



The acclimatisation process in dairy cows with different milk yield potential

Searching for reliable biomarkers

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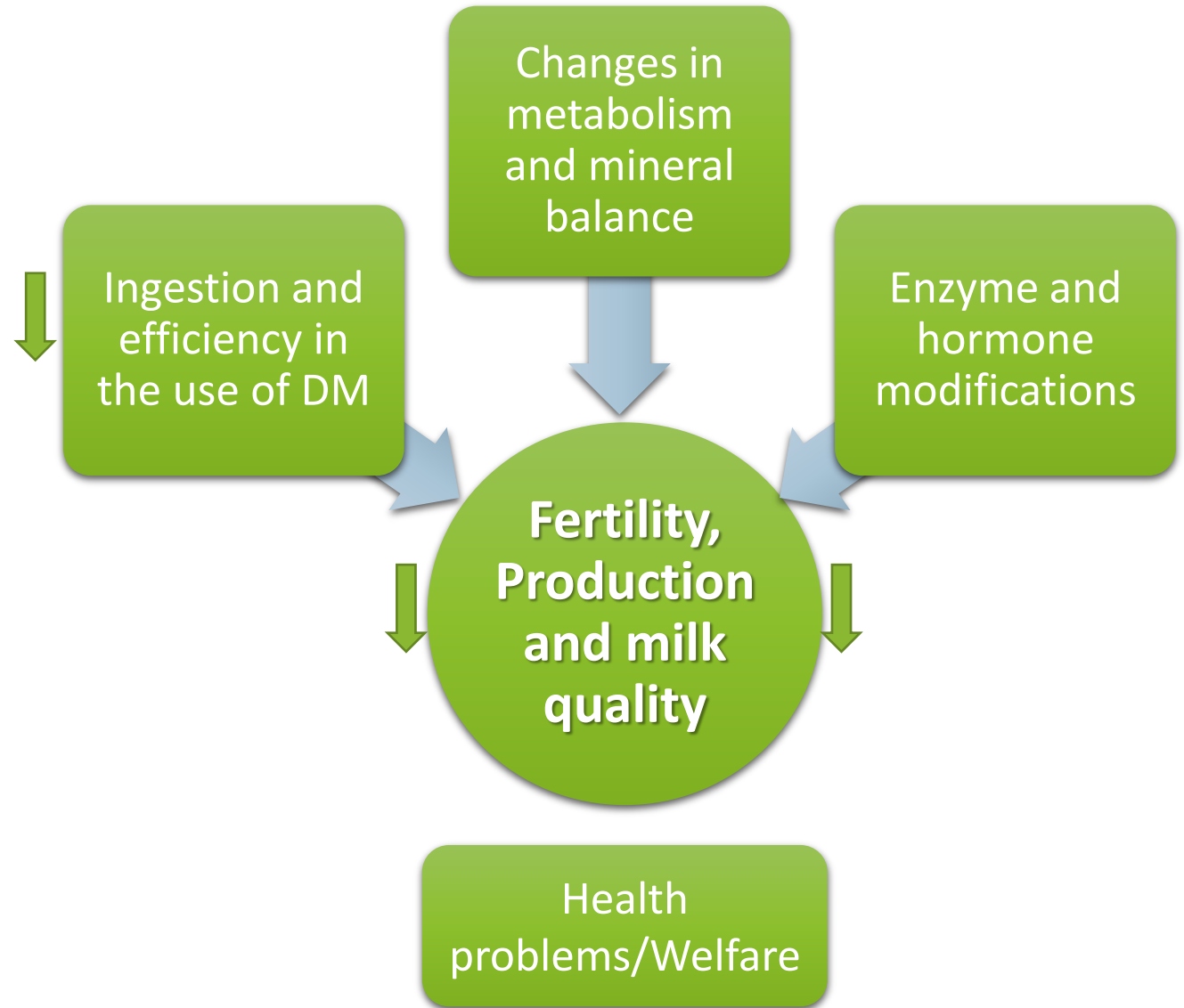


ICAM
Instituto de Ciências Agrárias e Ambientais Mediterrânicas
Knowledge connecting land, food and people



Background

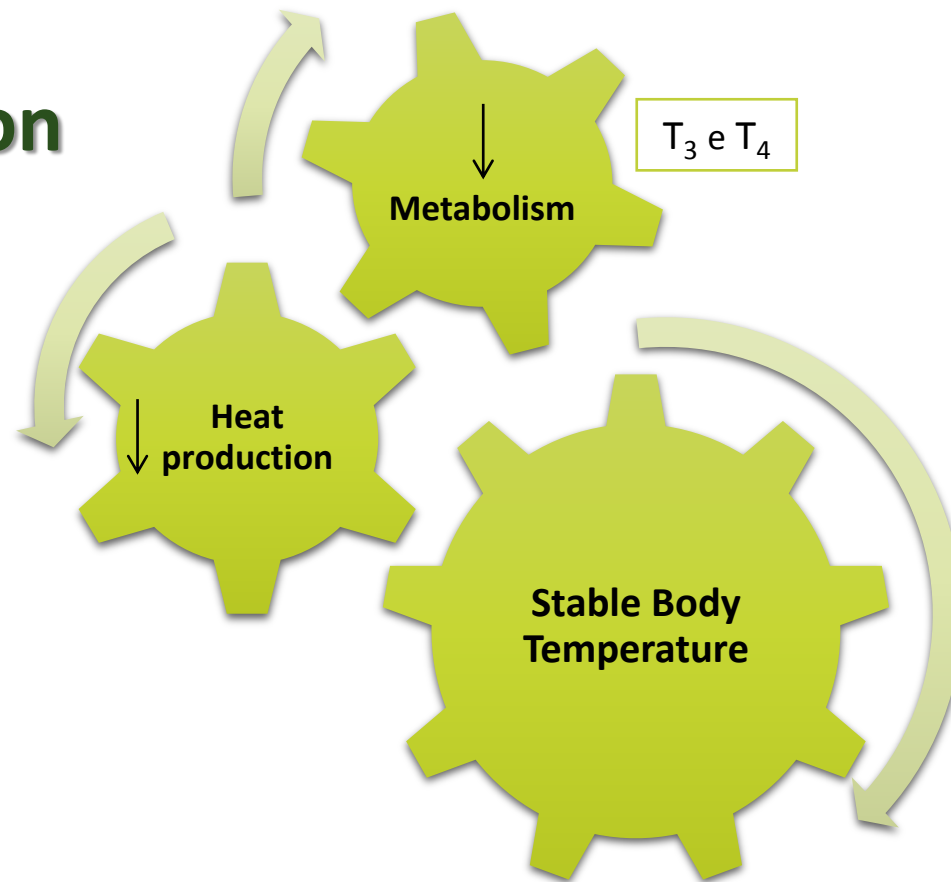
In dairy cattle, heat thermal stress is a major concern that limits animal growth, metabolism, and productivity





Background

Acclimatization

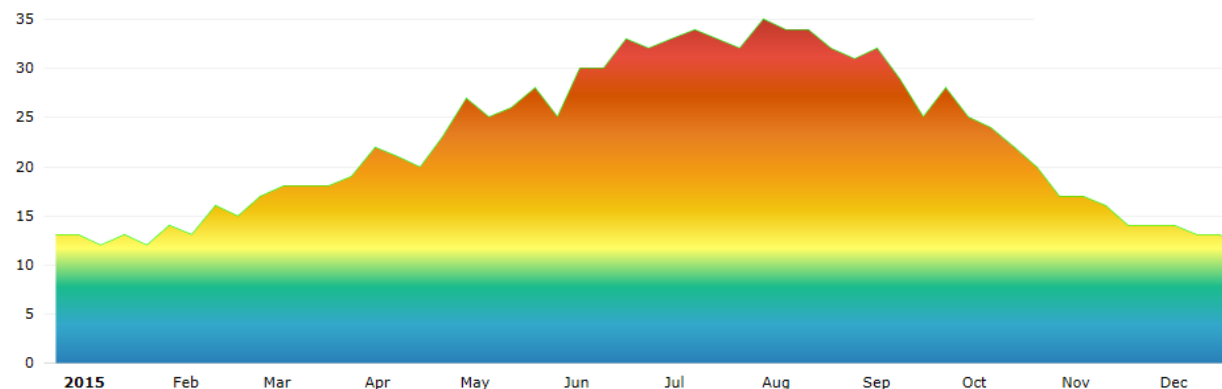




Background

Climatic conditions

- Mediterranean Climate
 - Moderate cold and wet Winter;
 - Dry and hot Summer with high amount of solar radiation





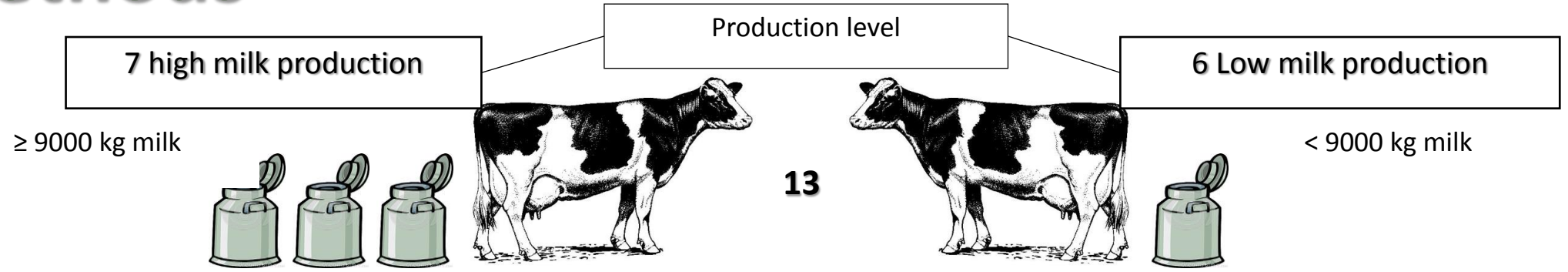
Objective

To search for (non-invasive) biomarkers of acclimatisation process in cows with different milk yield potential during summer and winter periods, in Alentejo region (Portugal)





Methods



sweating rate (SR)



Rectal temperature (RT)



respiratory frequency (RF)

Periods:

Summer

Winter

Environmental temperature



Dark bulb thermometer
Sun
Shadow

Samples





Methods

Blood (plasma):

T3 (ELISA)

Milk:

Lactose

Protein

Fat

Urea

β -hidroxybutyrate

Somatic Cell counting

Saliva:

SDS-PAGE

Hsp70 (ELISA)

Cortisol (ELISA)





Results

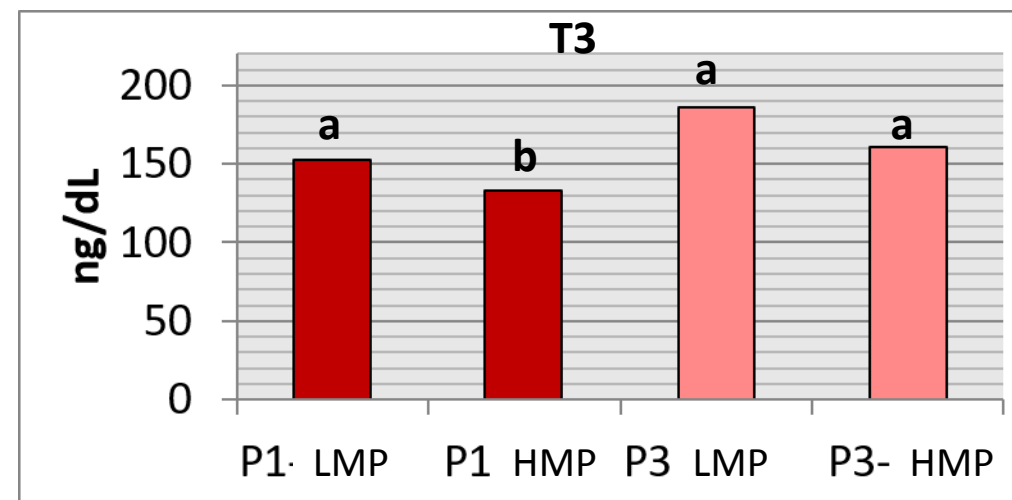
	summer	winter
Resp. Freq. (mov./min)	64.13±12.78	36.13±7.67
Sweating Rate (g/m ² /h)	76,89±46.77	24.69±7.30
Rectal Temp. (°C)	38.82±0.68	38.06±0.52



No differences between High and Low milk producers

Triiodothyronine lower in summer than in winter

Blood



In summer HMP cows presented T3 concentrations lower than LMP.





Results

Milk

Regarding milk analysis, urea was the only parameter whose levels differed between production groups ($P < 0.05$)

Summer

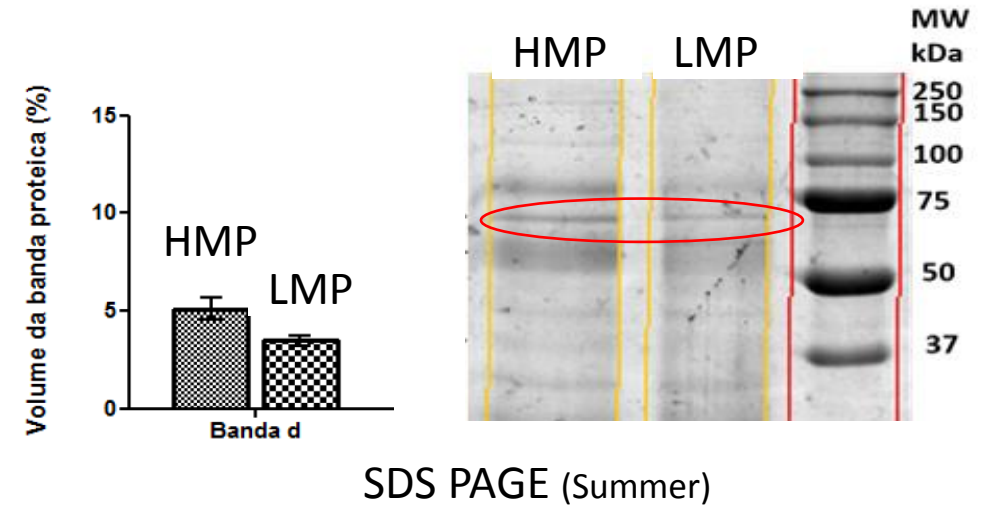
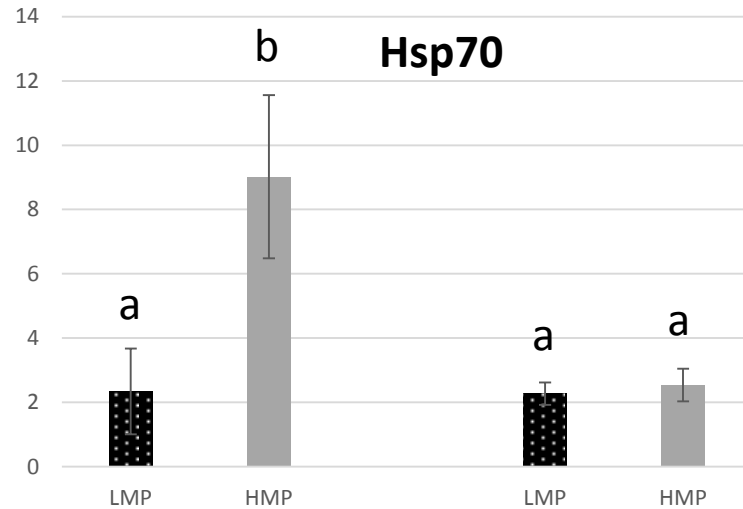


	Period	Concentration
Lactose	P1	4.95±0.14
	P3	4.88±0.52
Protein	P1	2.97±0.23
	P3	3.69±0.29
Fat	P1	2.52±0.75
	P3	3.80±0.75
Urea*	P1	LMP: 253.69±33.81 HMP: 293.62±35.97
β-hidroxybutyrate	N.S.	N.S.
Somatic Cell Counting	N.S.	N.S.

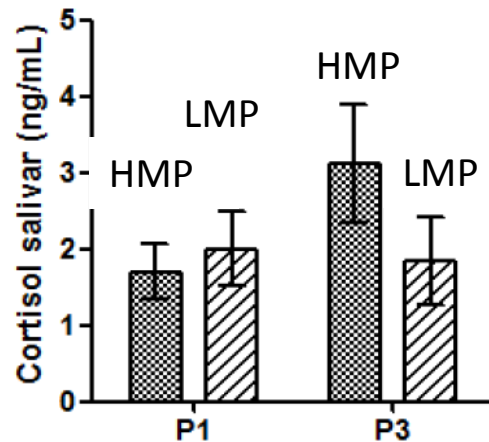


Saliva

Only HMP cows showed higher **HSP70** concentrations during summer



Cortisol



Salivary **cortisol** did not differ between High and low producers, in summer, but was increased in high producers in winter





Conclusions

- ✓ According to respiratory frequency (RF), sudation rate (SR) and rectal temperature (RT), the summer conditions from Alentejo did not result in “real” heat stress in cows.

Even so, High Milk Producing cows present higher need of adaptation to hot temperature conditions:



- ✓ HMP – higher decreases in the **metabolism** in summer (T3)
- ✓ HMP – higher increases in the levels of **urea in milk**, in summer
- ✓ HMP – increases in the levels of **salivary HSP70** in summer

Potential biomarker
of acclimatization



Thank you!

Obrigado

