iSAGE Training Course and Workshop

INNOVATIONS TO IMPROVE SUSTAINABILITY
IN THE SHEEP AND GOAT SECTOR
(Zaragoza, Spain, from 10 to 13 December 2019)

Genetic approaches to improve sustainability and adapting to climate change

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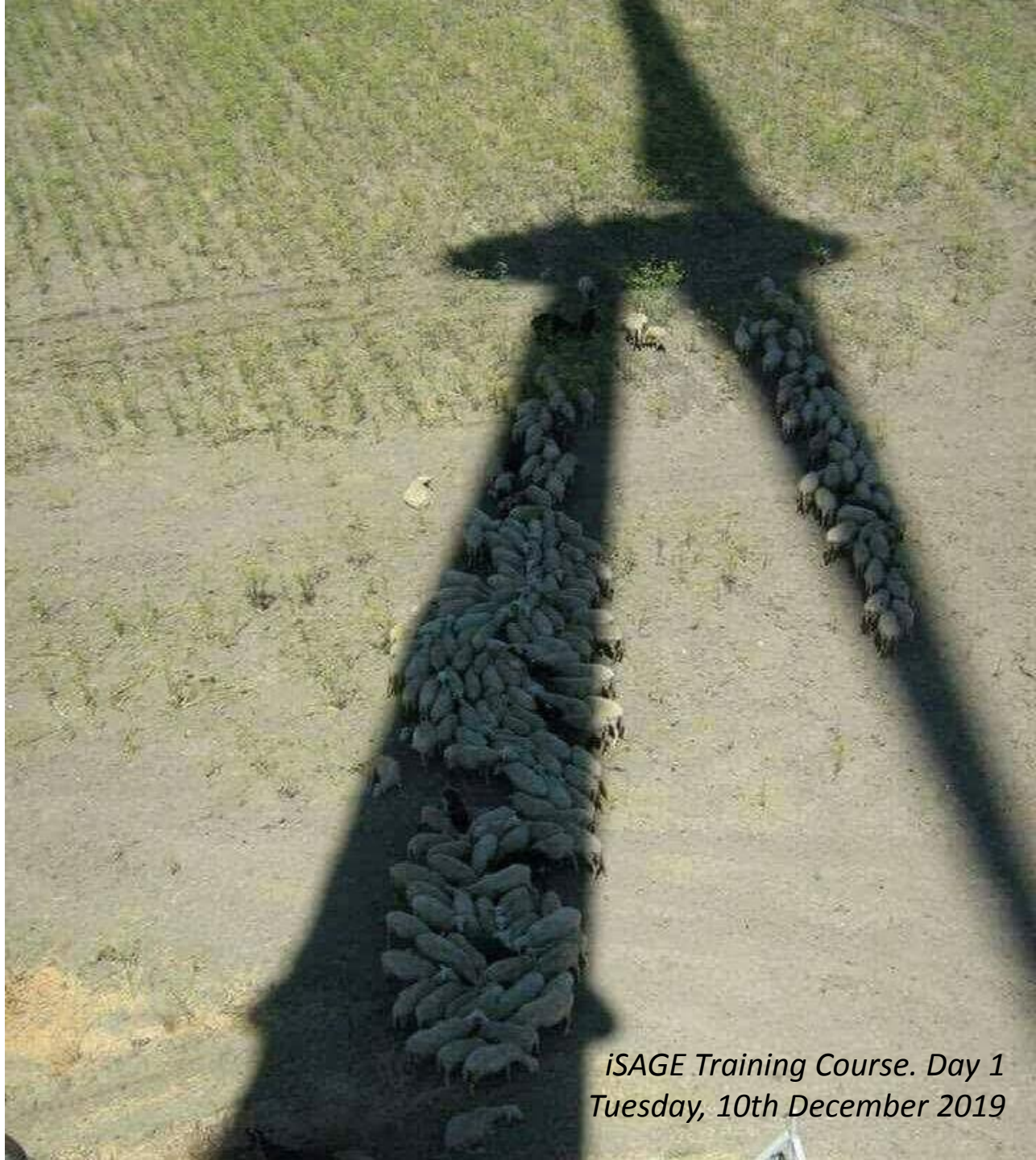
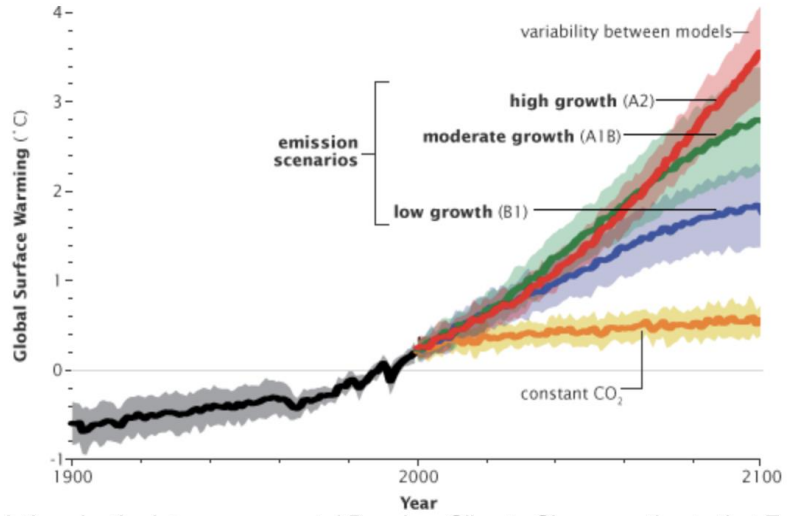


iSAGE Training Course. Day 1
Tuesday, 10th December 2019

Acknowledgements

…and all the people involved in WP5

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

How to deal with CC challenge in livestock?

TRAINING THE SECTOR

- ✏ Ask about their problems and desire goals
- ✏ Explain the consequences of CC, and …
- ✏ … the tools available to deal with them
- ✏ Allow them to make optimal decisions

MITIGATION STRATEGIES

- ❄ Farm facilities design
- ❄ Change in management practices
- ❄ Efficient but usually expensive and labour-consuming

BREEDING & GENETICS

- Genetic basis of thermotolerance
- Correlations with other traits of interest
- Progress is slow but changes are permanent

Genetic approaches to improve sustainability and adapting to climate change

1. We know there is *productive losses associated with adverse climatic conditions*

   Sabemos que existen pérdidas productivas bajo condiciones climáticas adversas

2. We know that animals/individuals perform different under heat stress

   Sabemos que existen diferencias productivas individuales bajo estrés por calor

3. We have found production data useful for characterization of animal thermotolerance: heat stress threshold and slope of decay as proposed traits

   Los datos productivos son útiles para evaluar la termotolerancia de un animal. Umbral de termotolerancia y la pendiente de caída productiva como criterios

Genetic approaches to improve sustainability and adapting to climate change

4. There is enough genetic variance to consider selection to improve thermotolerance as breeding goal…

   Existe suficiente variancia genética para considerar la selección hacia una mayor termotolerancia como objetivo de selección…

5. … but genetic correlations with productive traits are negative!

   … pero las correlaciones genética con los caracteres productivos son negativas!

6. A selection index including production traits, fertility (fitness) and thermotolerance has been shown as an appropriate breeding strategy, but more studies are needed before

   Hemos visto que un índice de selección que incluya caracteres productivos, fertilidad y termotolerancia puede ser una estrategia acertada, si bien es necesario realizar más estudios