RD...

Assess how environmental factors influence species' behavioral patterns relevant to TB transmission

Multinomial and binomial Generalized Linear Mixed models for each species analyzed:

- Cattle — *Wallowing**; *Foraging*; *Drinking**; *Resting*; *Moving*
- Fox — *Foraging*; *Drinking**; *Moving*
- Wild boar — *Wallowing**; *Foraging*; *Drinking**; *Moving*
- Red deer — *Wallowing**; *Foraging*; *Drinking**; *Moving*
- Badger — *Foraging*; *Moving*

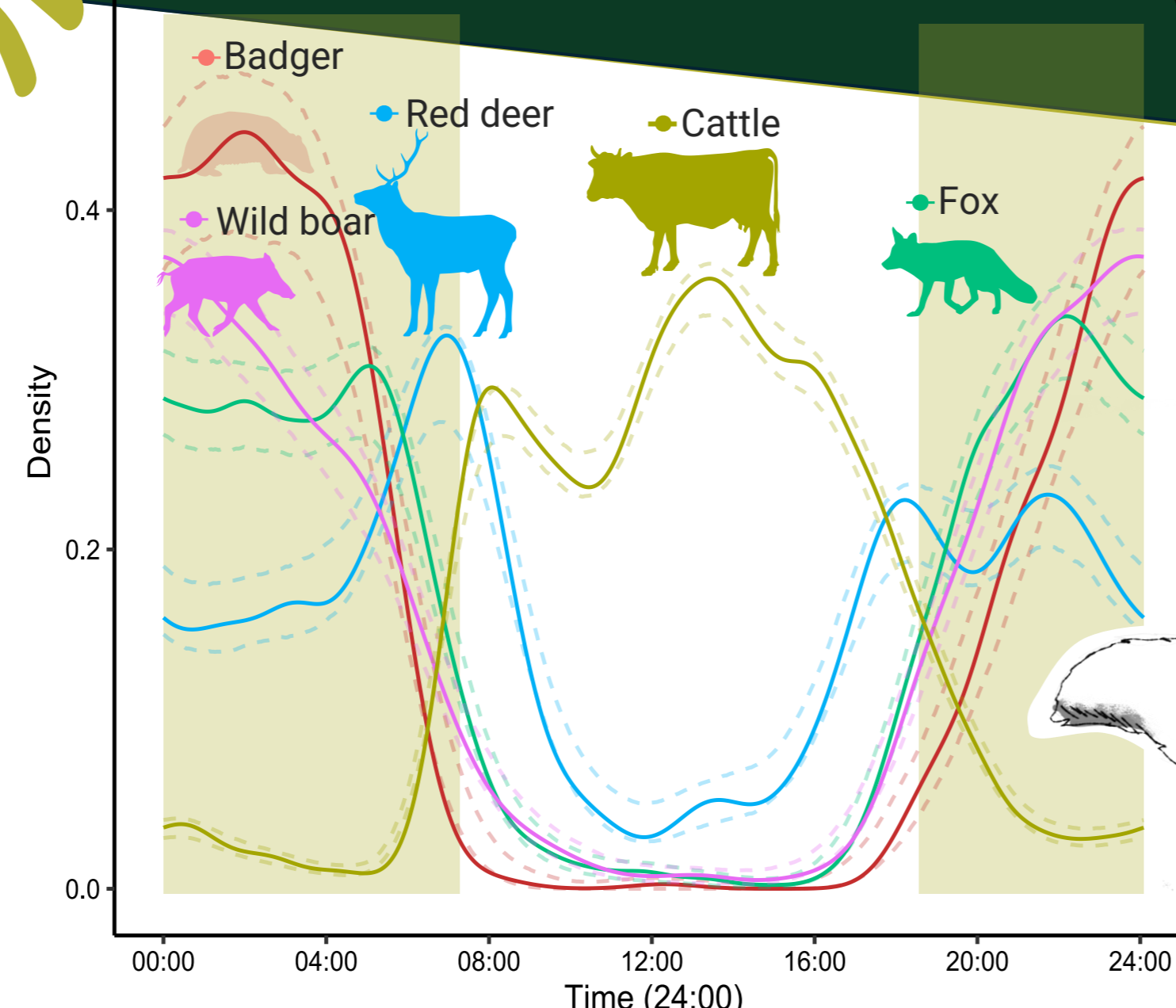
* Only conducted at sites where water was present

ALL WILD SPECIES CONSIDERED IN THIS STUDY ARE NOCTURNAL OR CREPUSCULAR. ON THE CONTRARY, CATTLE IS A DIURNAL SPECIES. THIS DIFFERENCE REVEALS A LOW PROBABILITY OF A DIRECT CONTACT BETWEEN SPECIES.

SPECIES' TEMPORAL OVERLAP

Temporal overlap between cattle and wildlife was generally low ($D_{HAT4} < 0.5$).

HOWEVER,

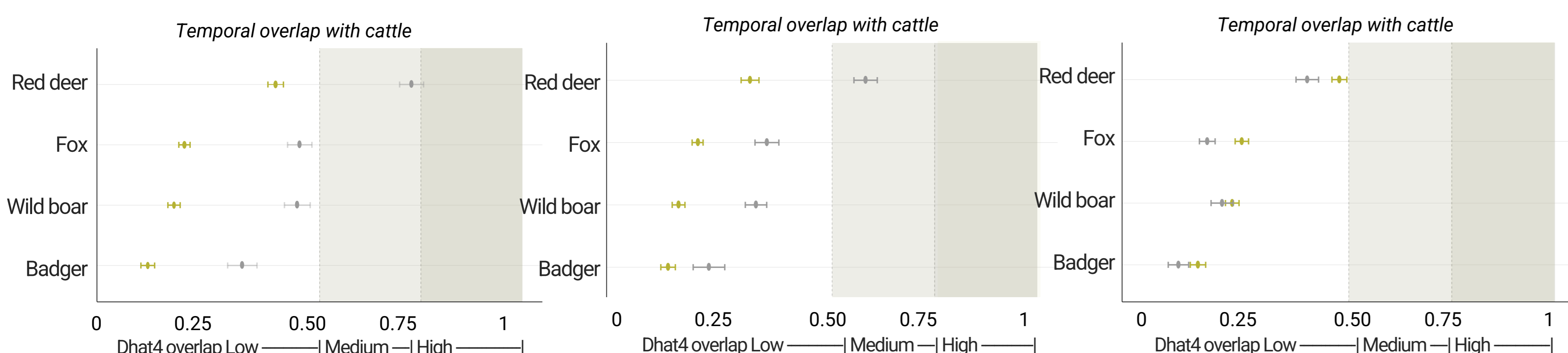


Overlap varied significantly across station types, main habitat types, and seasons. Red deer showed medium overlap with cattle in control sites and in forests with shrub understory.

CONTROL SITES vs WATER SITES

SHRUB UNDERSTORY vs GRASS UNDERSTORY

WET SEASON vs DRY SEASON



Kingdom: Bacteria
Species: *Mycobacterium bovis*
Agent of bovine tuberculosis

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IDENTIFYING HIGH-RISK MULTI-HOST BEHAVIORS FOR TUBERCULOSIS TRANSMISSION AT THE WILDLIFE-CATTLE INTERFACE

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THE STUDY WAS CONDUCTED ON 5 ADJOINING FARMS IN BARRANCOS, PORTUGAL, NEAR THE SPANISH BORDER...

IN ADDITION TO ANALYZING OCCURRENCE PATTERNS FROM CAMERA TRAP PHOTOS, IT IS IMPORTANT TO ASSESS HOW SPECIES INTERACT WITH THEIR ENVIRONMENT WHEN EVALUATING PATHOGEN TRANSMISSION RISK, AS NOT ALL PHOTOS REFLECT THE SAME BEHAVIOR, AND THE ASSOCIATED RISK VARIES ACCORDINGLY.

A FOX APPEARS...

... IT SCENT-MARKS THE AREA WITH URINE...

05/10/2024 19:03

A RED DEER APPEARS...

... IT'S FORAGING ON THE GROUND, GRAZING ON HERBS...

05/10/2024 19:30

A WILD BOAR APPEARS...

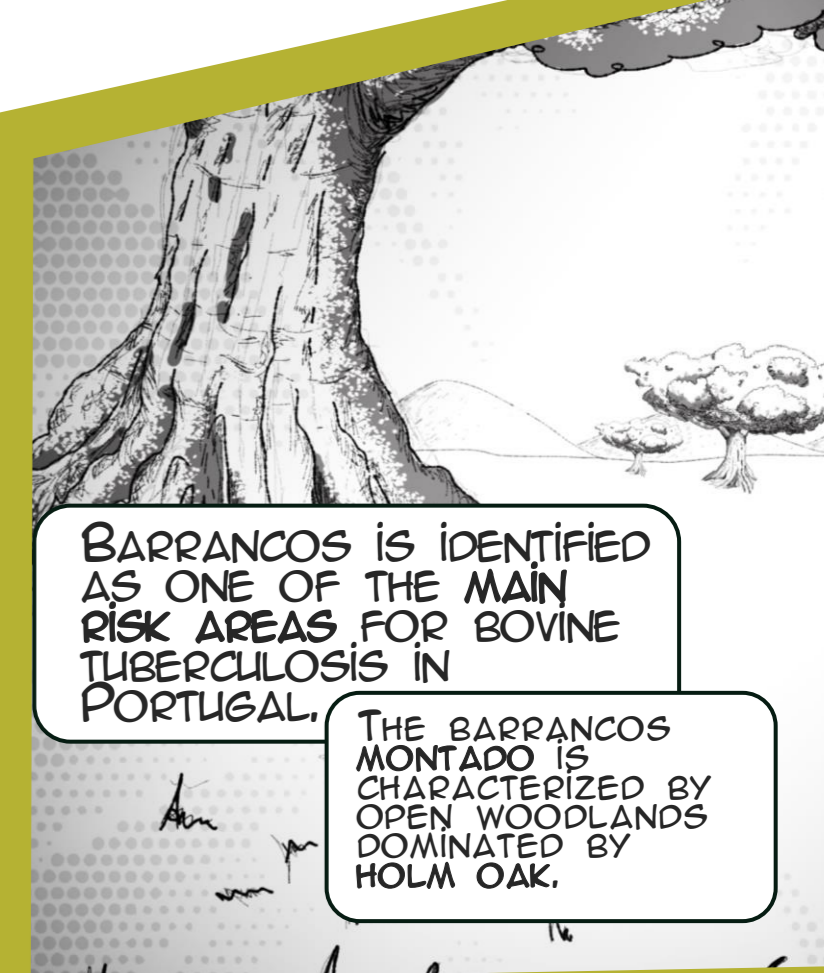
... IT'S MOVING THROUGH...

06/10/2024 09:25

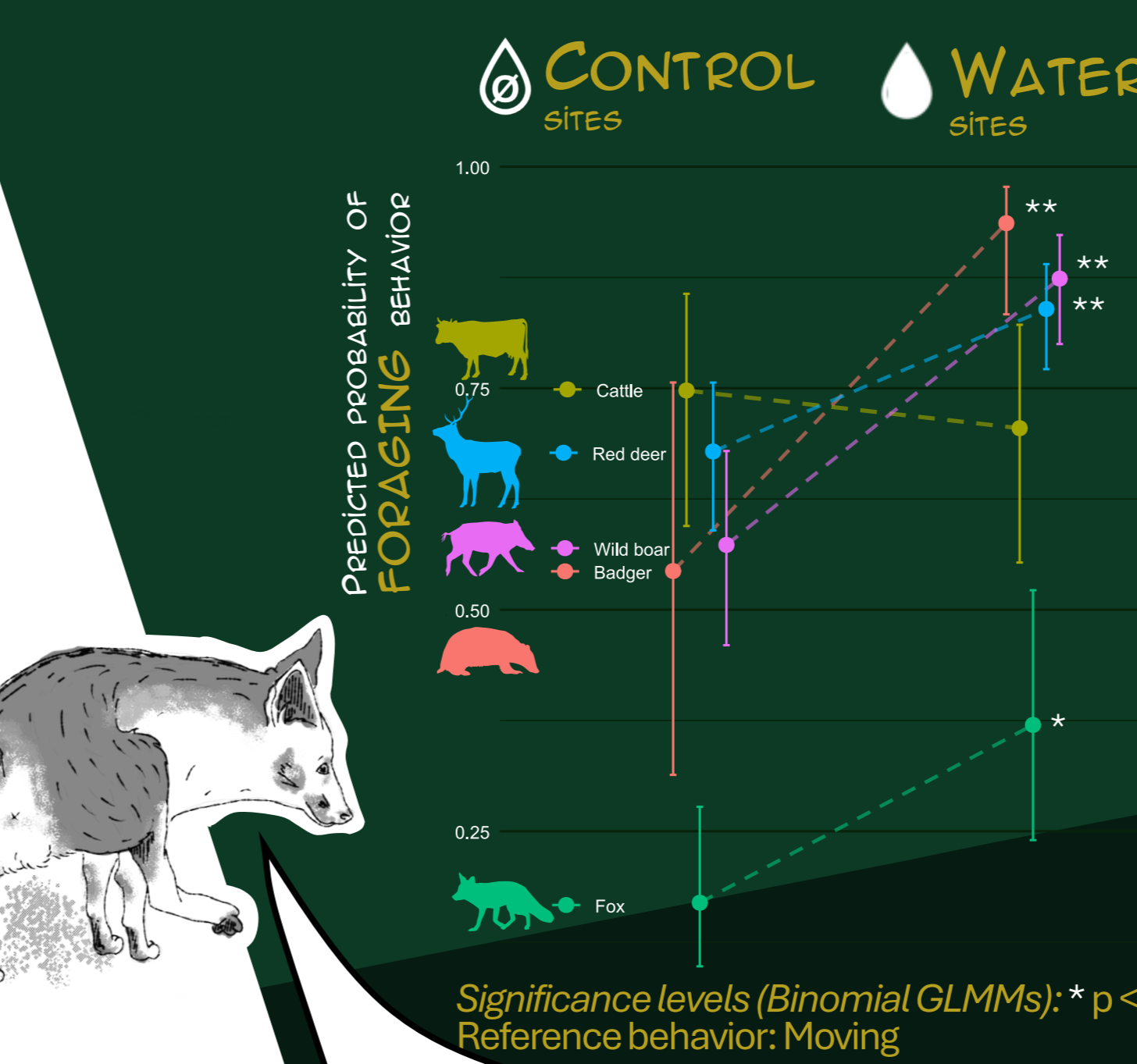
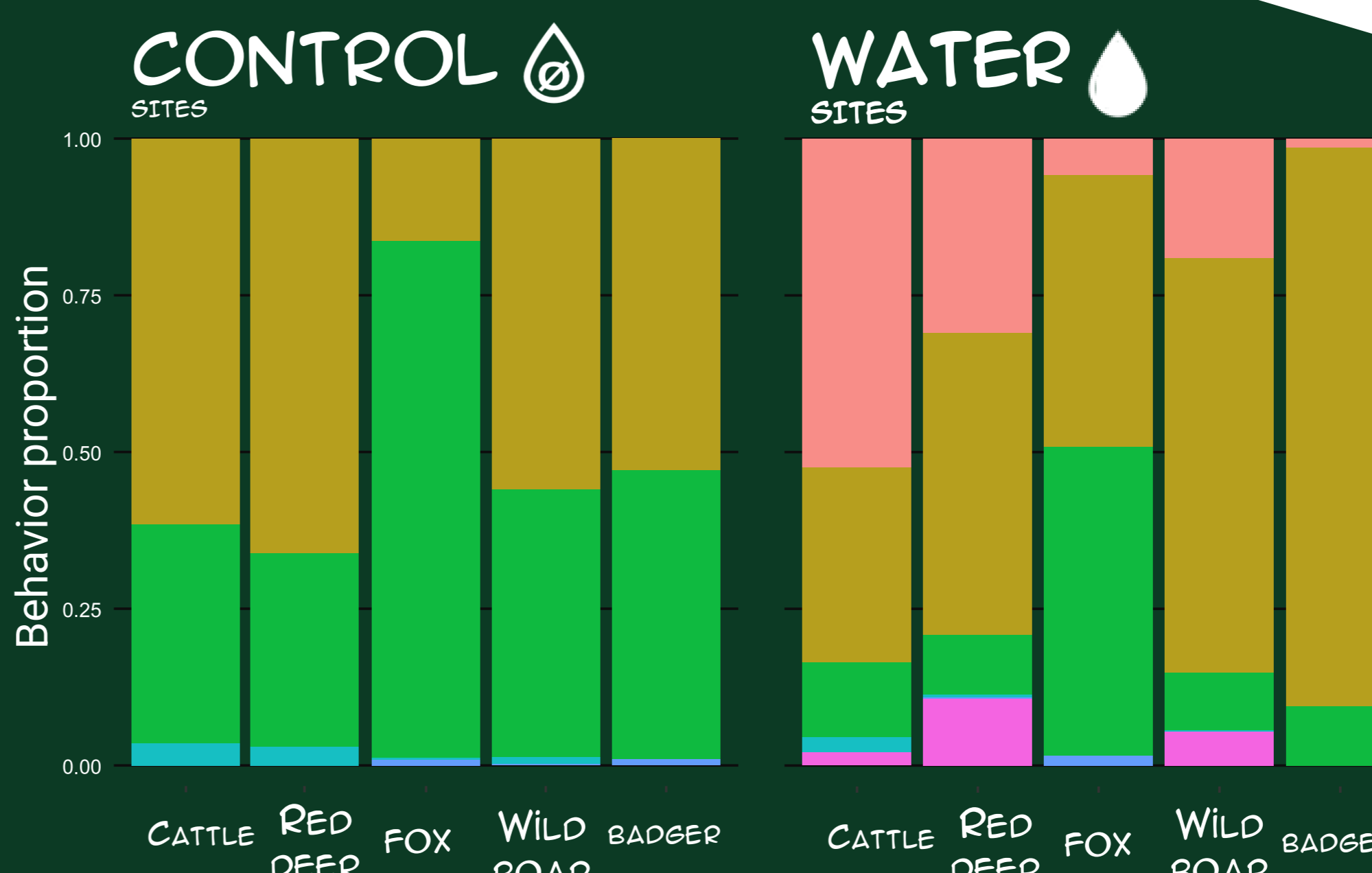
CATTLE ARRIVES...

... FORAGING ON THE GROUND...

06/10/2024 09:00



SPECIES' BEHAVIOR



- CATTLE + FORAGING + RESTING: Dry season, Higher tree density
- FOX + FORAGING + DRINKING: Dry season, Smaller water bodies
- BADGER + FORAGING: Higher tree density
- RED DEER: None of the tested models showed a significant improvement over the null model
- WILD BOAR: None of the tested models showed a significant improvement over the null model

WATER SITES ACT AS KEY FOCAL POINTS FOR FORAGING ACTIVITY IN WILD SPECIES!

Despite limited overlap in activity, foraging in water sites and dense forests may increase transmission risk in these areas. Combining these findings with spatial data on habitat use can reveal key water sources and forest zones that act as transmission hotspots.

This knowledge supports targeted management, such as restricting cattle access to high-risk zones, to limit disease spread.