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Effects of heat stress on serum insulin, adipokines, AMP-activated protein kinase, and heat shock signal molecules in dairy cows

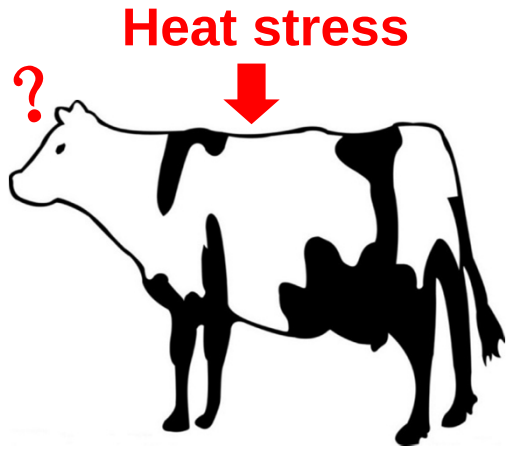
Key words: Heat stress, Dairy cows, Serum, Biomarkers, Temperature-humidity index (THI)



Introduction

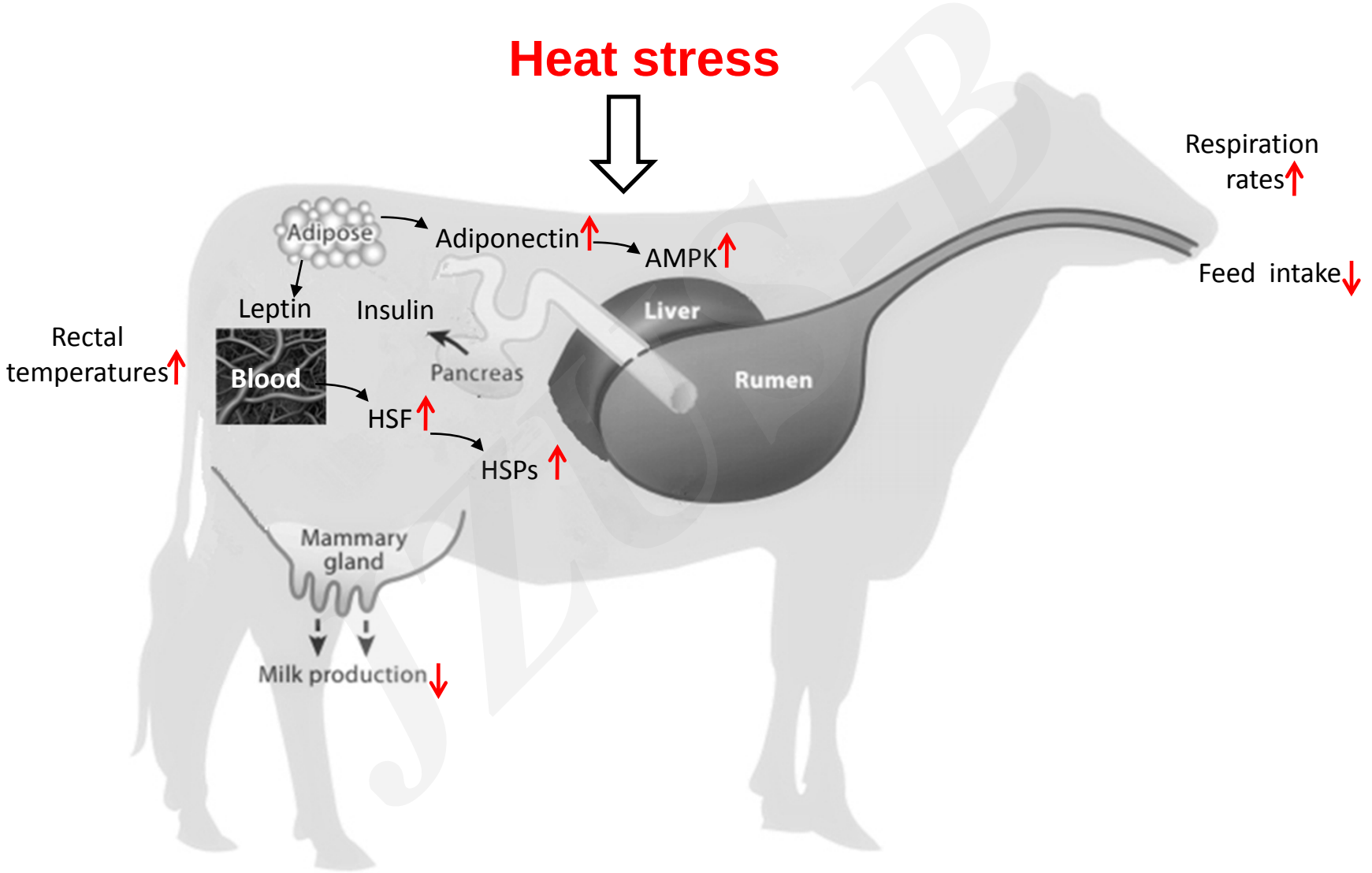
- Dairy cows are extremely sensitive to heat stress. To our knowledge, the effects of heat stress on leptin and adiponectin in dairy cows have not yet to be clearly elucidated. Meanwhile, the relationship between heat stress and serum AMPK activity of dairy cows are still unclear.

- Traditionally, the temperature-humidity index (THI) is employed as the index to evaluate the degree of heat stress in dairy cows. We hypothesize that serum signal molecules during heat shock response can be biomarkers to identify the degree of heat stress in dairy cows.



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Results


Heat stress
Respiration rates
Feed intake
Adipose
Adiponectin
AMPK
Leptin
Insulin
Liver
Rectal temperatures
Blood
Pancreas
Rumen
HSF
HSPs
Mammary gland
Milk production

Innovation points

- Heat stress may not directly affect the secretion of insulin and leptin. However, if we put the data on a dry matter intake basis, heat stress increased the concentrations of insulin and leptin under the same DMI conditions.

- During heat stress, the increase of adiponectin activated AMPK and dairy cows may enhance adiponectin and AMPK to cope with their adaptation to heat stress.

- Serum HSF and HSP 70 are sensitive and accurate in heat stress, we recommend them as meaningful biomarkers and for monitoring their changes to alert heat stress in dairy cows in the future.

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