Giornata di studio
"Le attività dell'Università di Pisa sul tema degli effetti del cambiamento climatico"

The effects of climate change on livestock production systems: the cases of mycotoxins in animal feed and animal heat stress

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Climate change and livestock production systems

animal

Future consequences and challenges for dairy cow production systems arising from climate change in Central Europe – a review

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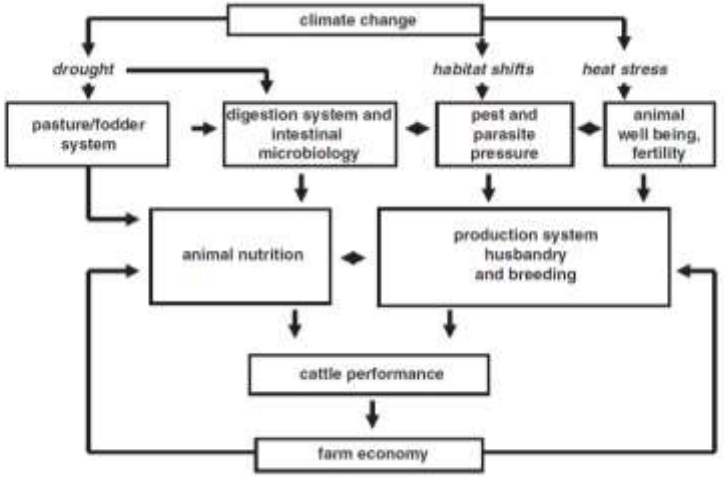


Figure 1 Scheme of effects from climate change on environmental factors and farm-related factors concerning the performance of cattle.

Main issues

a. **considerable spatial variation in the impacts of climate change on feed crop impacts;**

b. **the impact of climate variability will be of particular importance for feed crop productivity and quality;**

c. **adaptation of crop selection and management can counter some negative impacts of climate change, or even turn negative impacts into local opportunities where these are expected;**

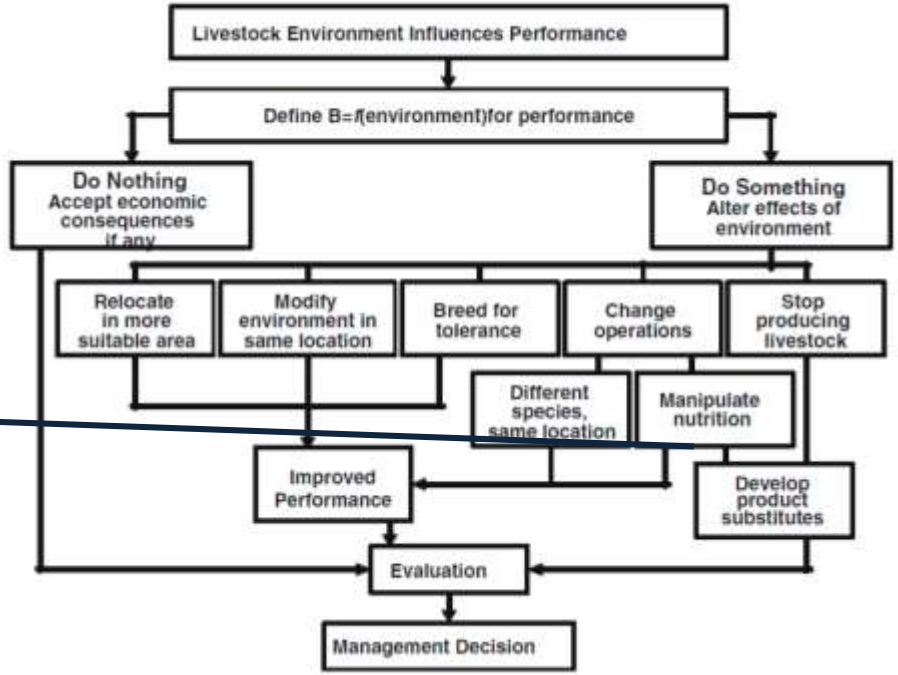
d. **considerable uncertainty about future climate change impact projections;**

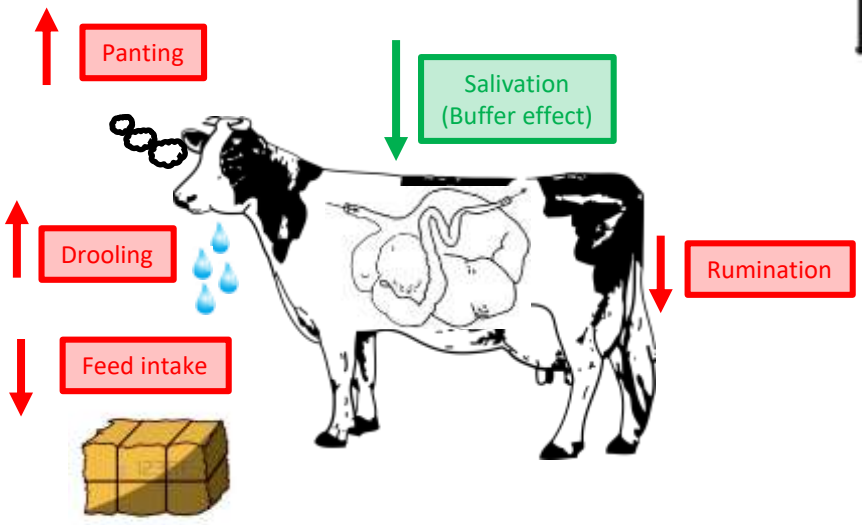
e. **there will be substantial effects of non-climate factors that can outweigh any climate change signal on feed crops.**

Climate change and livestock production: strategies

Negative aspects of heat stress on animal nutrition:
Forage quality reduction
DMI reduction

Methods for Enhancing animal nutrition
Fiber level
Fat supplementation
Feeding proteins
Feeding minerals





Nienaber J.A., Hahn G.L. (2007)
Int. J. Biometeorol 52 (2): 149-157

Climate change and forage quality: MYCOTOXINS

Mycotoxins are chemical compounds produced naturally by moulds. They vary in size and structure and can cause toxicity in a variety of species.

Mycotoxins can reduce farm profits through reduced crop yields, product rejection and a reduction in animal productivity and health.

Feeds and forages can become contaminated with mycotoxins in the field, during harvest, drying and transport as well as during storage.

Mycotoxins production is influenced by **environmental conditions**.

Generally, mycotoxins contamination is most likely to occur in **warm and wet conditions**.

Mycotoxins affecting animal health

Type of mycotoxin	Causative mould	Symptoms	Additional information
Aflatoxins (AFL)	*Aspergillus*	Jaundice Weight loss Depression Immunosuppression Reduced milk yield	Carcinogenic Partially broken down by the rumen and excreted in milk
Fumonisins (FUM)	*Fusarium*	Decreased feed intake Reduced milk yield	Incompletely degraded by the rumen
Ochratoxin A (OTA)	*Aspergillus* *Penicillium*	Ill thrift	Potential human carcinogen Metabolised by rumen Found in meat, milk and dairy products
Deoxynivalenol (DON)	*Fusarium*	Immunosuppression Decreased feed intake Decreased milk yield	Commonly detected in maize Contamination usually occurs during crop growth when *Fusarium* grows best
T-2/HT-2	*Fusarium*	Immunosuppression Reduced fertility	Members of the same family as DON and affect animals in a similar way Commonly detected in oats and oat feed Signs of exposure seen at lower levels of contamination than DON
Zearalenone (ZEN)	*Fusarium*	Reduced fertility	Rarely toxic to ruminants Can be detected alongside its metabolites in urine

Iheshiulor et al., 2011

Activities of the Department of Agriculture, Food and Environment

Project PRA_2018_19:

Mycotoxin containment techniques during maize cultivation: CO.MICO.

***Pathological topic**:*
Control of mold development and physical treatments (in order to reduce contamination).

***Agronomic topic**:*
Evaluation of the best cultivation system in stress conditions.

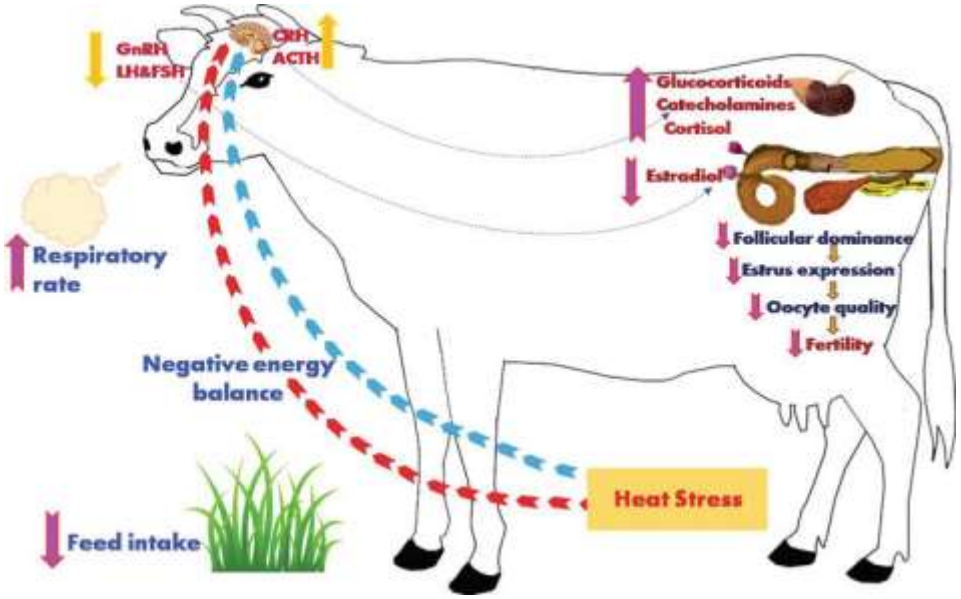
***Hydraulic topic**:*
Relationship between the development of mycotoxins and free water.

***Animal feed topic**:*
Silage management in heat-stressed animals.

***Economic topic**:*
Economic repercussions on the company and the consumer.

Activities of the Department of Agriculture, Food and Environment

Evaluation of physiological responses of beef cattle kept in feedlot or pasture, during the Mediterranean hot season, by the estimation of relationship between hair cortisol and rectal temperature.



Krishnan et al., 2018

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Thank you for your attention