Impacts of heat peaks in France on the performances of dairy goats housed in an insulated roof shed

K. Boissard[1], A. Fatet[1], M. Lambert[2], P. Sales[3], H. Caillat[1]

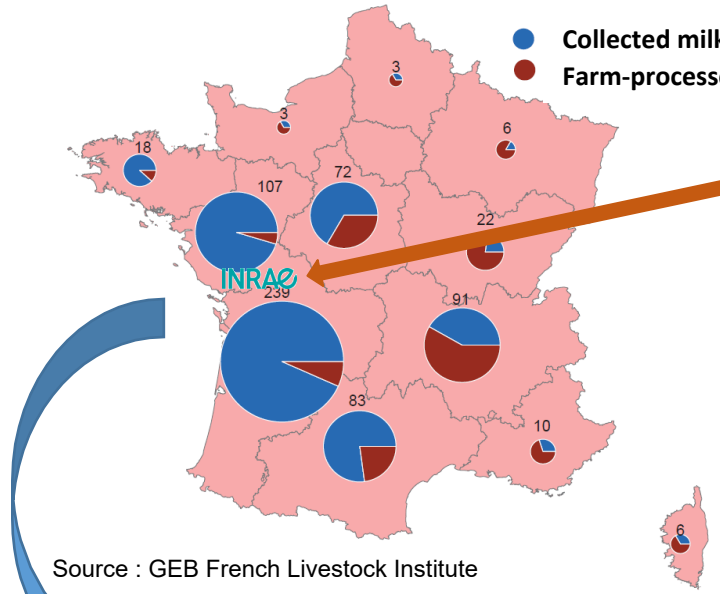
[1]Experimental unit Forage, Ruminants, Environment of Lusignan - INRAE
[2]French livestock institute (Idele)
[3]Departemental Chamber of Agriculture of Aveyron

AVEC LA CONTRIBUTION FINANCIÈRE DU COMPTE D'AFFECTATION SPÉCIALE DÉVELOPPEMENT AGRICOLE ET RURAL

FRANCE: the country of goat's milk in EU

1st EU producer: 660 millions liters collected

4th flock: 1.3 million of dairy goats



Source : GEB French Livestock Institute

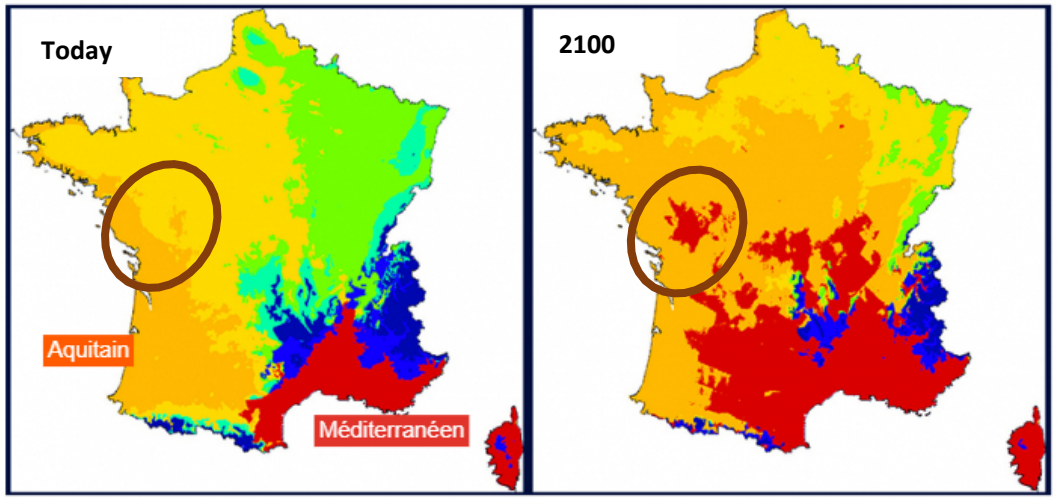
Carte réalisée avec Cartes & Données - © Articque

INRAE Lusignan research center is based in the main region of goat milk industry

52% of national delivered milk collection

48% of French goat flock

Potential Mediterranean climate for 2100!



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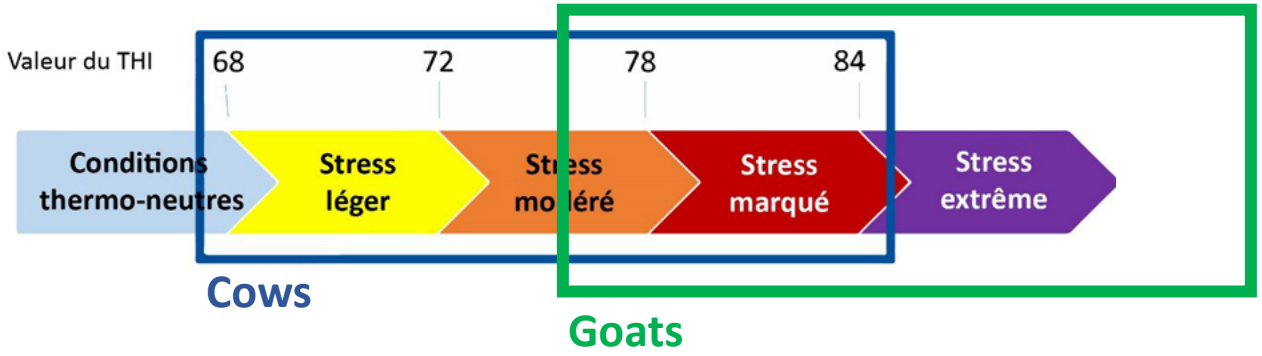
Impacts of heat stress for ruminants

- When environmental temperatures exceeds thermo-neutral zone, dairy ruminants experience heat stress (Burgos *et al*., 2011 ; Sejian *et al*., 2021) and the response could depend on the age, the breed or level of production (Erhard & Giger-Reverdin, 2020).

- Thermal comfort for animals *and farmers* is a key factor in ensuring the sustainability of systems taking into account animal welfare.

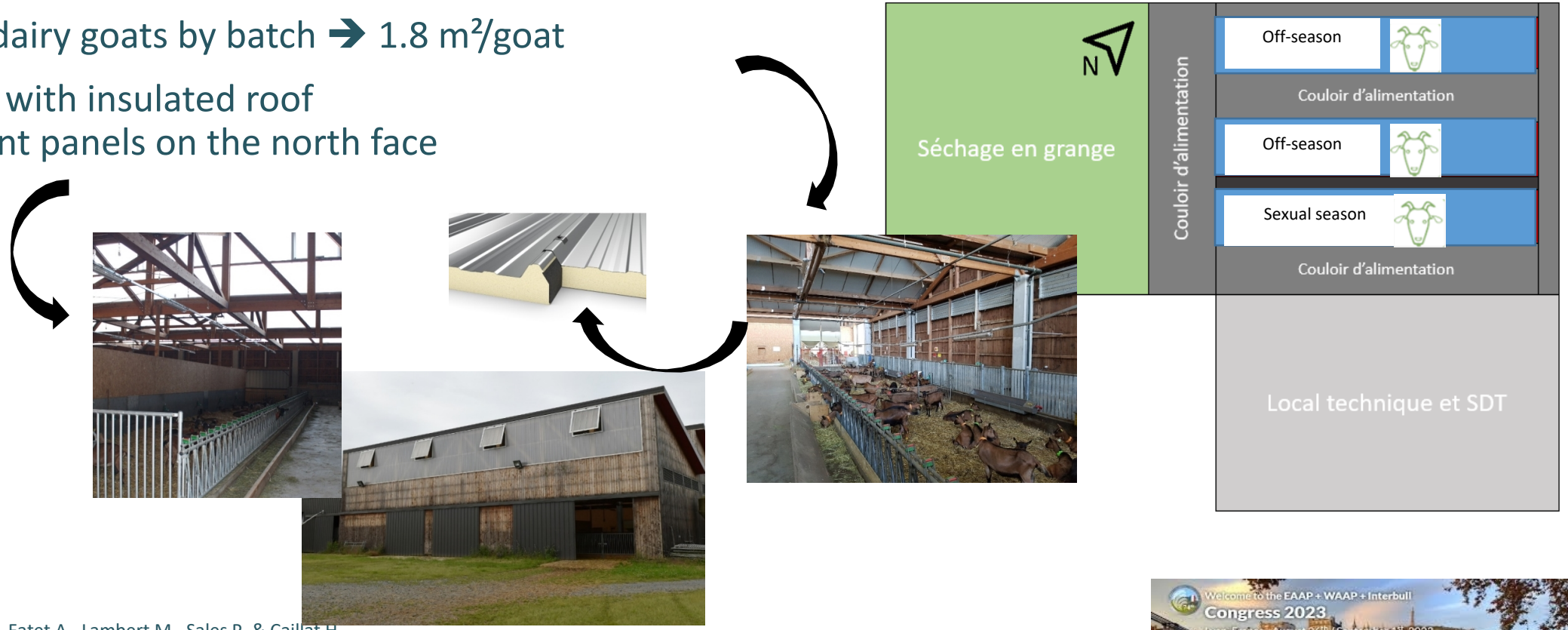
- Under a stressed environment, temperature humidity index (THI) was established as a vital measurement to identify the thermal stress in livestock.

- Goats are much more adapted and resilient than cows to the effect of heat stress (Silanikove *et al*., 2023) Modest effect from for THI > 74 for cows vs THI > 80 for goats.



Facility & solution to limit temperature variations

- Experimental device Patuchev of INRAE Lusignan
- 3 batches of Alpine goats : 1 group with grazing and breeding during sexual season
  1 group with grazing and breeding during the off-season
  1 group housed inside year-round and breeding in the off-season.
- About 60 dairy goats by batch ➔ 1.8 m²/goat
- Goat shed with insulated roof
and translucent panels on the north face



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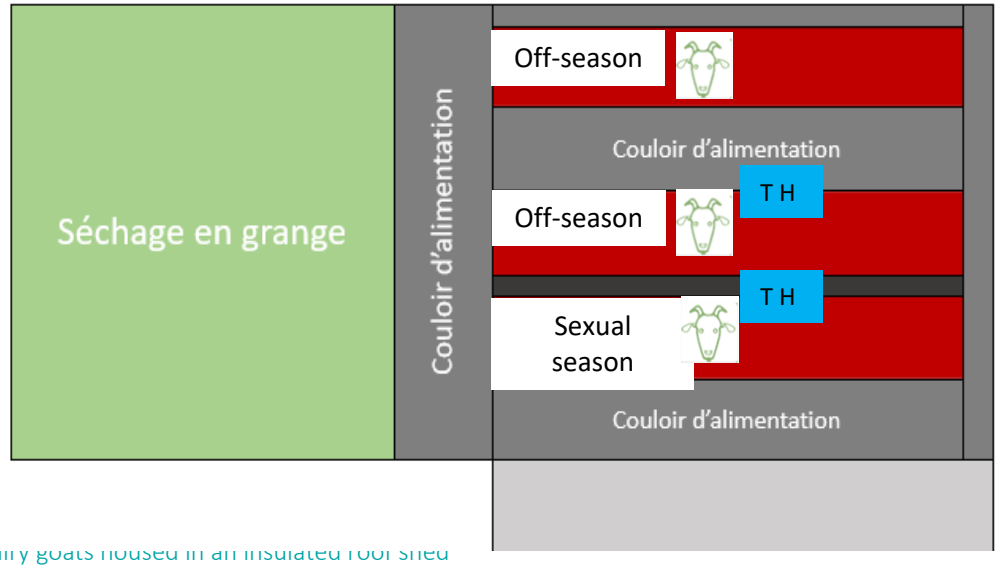
Measurements during summer 2022 – 1st June ➔ 30th September

- Daily feed intake : distributed and refusal
- Daily milk production per group *(and quality 3 times per month)*
- Daily water consumption per group

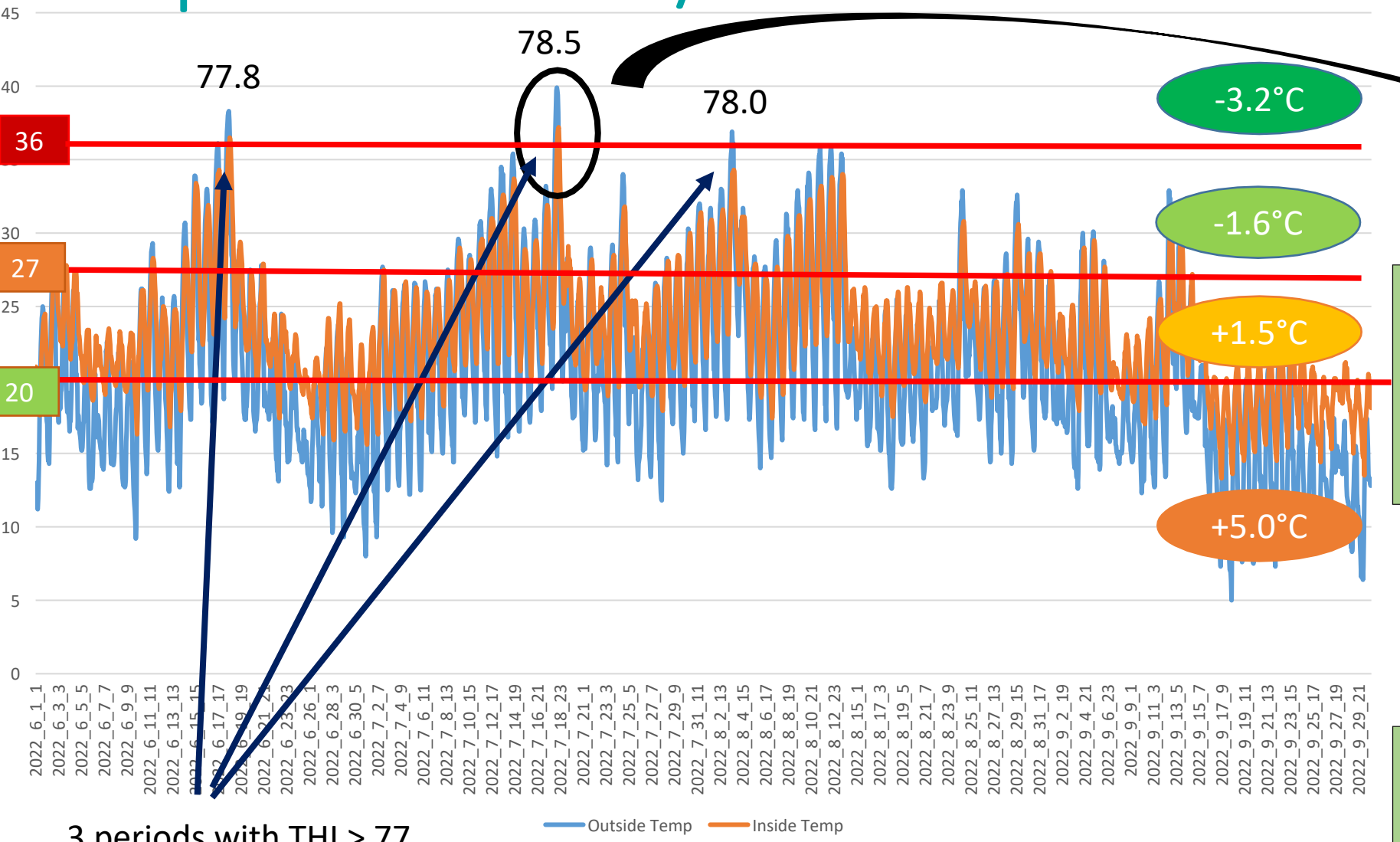
- Sensors were used to record hourly temperatures and humidity in 2 places in the building, then calculate the temperature hygrometry index (THI) (Ravagnolo *et al*., 2000) :

  ➔ Daily mean THI Inside

- Outside data were collected by a 300m-distant station



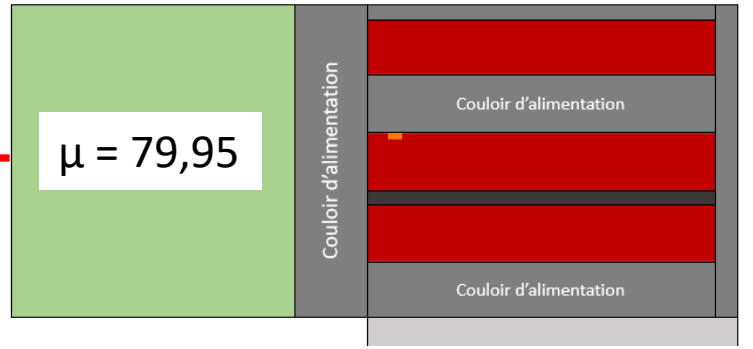
Temperature Outside/Inside



3 periods with THI > 77

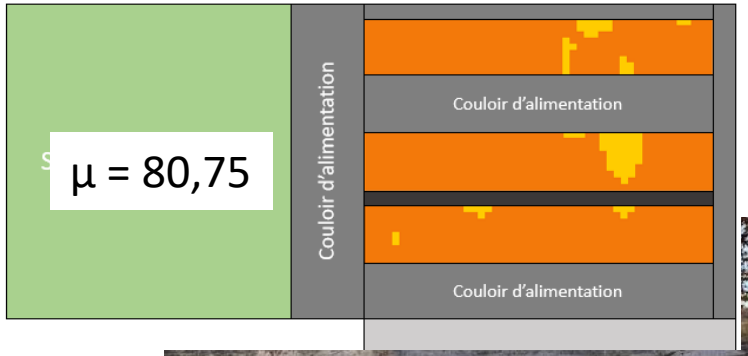
THI		
Pas de stress	<= 68	
Stress léger	68-72	
Stress moyen	72-78	
Stress important	78-84	
Stress extrême	>84	

THI



HLI		
Pas de stress	<= 70	
Stress léger	70-77	
Stress moyen	77-86	
Stress important	86-96	
Stress extrême	>96	

HLI



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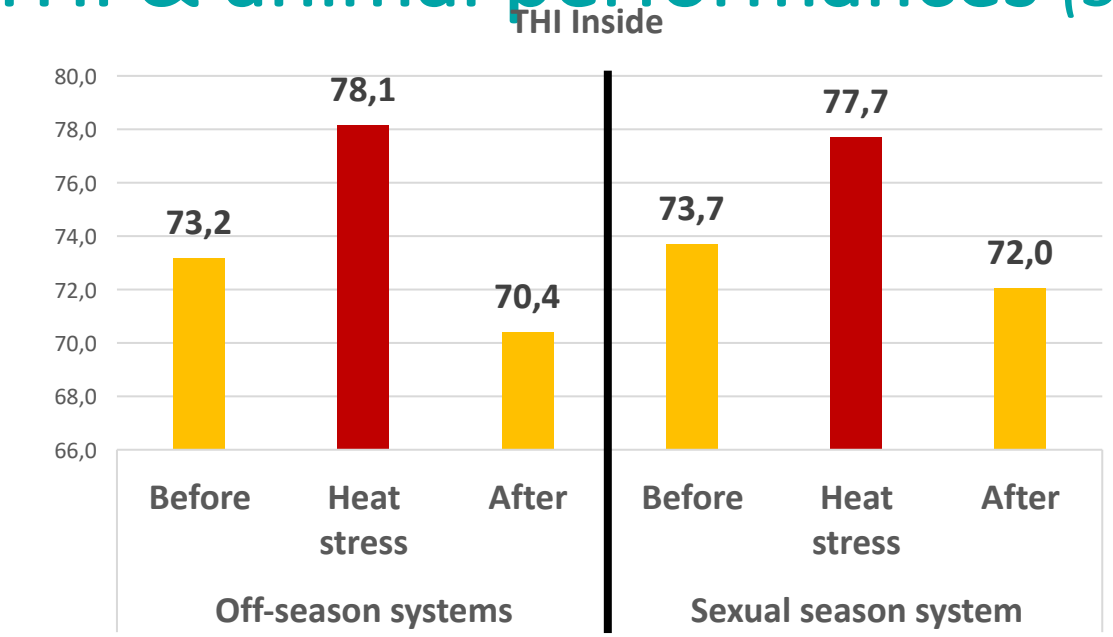
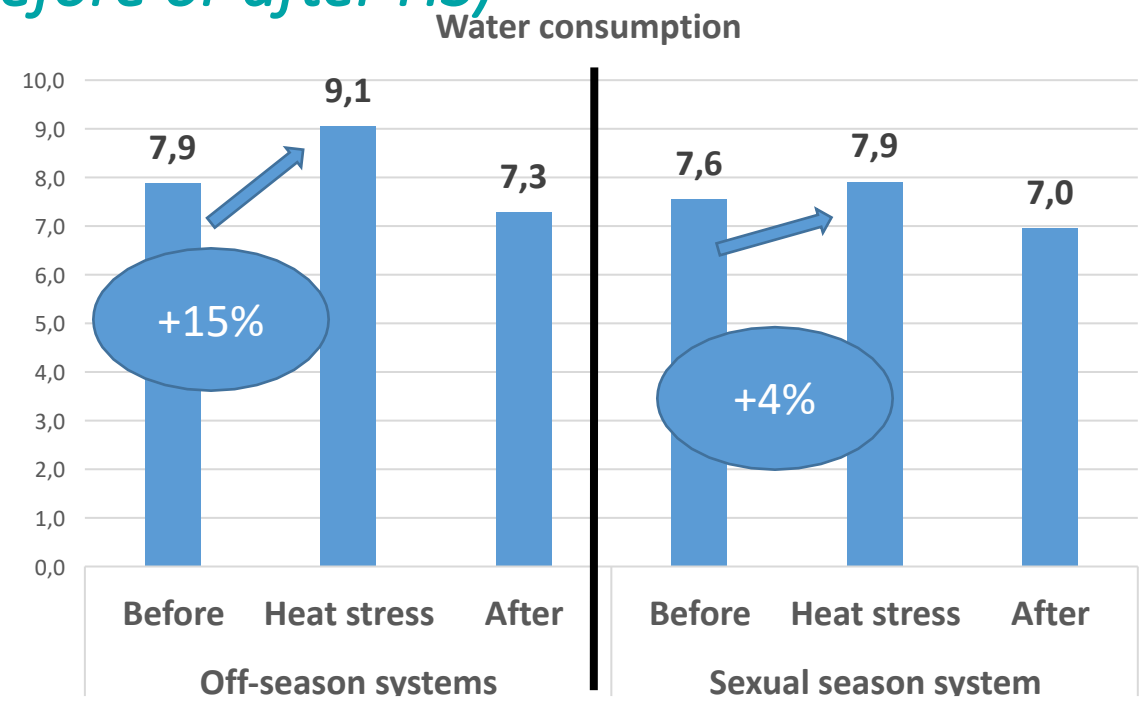
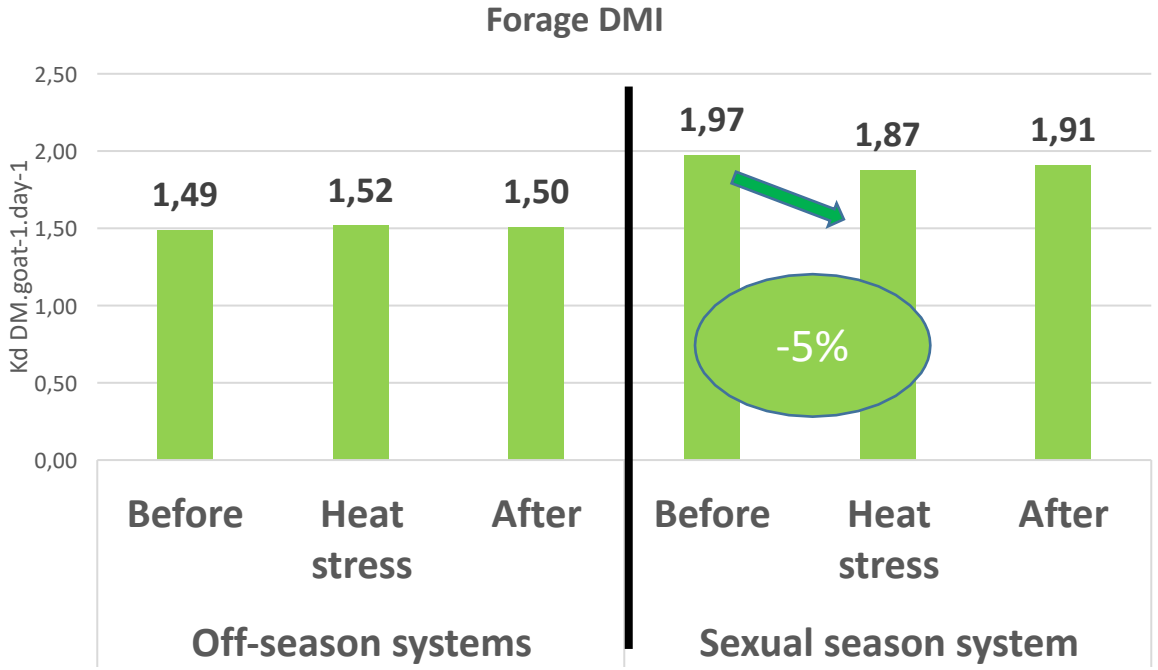
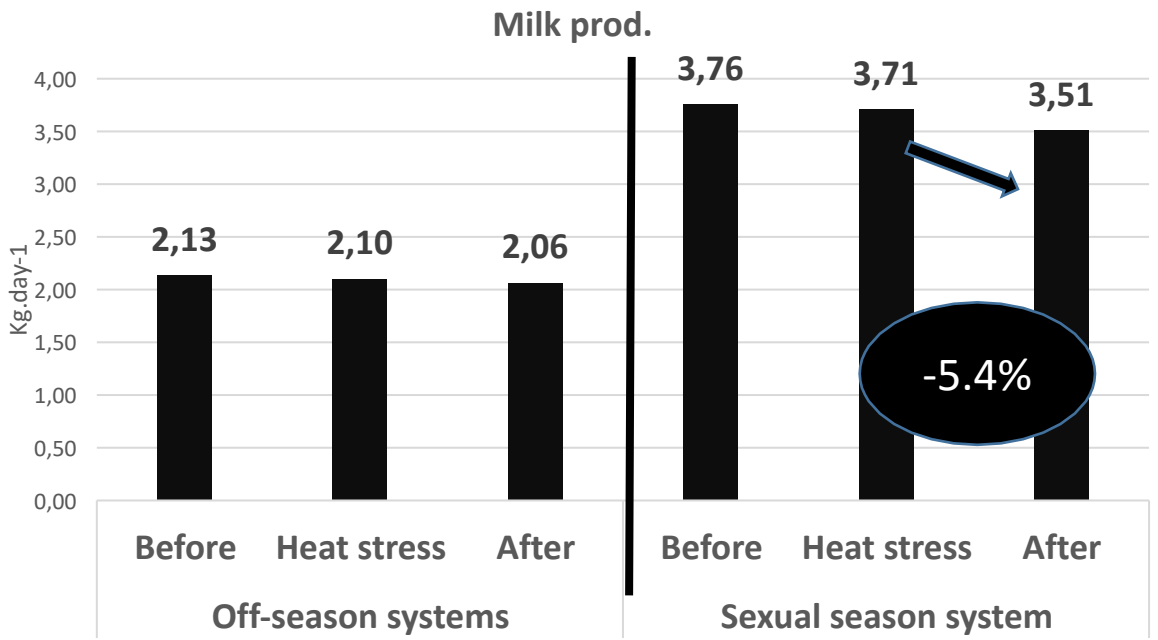
THI & animal performances *(3 days before or after HS)*









Conclusion

- First results and only 3 short heat stress periods in 2022….
- When THI > 77, we found a slight decrease of dry matter intake and milk yield for the goats with a kidding period in February, but no impact for the other groups, except on the water consumption.
- According to Silanikove *et al*., 2023, there is no impact when THI is below 80. Even if the observed impact is small, we might wonder :
  - *What is the impact of an insulated roof maintaining high temperatures during the night on performances of goats?*

- A ventilation system (with cooling or not) could be an interesting option to combine with this type of roof to evacuate heat. This solution will be tested next year.

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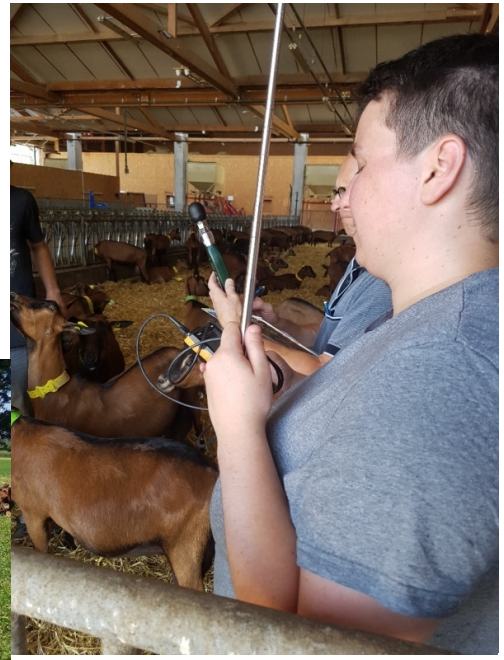
- Thanks to the experimental staff
  C. Bealu for the complementary measures
  the French ministry of Agriculture for financial support



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