GRA Engagement Workshop
Izmir
Turkey
November 18-19 2015

Actions for mitigation and adaptation to climate change of the livestock sector in the Mediterranean area

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Two preceeding meetings

- Mediterranean Engagement, Tunis, 4-5 May 2015
- Annual Meeting of LRG, Lodi (IT), 23-24 June 2015

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Mediterranean region

- Transition zone between the arid climate of North Africa and the temperate and rainy climate of CE.
- Affected by interaction between Mid-latitude and tropical processes

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Mediterranean region

- Includes 20 countries from the Alpine region to the North Africa countries, from the Iberian Peninsula to the Middle East countries
- Shows a wide range of climatic types, from the North Africa desert to the Alps
- Variety of agricultural and livestock systems (intensive, pastoral, livelihood, nomadism, continental, arid, irrigated)

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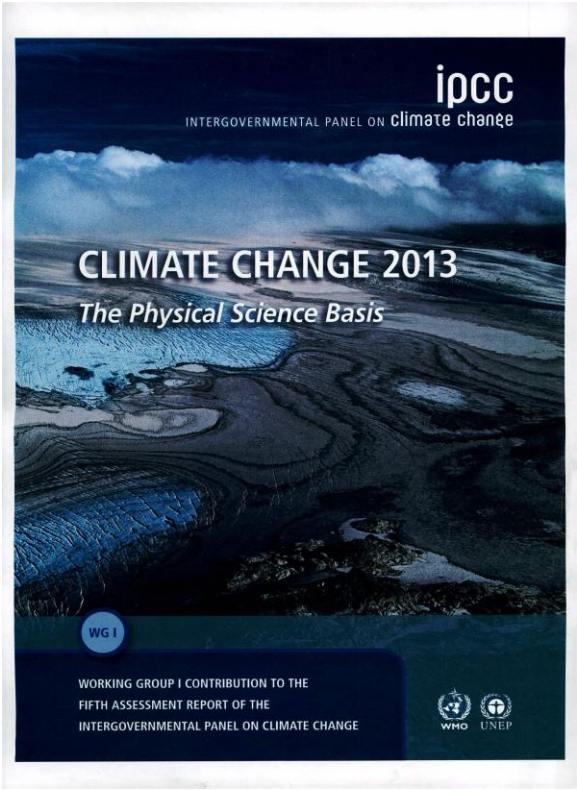
Observed changes in Mediterranean climates (IPCC, 2013)

- Increase of warm days
- Decrease of cold days
- Increase of worm nights
- Decrease of cold nights/frosts
- Increase of heat waves/warm spells
- Increase of extreme precipitations
- Increase of dryness/drought



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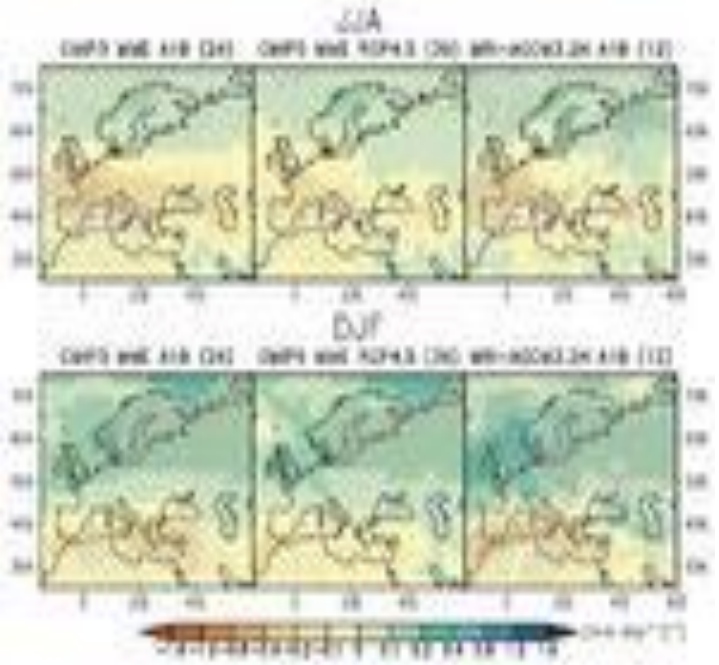
Perspectives for Europe and Mediterranean area (IPCC, 2013)



- Temperatures continue to increase
- Winter mean temperature will rise more in NEU than CEU or MED
- Summer warming will be more intense in MED and CEU than NEU
- The length/frequency/intensity of warm spells or heat waves will increase throughout the whole region
- Annual mean precipitation will increase in NEU and CEU, but summer mean precipitation will decrise in MED

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Effects of CC on feeds: quantity and quality

- Effects of increased CO_2 atmospheric concentration on forage growth
- Change of grass to legume ratio
- Drought and DM growth
- Rainfall and N leaching
- Increased lignification

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Effects of CC on livestock

- Feeds: quantity and quality
- Water: availability, competition and quality
- Animal health: metabolism and exotic diseases
- Production and reproduction
- Mycotoxins: food security and animal health/performances

Water: availability, competition and quality

- Reduced of ice/water stocks
- Increasing competition for blue water with other human activitis (industry/tourism/domstic uses)
- Reduced water quality due to pollution, N leaching
- Increased salinity due to excessive/incorrect irrigation

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Animal health: metabolism and exotic diseases

- Reduction of feed intake
- Negative energy balance, metabolic diseases
- Increased mortality
- Effects of heat stress on immune response
- Alterartion of biology and distribution of vector-borne infections (Blue tongue disease by *Orbivirus* transmitted by *Culicoides*)
- Effects of mycotoxin

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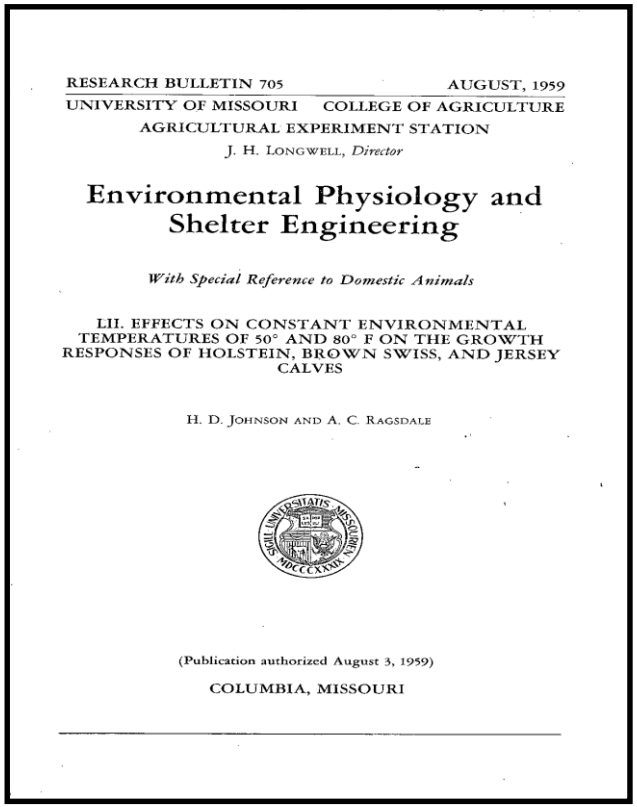
Climate change and production

- Reduction of milk yield
- Reduction of milk protein content
- Reduction of production of beef, pork and poultry meat and eggs
- Reduction of reproduction performances in both sexes



RESEARCH BULLETIN 705 AUGUST, 1959

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
J. H. LONGWELL, *Director*

Environmental Physiology and Shelter Engineering

With Special Reference to Domestic Animals

LII. EFFECTS ON CONSTANT ENVIRONMENTAL TEMPERATURES OF 50° AND 80° F ON THE GROWTH RESPONSES OF HOLSTEIN, BROWN SWISS, AND JERSEY CALVES

H. D. JOHNSON AND A. C. RAGSDALE

(Publication authorized August 3, 1959)
COLUMBIA, MISSOURI

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Climate change and mycotoxins

- High temperatures, drought stress, insect injuries foster develpment in maize of
  - **aflatoxins**: immunotoxicity and reduced weight gain
  - **fumonisin**: several effects on animal helath
  - **deoxynivalenol**: reduction of immune functions and weight gain

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Mitigation/adaptation strategies

- Use of varieties or cultivars less sensitive to drought
- Forage systems more efficient in water resource use
- Selection in favour of animals more tolerant to heat stress and less sensitive to mytoxins
- Facilities requiring less water for manure management and protecting animals from heat stress
- Smart use of pesticides, erbicides and ferilizers to preserve water quality
- Irrigation systems reducing water and energy consumtions (in water-cycle perspective)

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Some research themes (mitigationand adaptation)

- Breeding and feeding strategies for reducion GHG emisions and for improve feed efficnecy
- Vegetable selection for resistance to drought and mycotoxins contamination
- Feeding strategies to reduce mycotoxin contamination of animal products and effects on productivity and health
- Breeding strategies for animal tollerance to heat stress
- Assessment of water footprint of different animal products, with different irrigation systems and forage systems
- Behavioural and physiologival studies on animals kept in facilities concieved for minimizing heat stress
- Improvement of efficiency use of water and natural resource in different production systems

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Challenges of LRG Mediterranean action Water

- Livestock production requires considerable amounts of water for drinking and cleaning
- Water is esencial for growing feed crops or grazing
- Livestock farming affects water avalability and quality with manure or fertilizers and pesticides for feed production
- An interdisciplinary approach is needed for reducing water consumption and mitigate climate change on livestock sector

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Challenges of LRG Mediterranean action Mycotoxins

- High temperatures and prolonged drought periods are favourable to mycotoxin contamination which are a hazard for human and animals
- Efforts are required to have more tolerant crops, to develop strategies of defence from paratites, to improve methods of conservation and to develop feeding strategies to face up breakouts

Challenges of LRG Mediterranean action Good practices

- Improvement of efficiency is an indirect strategy for reducing GHG emissions (IPCC, 2013 WG III) and improving sustainability
- Good practices have to be applied and, in some circumstances, adampted to the particular environments and production systems of Mediterranean countries.

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Challenges of LRG Mediterranean action Scientific capability

- Interdisciplinary strategy
- The initiative intends to promote specific actions to improve scientific capability of young scientists, similarly to what has been done in Latin America and South East Africa
- To promote research actions in the framework and with the assistance of LRG (opportunitues of the new calls of HORIZON 2020)

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Next steps

- Launch of the **Scientific Network on Livestock Actions for Mitigation of and Adaptation to Climate Change**: right now
- Presentation of contributions of early participants at the LRG meeting in Melbourne next February
- The first meeting in spring-summar 2016

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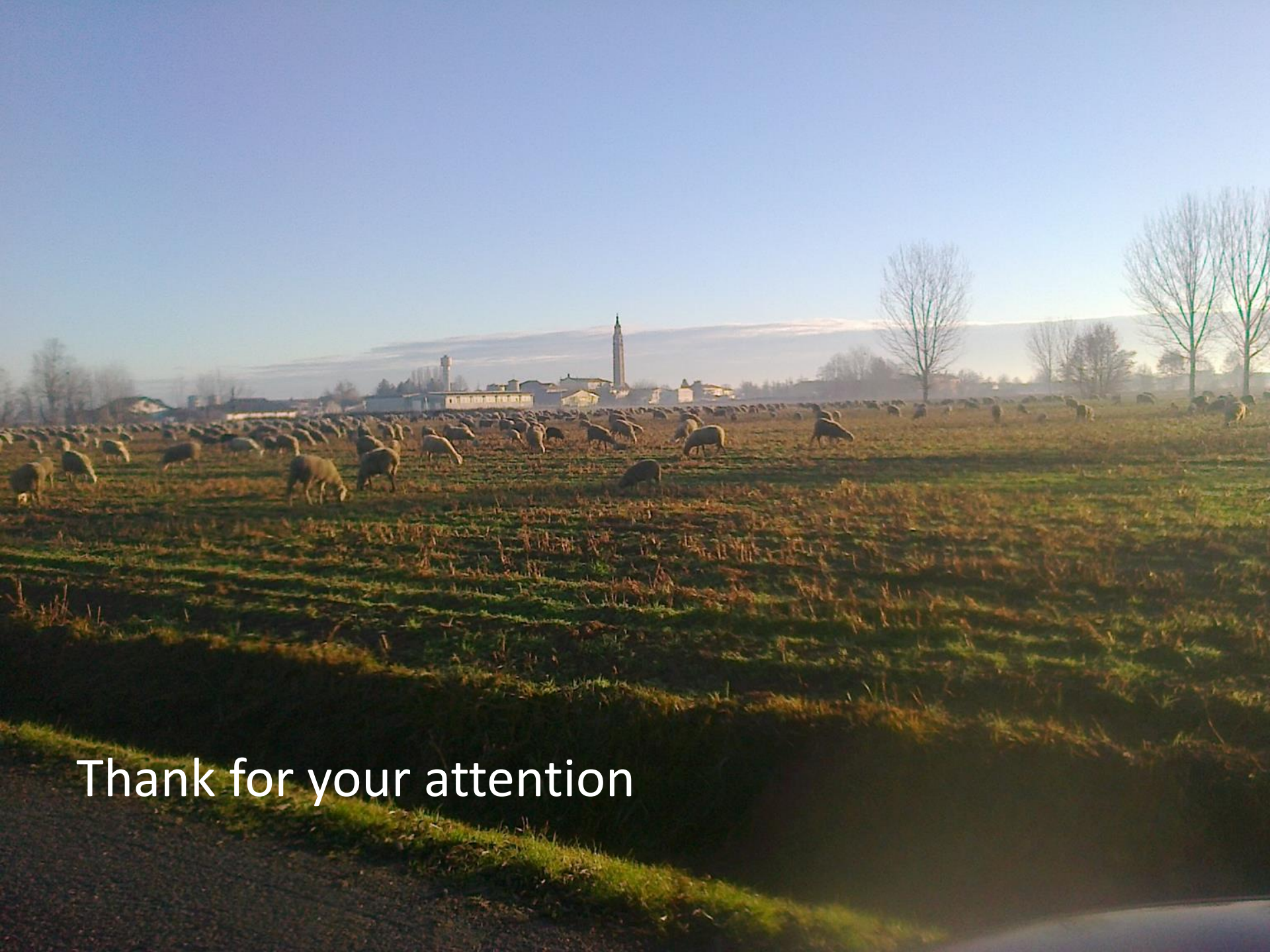
Thank for your attention