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HEAT STRESS RESPONSE IN SHEEP POPULATIONS UNDER DIFFERENT CLIMATIC AND PRODUCTIVE SCHEMES

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iSAGE

AGRAMA

ASSAF.ESPAÑA www.assafe.es

CONFELAC Confederación de Asociaciones de Criadores de Ovinos de Raza Lacha y Carranzana

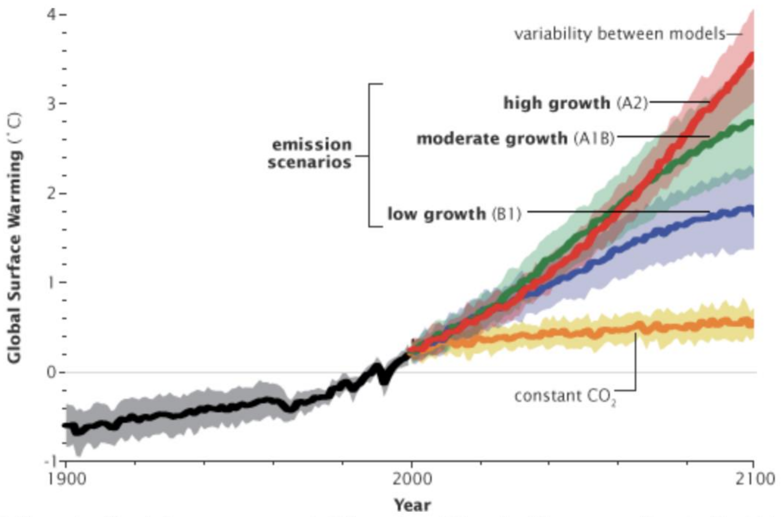
neiker tecnalia

INIA Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria

IRIAF Instituto Regional de Investigación y Desarrollo Agroalimentario y Forestal Castilla-La Mancha

Session 32. New sheep & Goats projects
Room: Guislain 1
Tuesday, 27th August, 14:00-18:00

The CC future perspective in Europe



Model simulations by the Intergovernmental Panel on Climate Change estimate that Earth will warm between two and six degrees Celsius over the next century, depending on how fast carbon dioxide emissions grow. Scenarios that assume that people will burn more and more fossil fuel provide the estimates in the top end of the temperature range, while scenarios that assume that greenhouse gas emissions will grow slowly give lower temperature predictions. The orange line provides an estimate of global temperatures if greenhouse gases stayed at year 2000 levels. (©2007 IPCC WG1 AR-4.)

The **IMPACTS of CC** on Livestock:

⚠ Decrease in quantity and quality of production
⚠ Impaired Reproductive performance
⚠ Increased susceptibility to diseases, new diseases

⚠ Reported Economic losses of 0.5–5% of the total production (St. Pierre et al. 2003; Hammami et al. 2013; Ramon et al. 2016)
⚠ Most of them associated to extreme climate events

⚠ Reduction of economic margins
⚠ Sustainability of production systems compromised

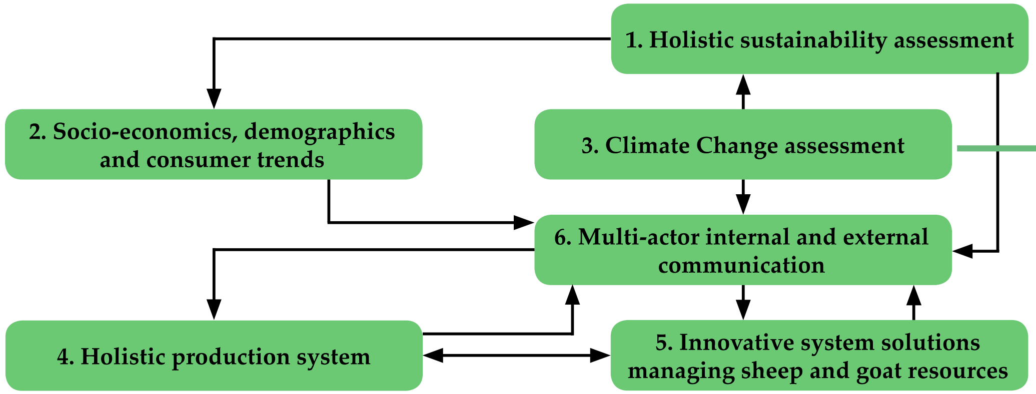
iSAGE Project (www.isage.eu)

iSAGE

Innovation for Sustainable Sheep and Goat Production in Europe

iSAGE will improve the overall sustainability and innovative capacity of the sheep and goat sectors in Europe

iSAGE approach



CC assessment involves:

- Assessment of the effects of CC on sheep & goat production systems
- Study of the mechanisms that drive the animal response
- Provide breeding recommendations to deal with future CC scenarios

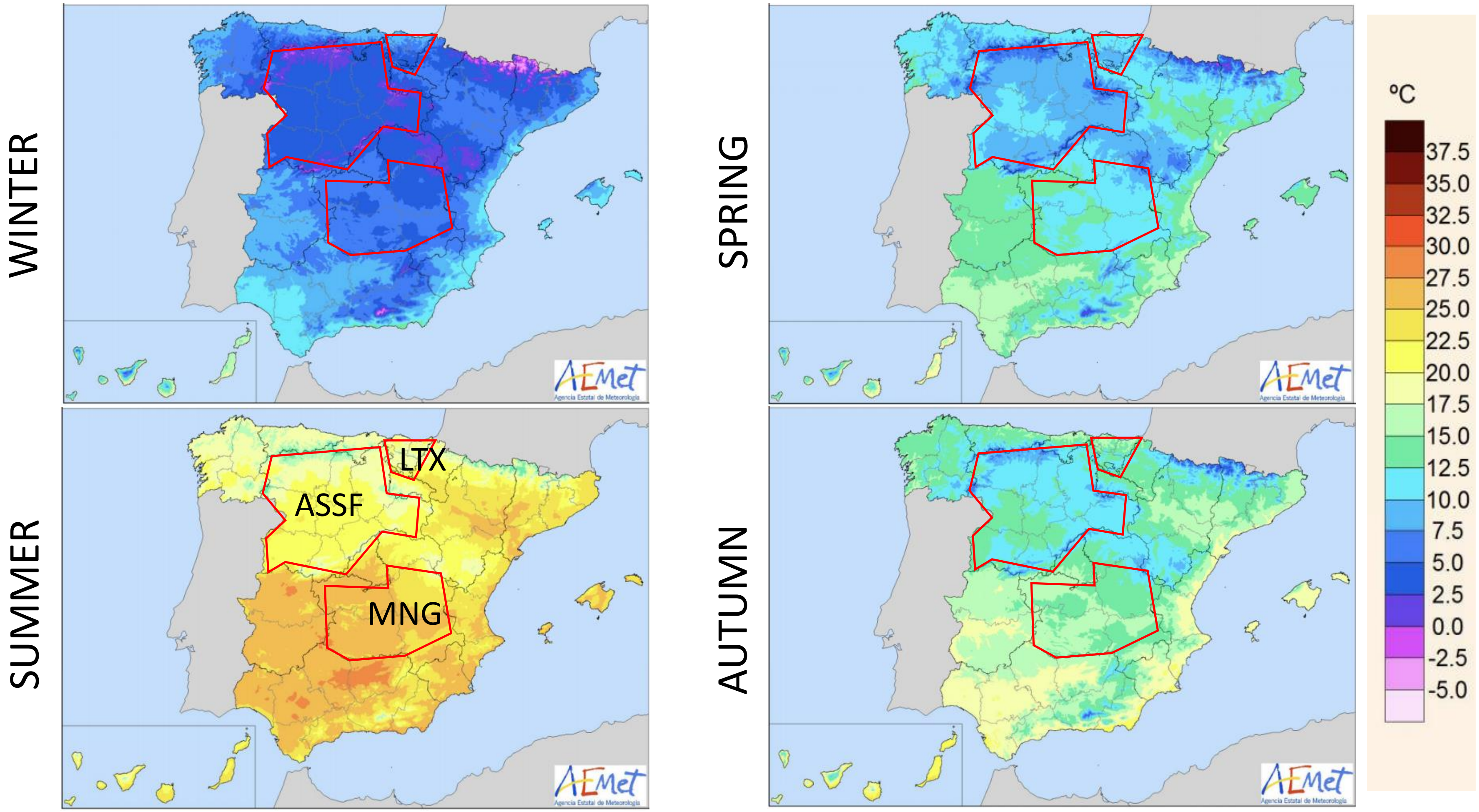
Data

ASSAF	LATXA	MANCHEGA
		

	ASSAF Annual Trend	ASSAF Avg.	LATXA Annual Trend	LATXA Avg.	MANCHEGA Annual Trend	MANCHEGA Avg.
No. Ewes		263937		18958		277904
Milk yield (Kg/d)		2.16		1.39		1.4
Fat yield (g/d)		127.1		66.80		90.83
Protein yield (g/d)		107.1		62.87		73.20
Fertility (%)		34.0				41,54
Temperature (℃)		13.6		11.0		14.73
THI		13.7		10.9		13.98
Production system	Intensive; 4-6 reproductive groups per year; indoor feeding		Semi-extensive; single reproductive season; grazing & indoor feeding		Semi-Intensive; 4-6 reproductive groups per year; grazing, but mainly indoor feeding	

Climate in Spain

Figure 1. *<u>Thermal maps of average temperature trend along the year (four seasons) in Spain</u>. Data are average daily temperatures for the years 2006 to 2015.*



Model

For **milk traits**:

Population response curve

Individual response curve, no pedigree

$$y = HY + PA + DIM + LAMBS + \sum_{r=1}^{3} b_r Z_r(T_j) + \sum_{r=1}^{3} c_{ir} Z_r(T_j) + e_{jklmni}$$

For **fertility**:

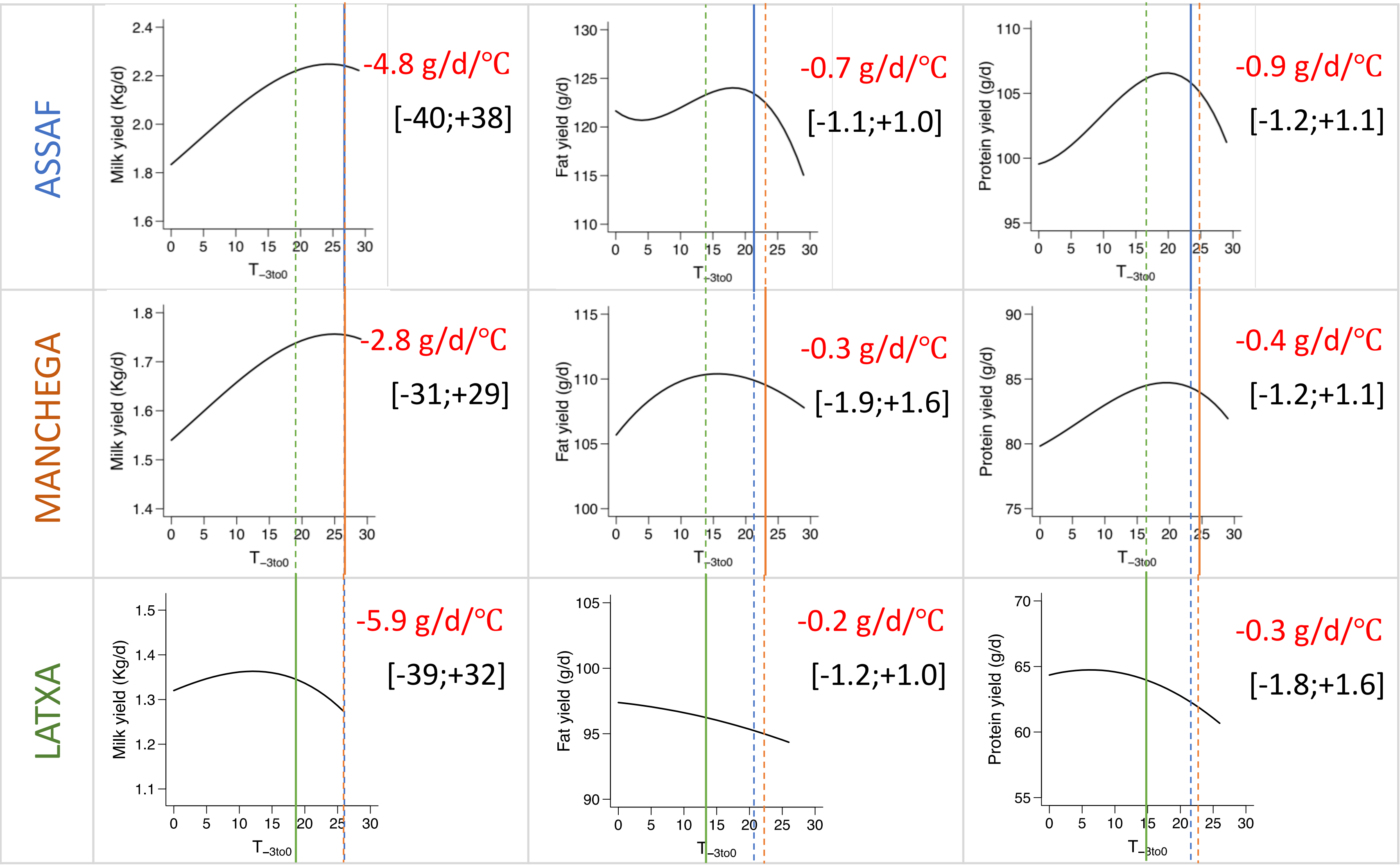
$$y = HY + AGE_{ewe} + AGE_{ram} + MILK + LAMB\_SEASON + \sum_{r=1}^{3} b_r Z_r(T_j) + \sum_{r=1}^{3} c_{ir} Z_r(T_j) + e_{jklmni}$$

Climate variable T_j was the daily average temperature or THI on the day of control or AI (also 35 days before AI – spermatogenesis), or and average of the 3 previous days . The THI was defined as (Finocchiaro et al. 2005):

$$THI = T - \left[0.55 \times \left((1 - RH)/100\right)\right] \times (T - 14.4)$$

Results. Production response curves

Figure 2. *<u>Thermal load average response curves for milk traits in dairy sheep</u>. Heat thresholds are represented by lines. Values in red are avg. slopes under heat stress (above thresholds). Values within [brackets] are ranges of individual variation under heat stress.*



Results. Fertility response curves

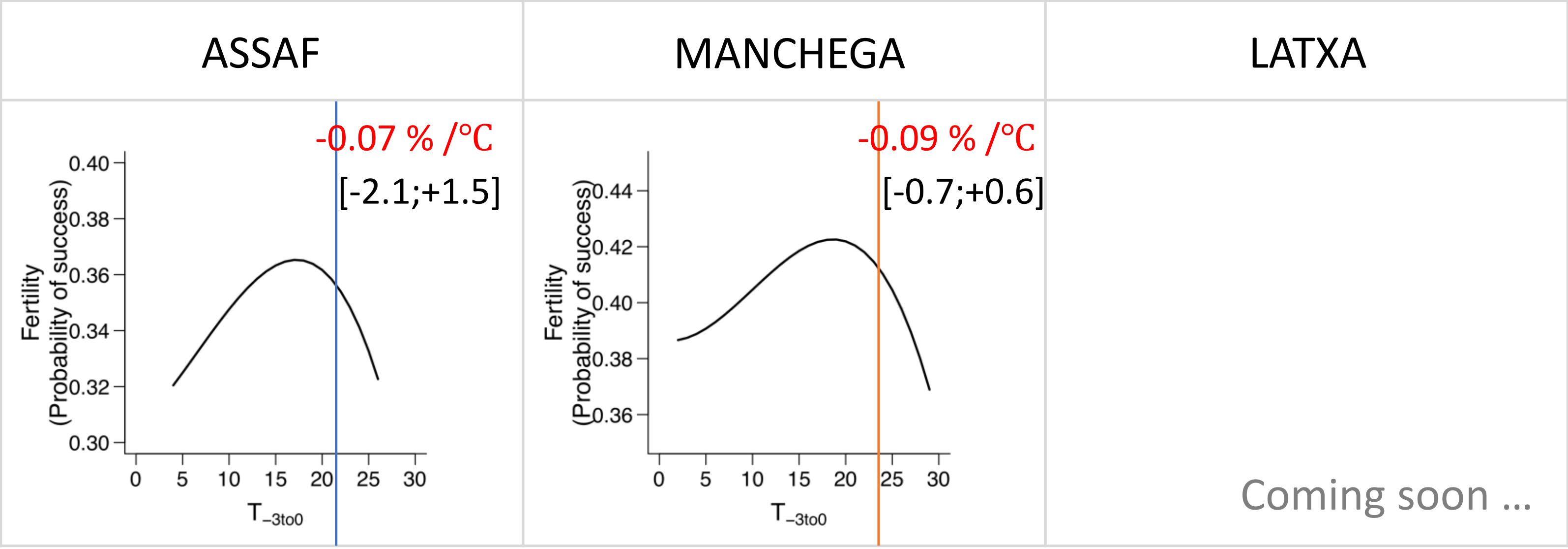


***Figure 3**. <u>Thermal load average response curves for conception rate in dairy sheep</u>. Values in red are avg. slopes under heat stress (above thresholds). Values within [brackets] are ranges of individual variation under heat stress.*

Conclusions. How different breeds perform?

1. More losses due to heat stress (HS) in Assaf, showing a slightly lower HS thresholds and greater slopes of decay above them than Manchega
2. Losses due to HS also important in Latxa for milk yield – breed under extensive system and adapted to cold environments.
3. Individual variation in the response to heat stress. There is room for selecting tolerance animals
4. Important decay of fertility due to HS

Acknowledgements

- iSAGE project (H2020)
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- Breeder Associations AGRAMA, ASSAF.E and CONFELAC

Thank you for your attention

Questions are welcome 🕵️‍♂️