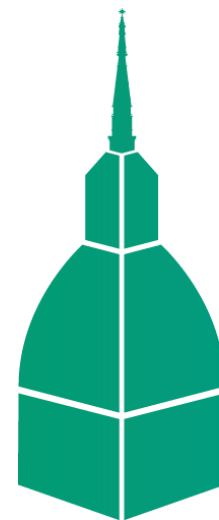# GPS as a tool to monitor grazing behavior of Sarda dairy ewes

Marco Acciaro[1], Andrea Frongia[1], Manuel K. Schneider[2], Valeria Giovanetti[1], Gabriella Serra[1], Andrea Cabiddu[1], Mauro Decandia[1], Caren M. Pauler[2]

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Why is it useful to study animal grazing behaviour?

Dumont et al. (2007)

A better knowledge of the interactions between plants and herbivores is needed to define appropriate management strategies for animals and grasslands within the context of sustainable grazing systems

…understanding the distribution of livestock grazing is critical for preventing grassland degradation and aiding restoration through grazing management

Gou et al. (2024)

The heterogeneous patterns of space use often produce overgrazing at the most preferred areas while other areas remain under-grazed

Bailey et al. (1998)

……. is part of a project's activities

TechCare is a multi-actor approach project (EU H2020 programme)

- monitor **animal-based welfare indicators**

- improve welfare management in small ruminant

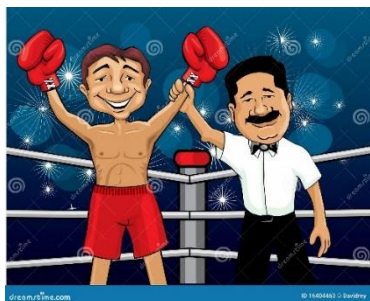 systems, using **precision livestock farming** (PLF)

  technologies

Welfare priorities for dairy sheep production

**participatory process with sheep farmers and stakeholders**

under/malnutrition, lameness, gastrointestinal parasites and mastitis.

Materials and methods: *Experimental site*

Bonassai experimental farm of the agricultural research agency of Sardinia (AGRIS Sardegna), located in the NW of Sardinia, Italy (40° 40′ 16.215″ N, 8° 22′ 0.392″ E, 32 m a.s.l).

Animals

Two groups of adult lactating ewes (24 heads each), homogeneous for age, lambing date, lactation stage, milk yield, live weight and body condition score.
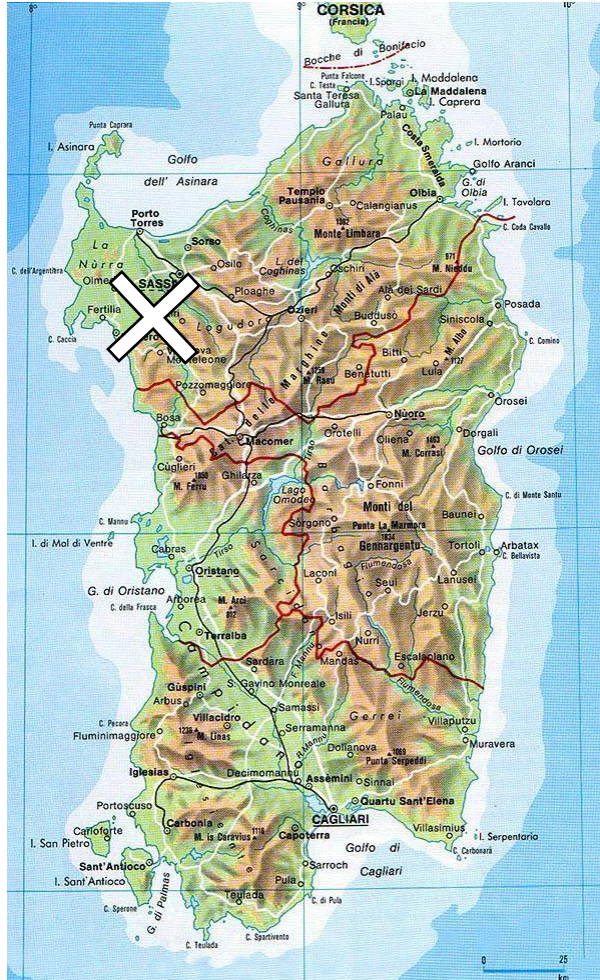
Materials and methods: Experimental design

Early detection of welfare problems (malnutrition/under-nutrition) in adult lactating ewes using data recorded by different technologies.
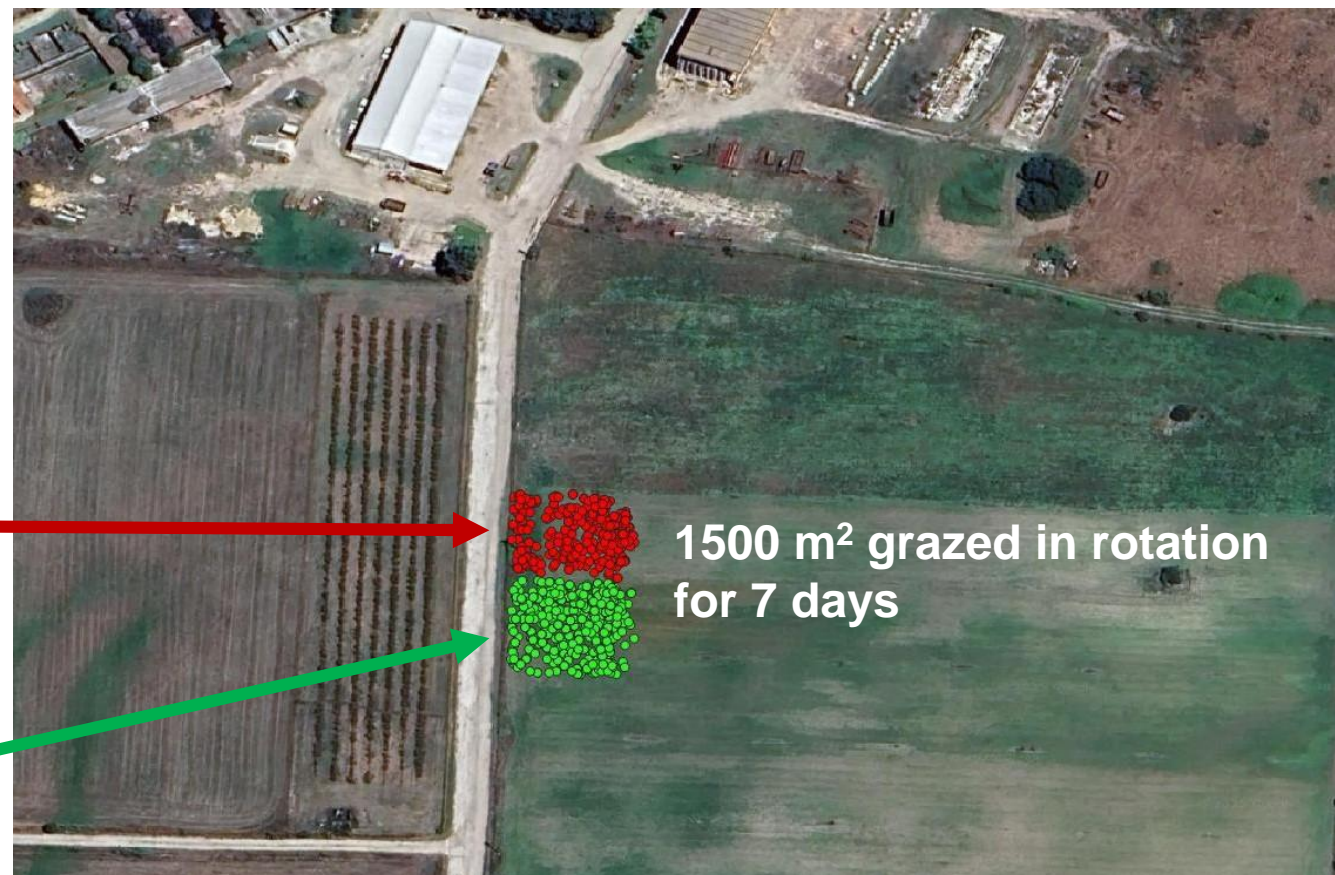
2 weeks adaptation period

4 hours/day on Italian ryegrass pasture + hay and concentrate

The groups were fed at pasture with varying **access times**

Group AT-3hrs 3 hours a day
about 70% of its nutritional requirements.

Group AT-6hrs 6 hours a day
fully meeting the animals' needs

1500 m² grazed in rotation for 7 days

Materials and methods: Data collection

- **3 ewes per group**, randomly selected from the herd

- **equipped with GPS collars** (IgotU GT-600®) collecting location, date, time and Estimated Horizontal Position Error (EHPE, cm) once per minute

- on **3** occasions

we added up the number of GPS positions within 5 × 5 m grid cells and computed **Camargo's index (CI) of space-use evenness** (Pauler et al., 2022)

Agris

Agenzia pro se chirca in agricoltura
Agenzia regionale per la ricerca in agricoltura

REGIONE AUTÒNOMA
DE SARDIGNA
REGIONE AUTONOMA
DELLA SARDEGNA

TECH CARE
Integrating innovative TECHnologies along the value Chain
to improve small ruminant welFARE management

Agroscopee

Materials and methods

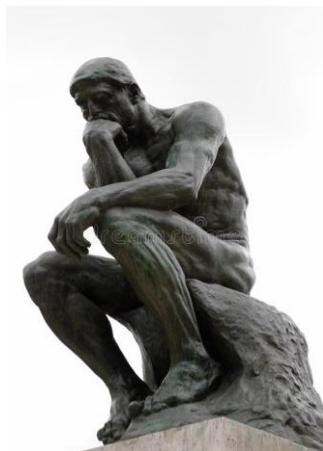**The Camargo's index of evenness (CI)**

A more uniform use ⟷ **less pressure on specific resources; more balanced impact on the environment.**

CI quantifies the uniformity of space use in grazing contexts

Hamidi et al. 2021; Pauler et al. 2022

Values = zero

a patchy distribution

Values = one

a homogenous distribution

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The hypothesis of the study:

The thinker
Rodin

Can sheep change their grazing behaviour in response to different access times to pasture?

Can GPS technology help us to identify different grazing behaviors?

How long does it take for the sheep to adapt to this different grazing routine?
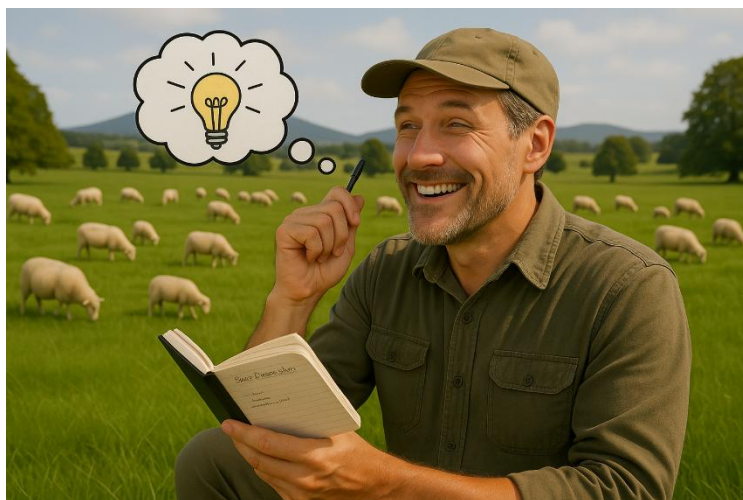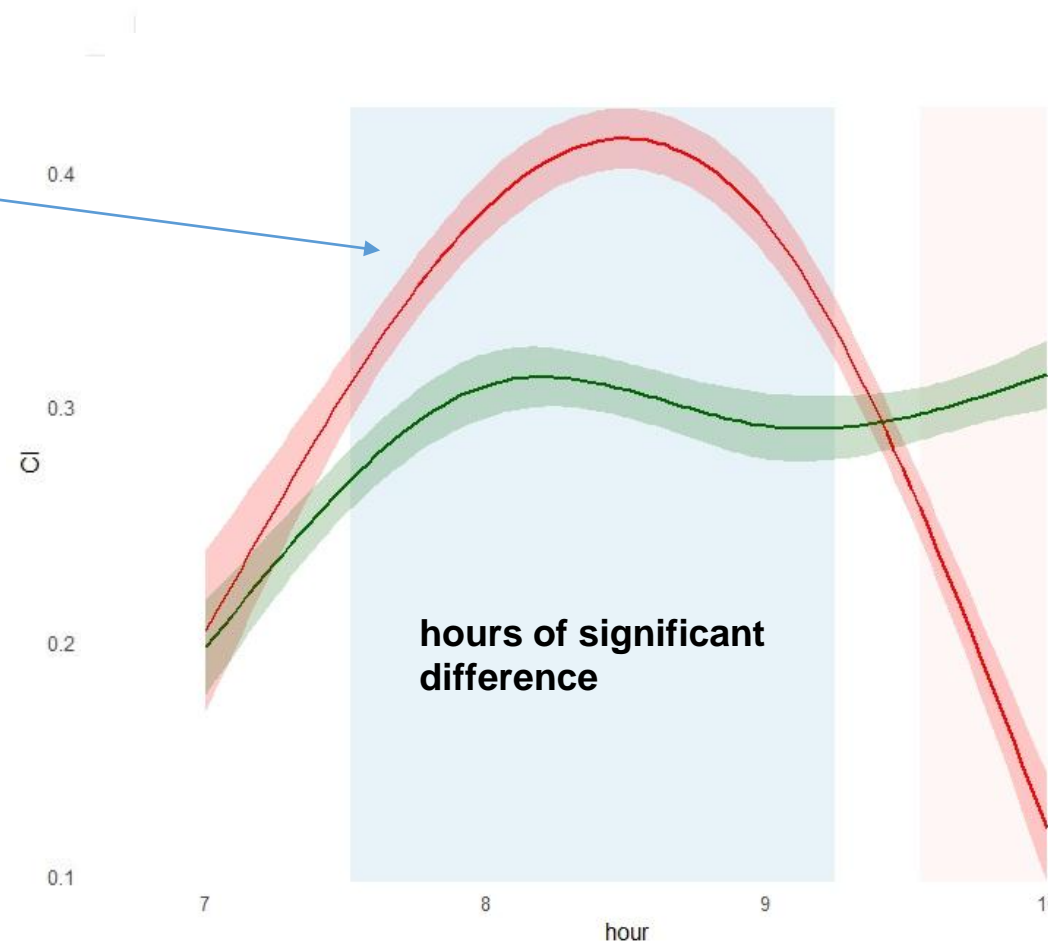
Results

different grazing durations
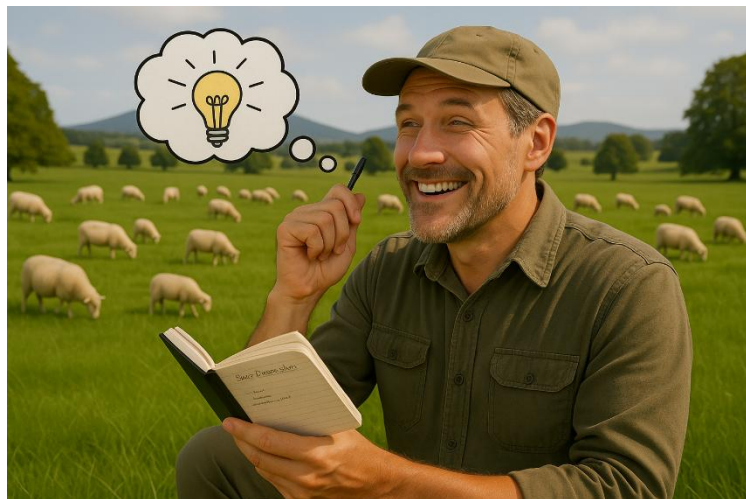
⇩

changes in behaviour

Group AT-3hrs > Group AT-6hrs

……almost as if they know they won't have much time to explore it

the **Group AT-3hrs** spread out more clearly and faster after entering the pasture

hours of significant difference

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Results

the **Group AT-6hrs** showed greater consistency in the CI value

as if they are aware that they will have more time available to explore the entire pasture.
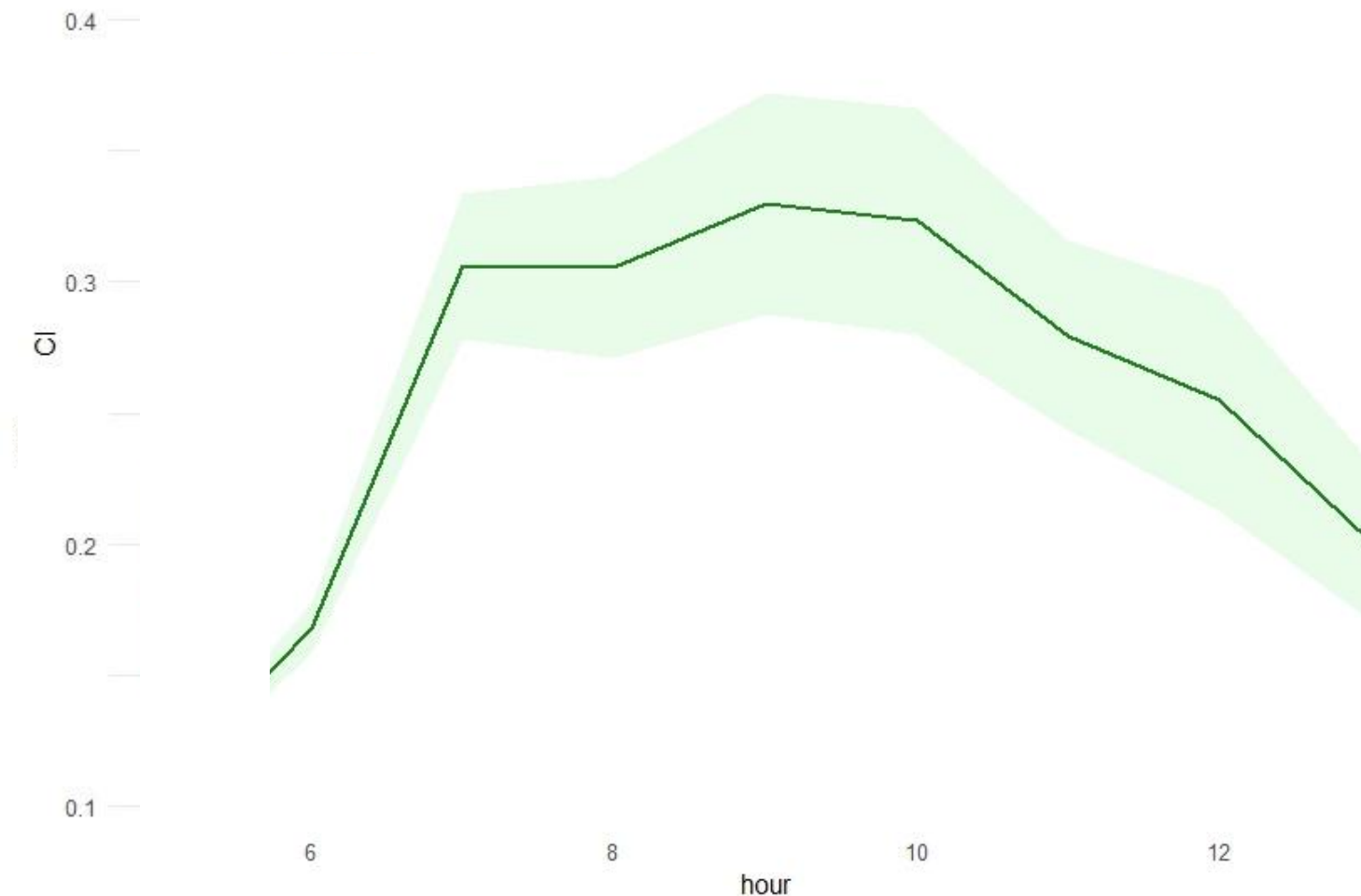
Results
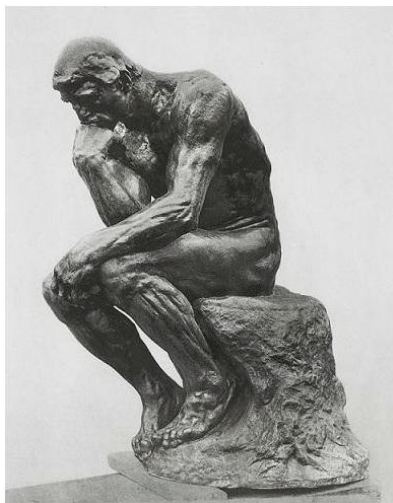
First day with 3 hours of pasture access time.

Predicted Camargo index by treatment and hour (per day)

Group AT-3hrs > Group AT-6hrs
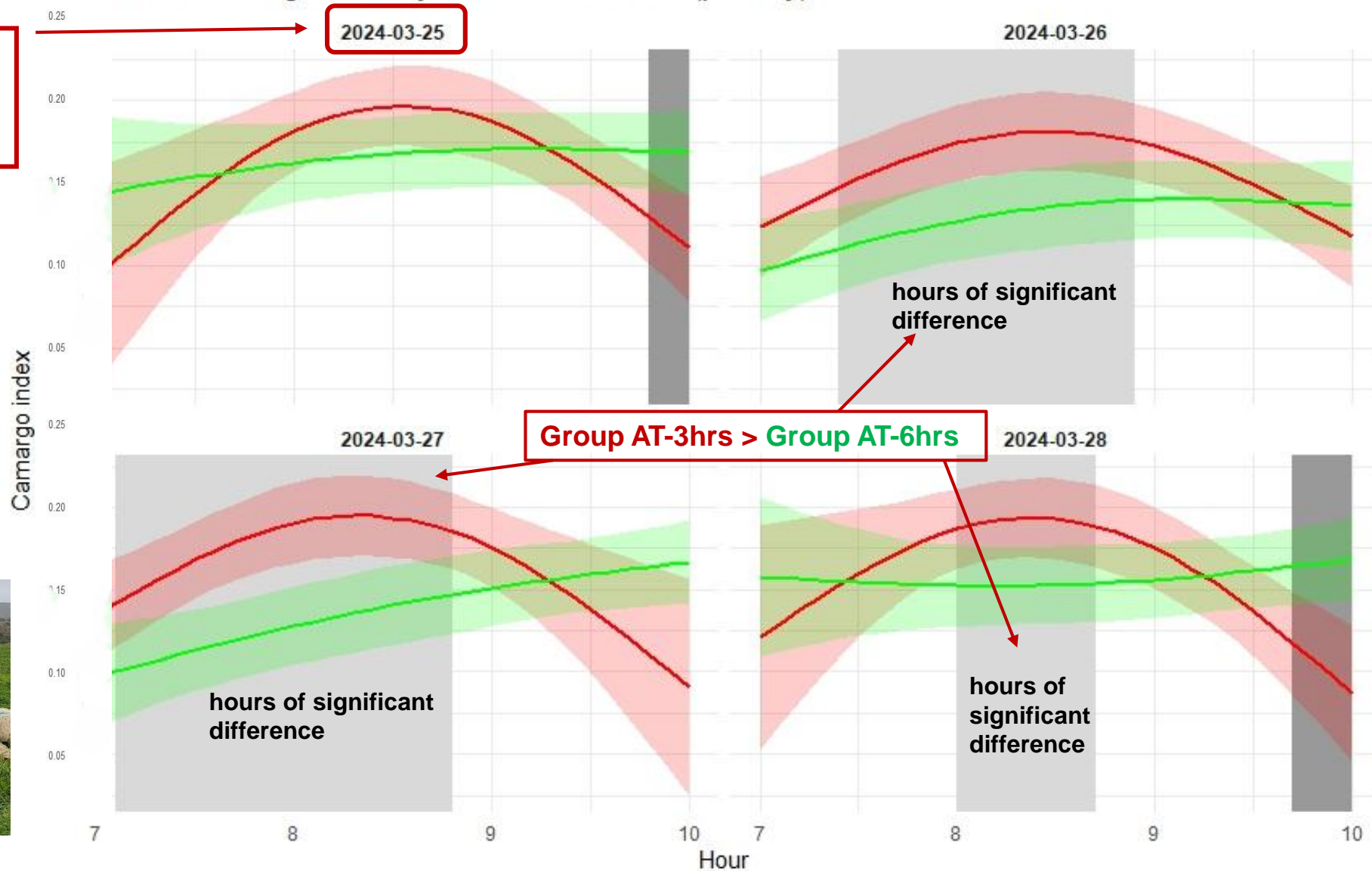
Conclusions

Sheep change their grazing behaviour in response to different access times at pasture ✓

GPS technology help us to identify different grazing behaviors ✓

how long does it take for the sheep to adapt to this different grazing routine?

The sheep adapted after just one day !

Pratical application

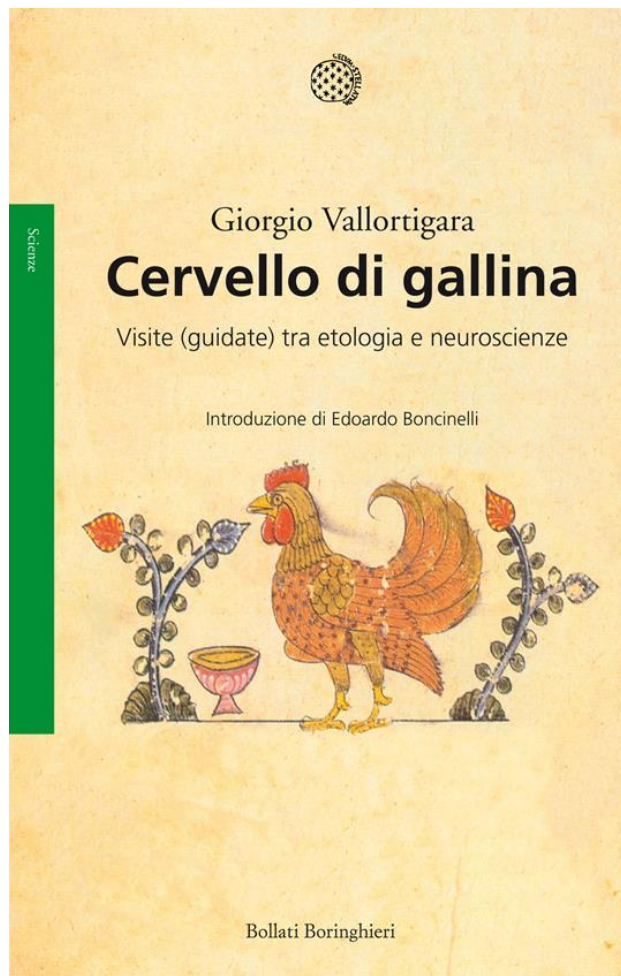finding a trade off between: more uniform use of pasture ⟷ herbage intake

Conclusions

…after debunking the myth of the "dumb" hens…

…we realize that the sheep is clever…

(perhaps better to say **resilient**..)

Sheep showed to be able to quickly adapt to changes in grazing management

Thanks for your attention…