Eco-systems of agricultural landscapes
and sustainable land use: Livestock systems

03 - Livestock Ecology - 1

Abiotic environmental factors

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Classification of environmental elements, factors or influences by origin

Abiotic factors: climate, ambient air, substrate, landscape, physical structures

Biotic factors: life forms, populations, abundance and distribution, competition, predator-prey relations, symbiosis and mutualism, parasitism and diseases, the “niche”-concept

Trophic factors: nutrients, food chains, food pyramids, fluctuating nutrient supplies, nutrient recycling, animal preferences, ecological efficiency

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Abiotic Environmental Factors

Substrate	Air, water, soil
Atmosphere	Gases, particles
Landscape structures	Topography, physical structures
Physical structures	Surfaces, restrictions
Climate	Temperature, humidity, air movement, radiation, air pressure, precipitation

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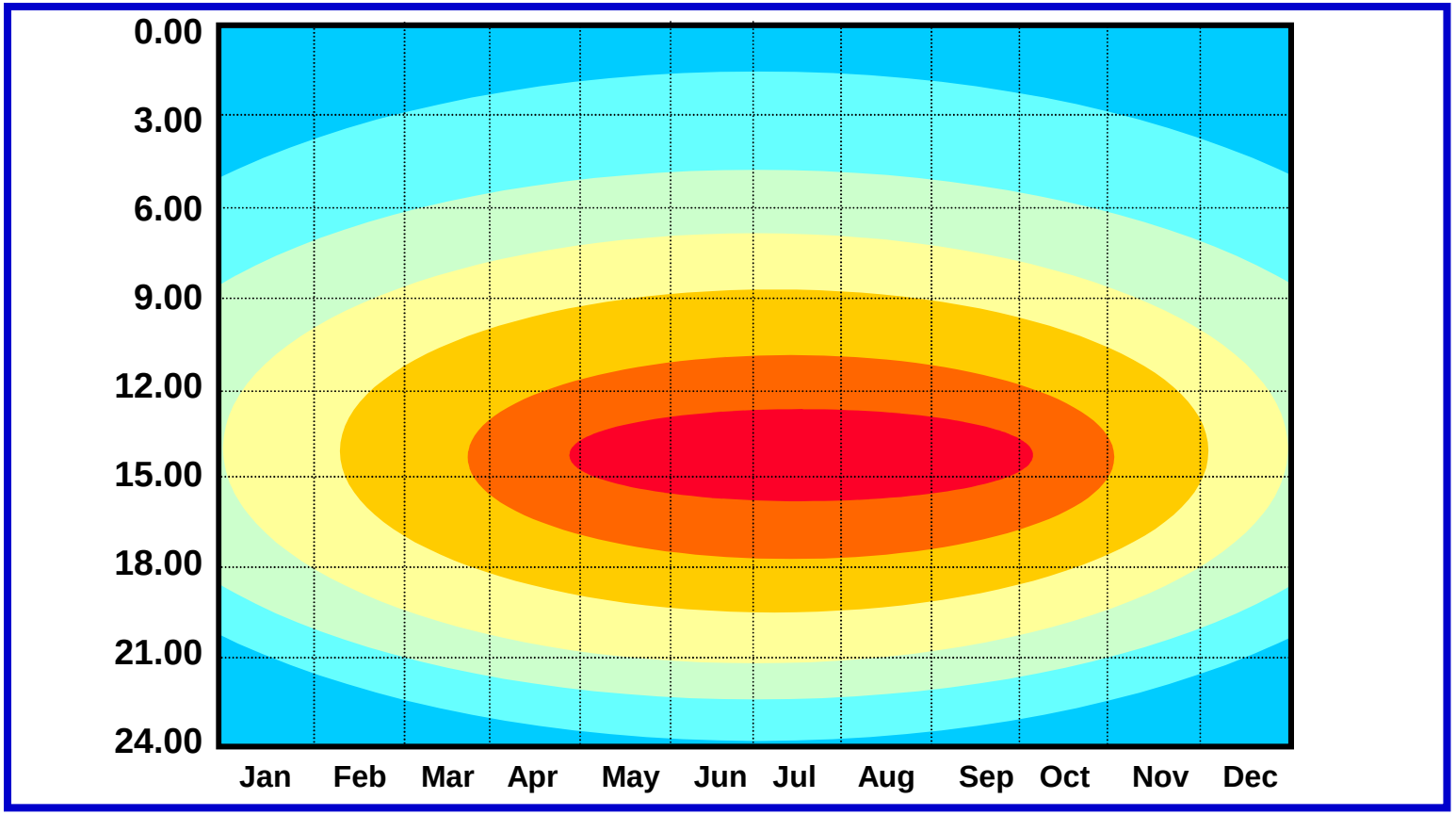
Schematic presentation of temperature variation in a dry equatorial lowland combining large diurnal and small seasonal variation



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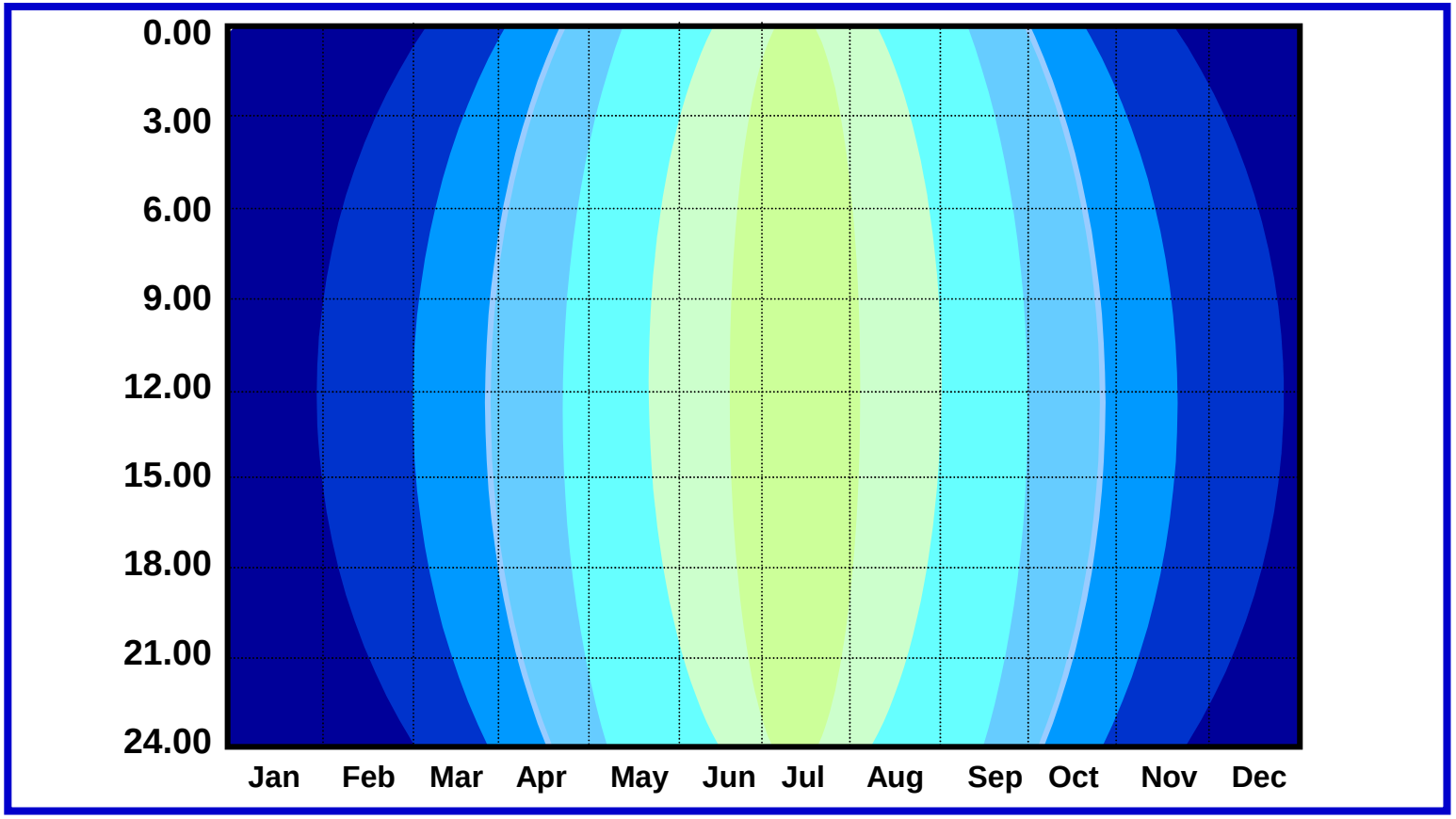
Schematic presentation of temperature variation in an arctic lowland combining minute diurnal and excessive seasonal variation



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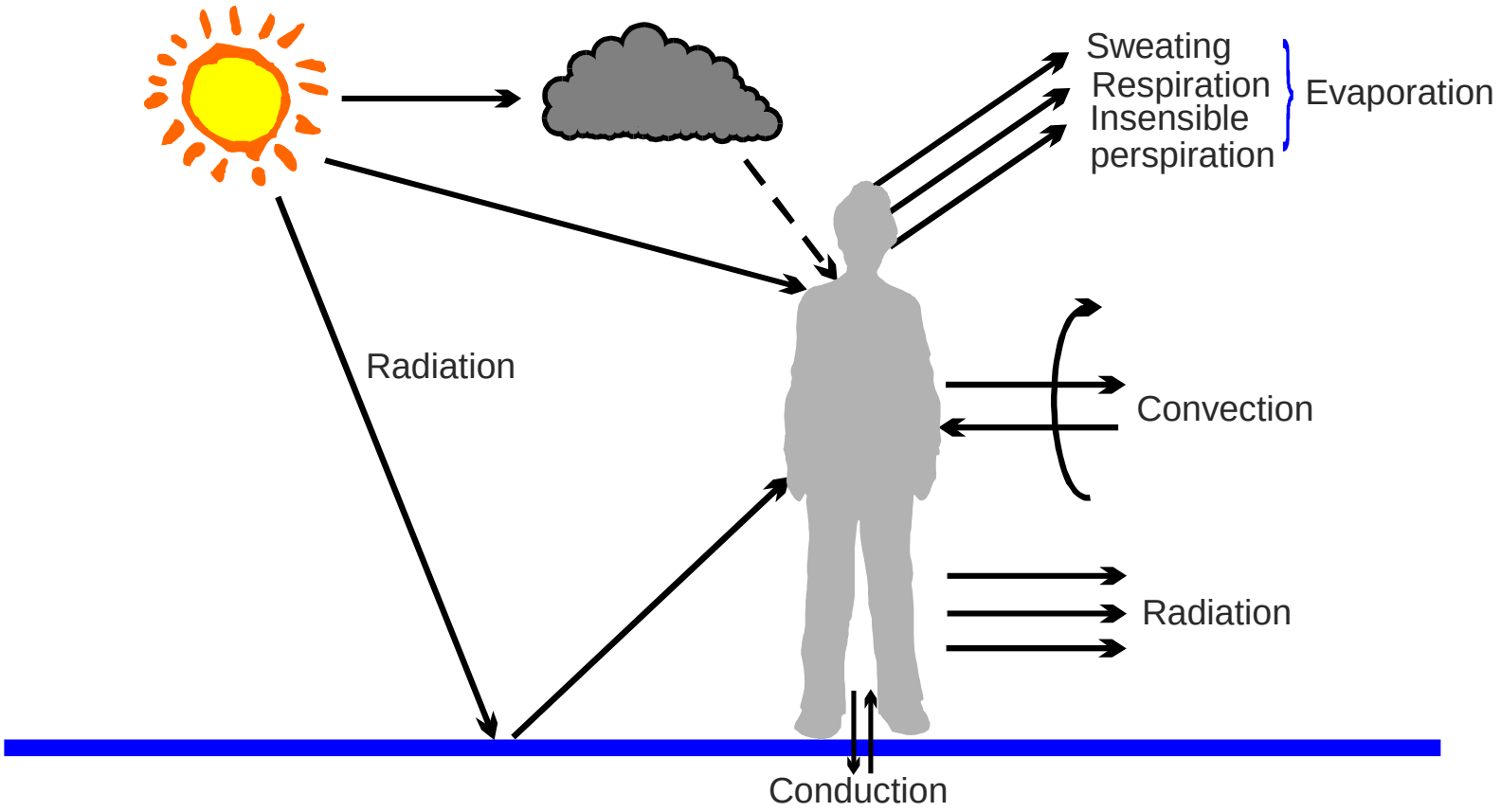
Mechanisms of heat exchange between body and environment



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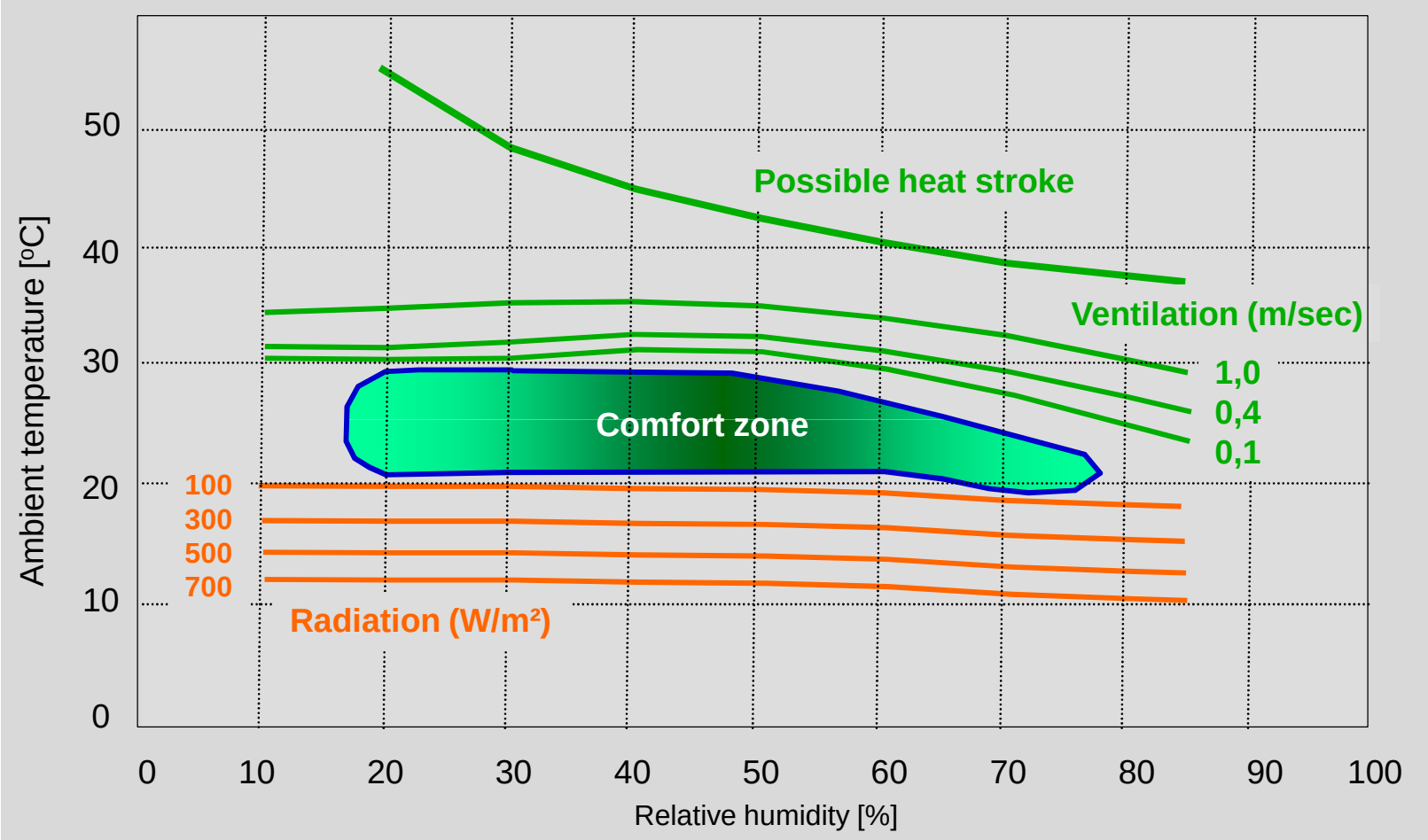
Main factors determining extent and position of the thermal comfort zone in warm blooded animals (example man)



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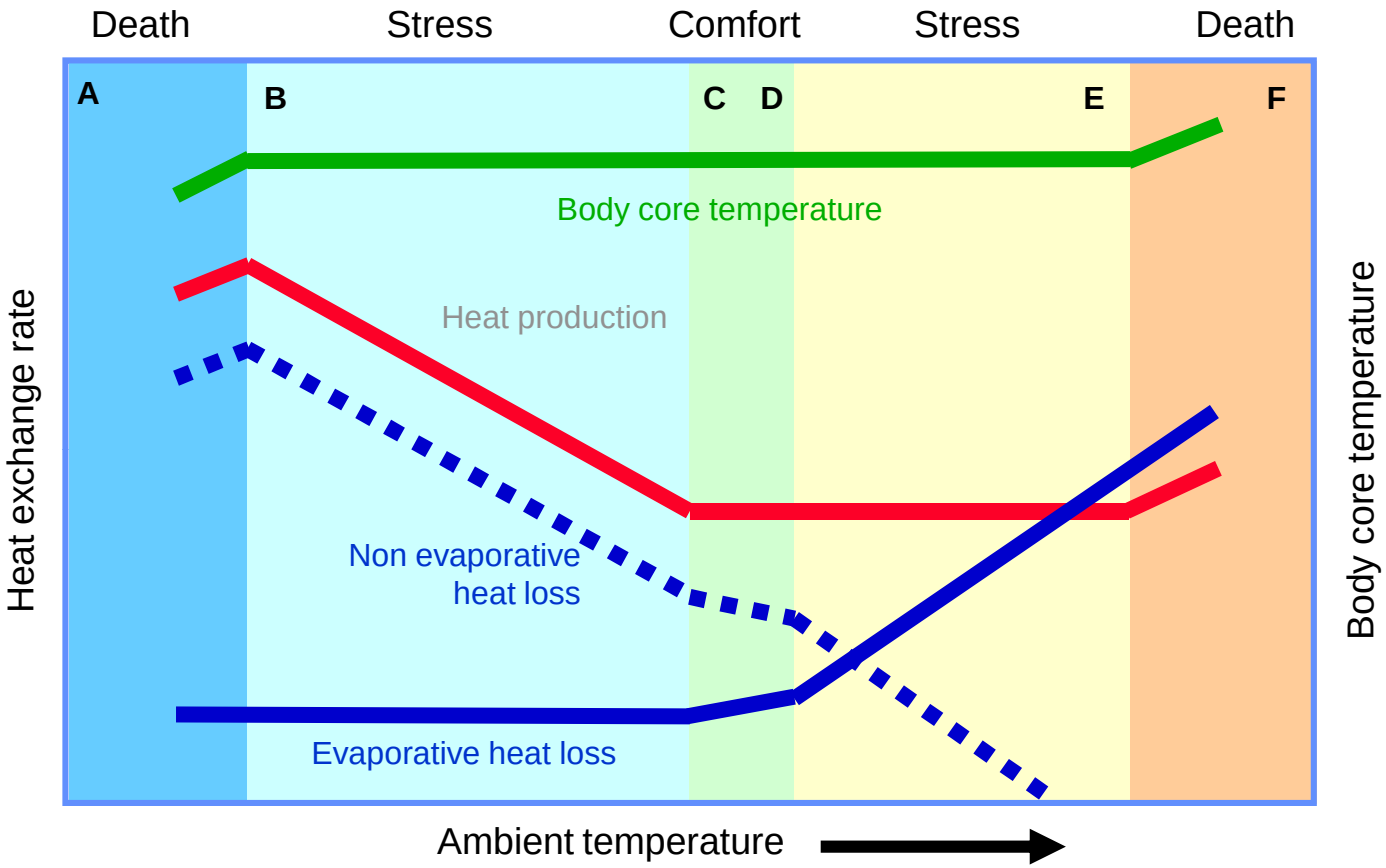
Heat exchange mechanisms in warm blooded organisms



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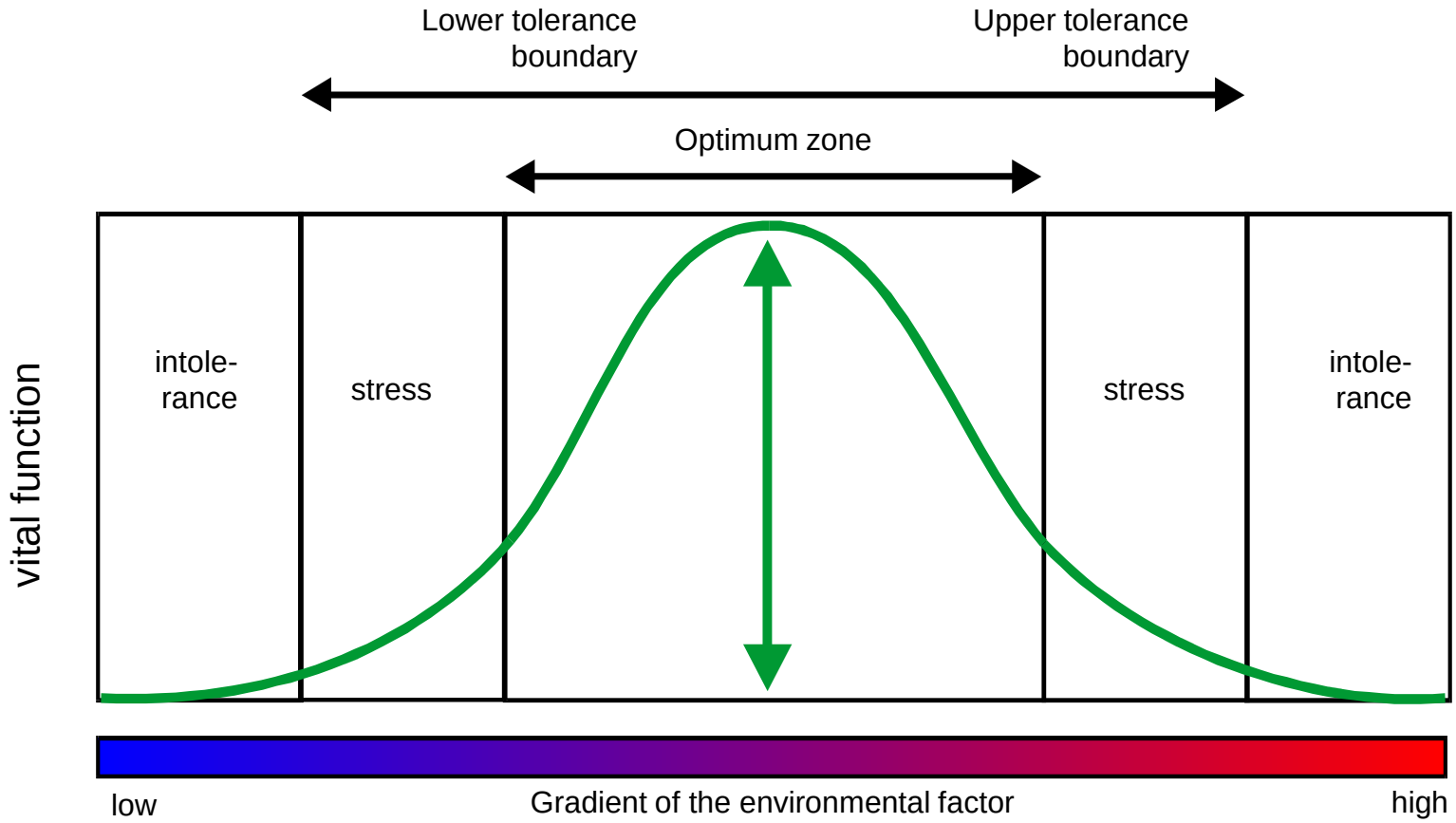
Typical reaction of an individual organism or a population to a gradient of a vital environmental factor



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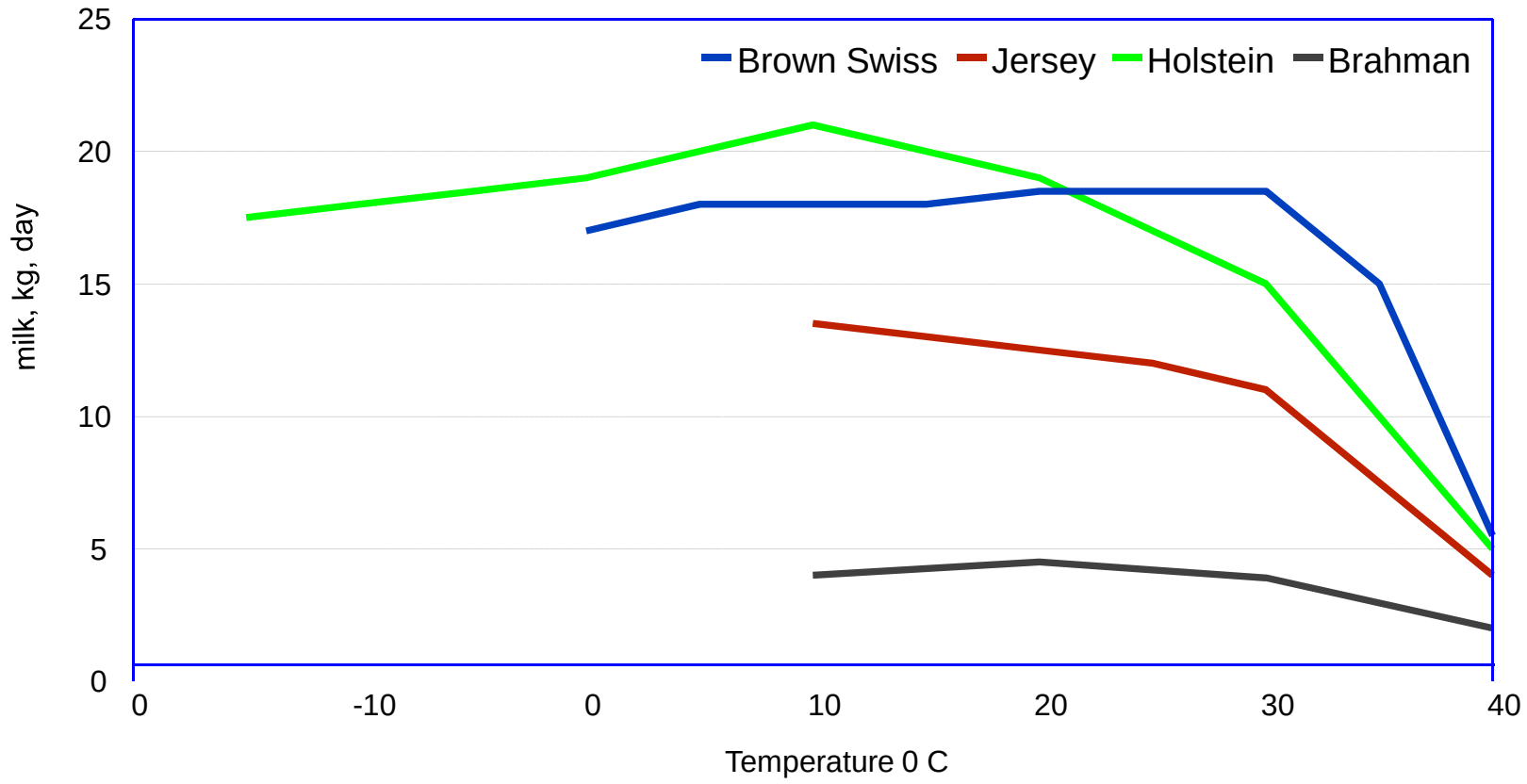
Breed differences in daily milk yields in response to different temperatures in a controlled environment at relative humidity between 40 and 60 %



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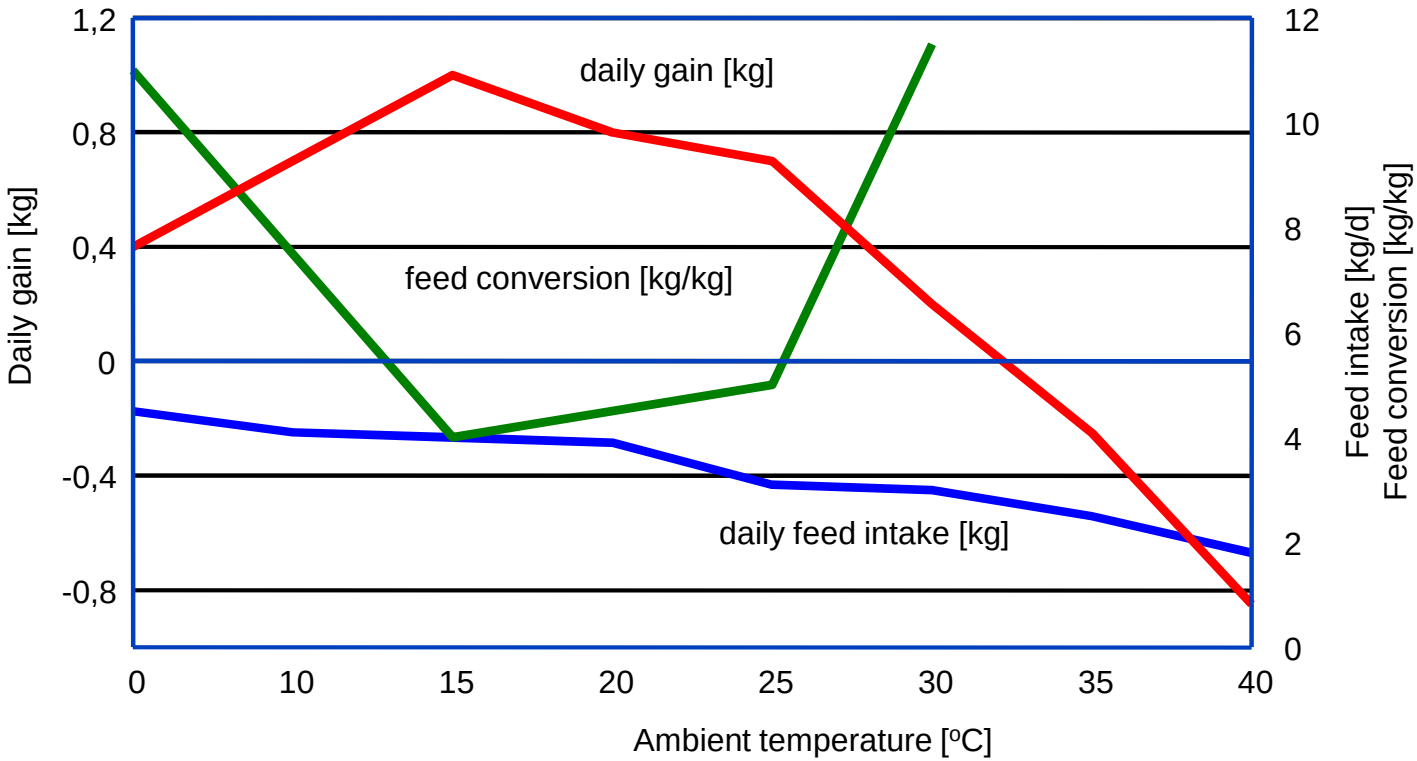
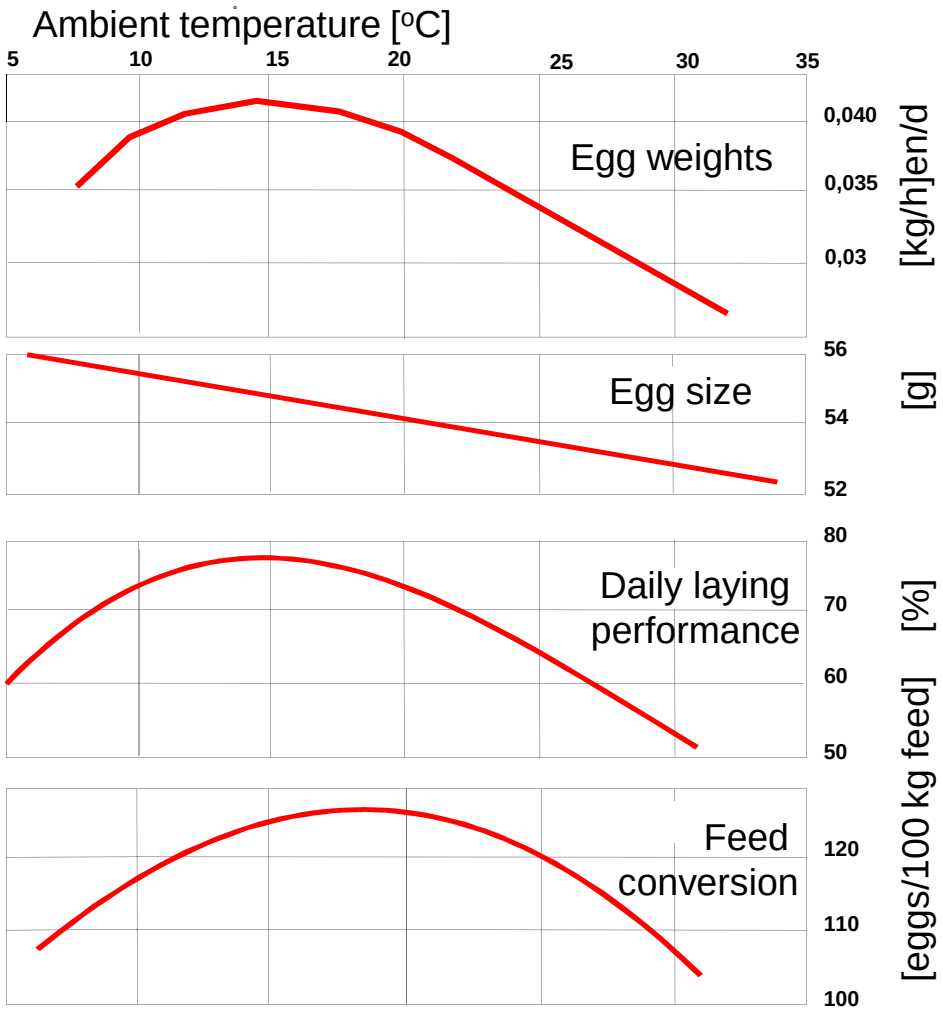
Feed intake, daily gains and feed conversion of fattening pigs (60-100kg) at different ambient temperatures



Effect of varying ambient temperatures on egg weights per hen and day, egg size, daily laying performance and feed conversion



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Reaction of animals and populations to climatic stress

Time frame	Process	Mechanism
Short-term	Immediate reaction	Behaviour Physiological
Medium-term	Acclimatisation	Physiological
Long-term	Adaptation	Genetic
Very long-term	Evolution	Genetic

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Short term behavioural response: seeking shade

Short term behavioural response: seeking shade

Short term behavioural response: seeking shade

Short term behavioural response: wallowing

Short term behavioural response: huddling

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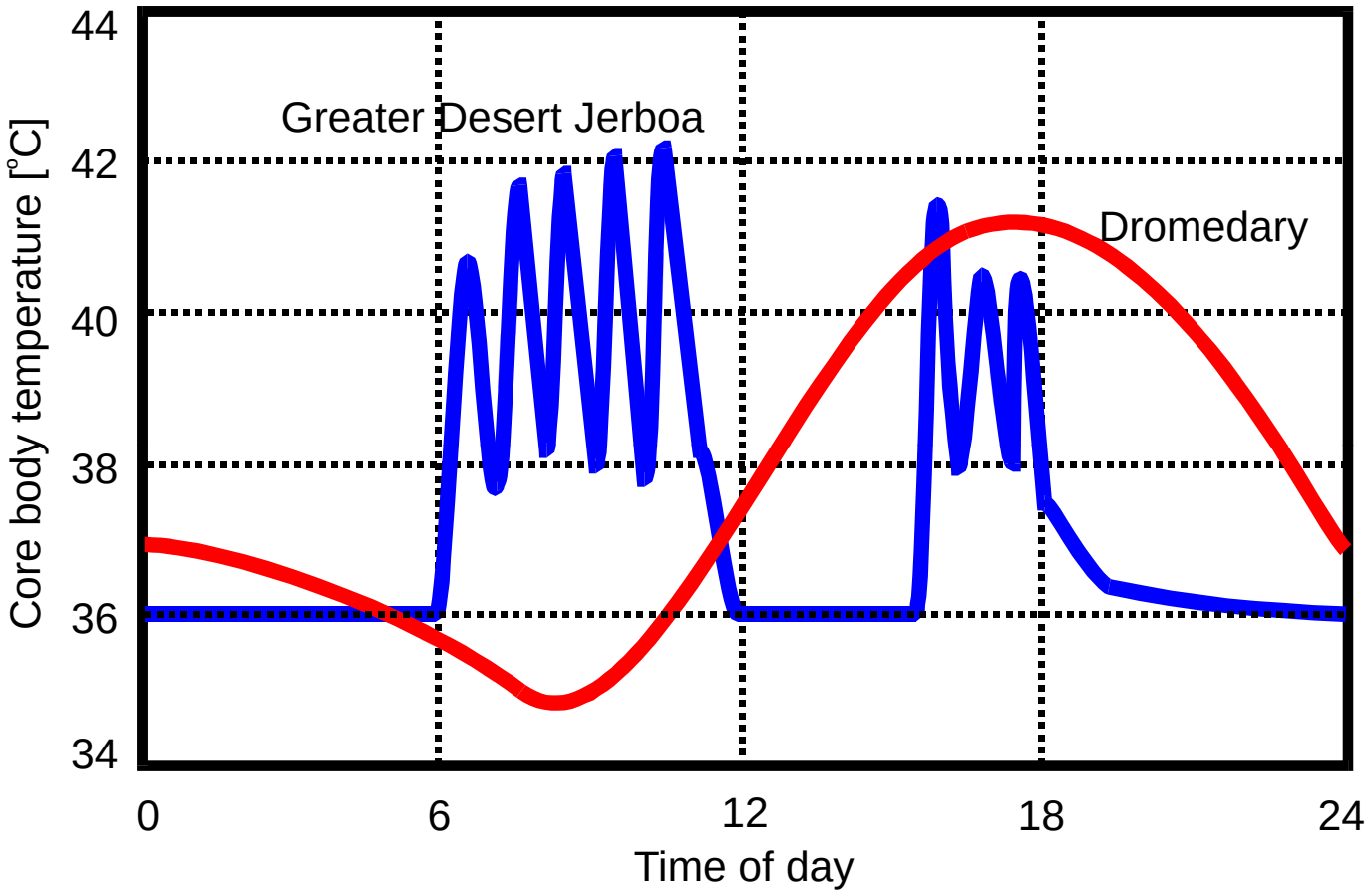
Diurnal changes in core body temperature in dromedaries and Greater Desert Jerboa in on a summer day in the southern Sahel



After Schmidt-Nielsen, 1954

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Long term behavioural response: building shade

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Physiological medium term response: seasonal fur change

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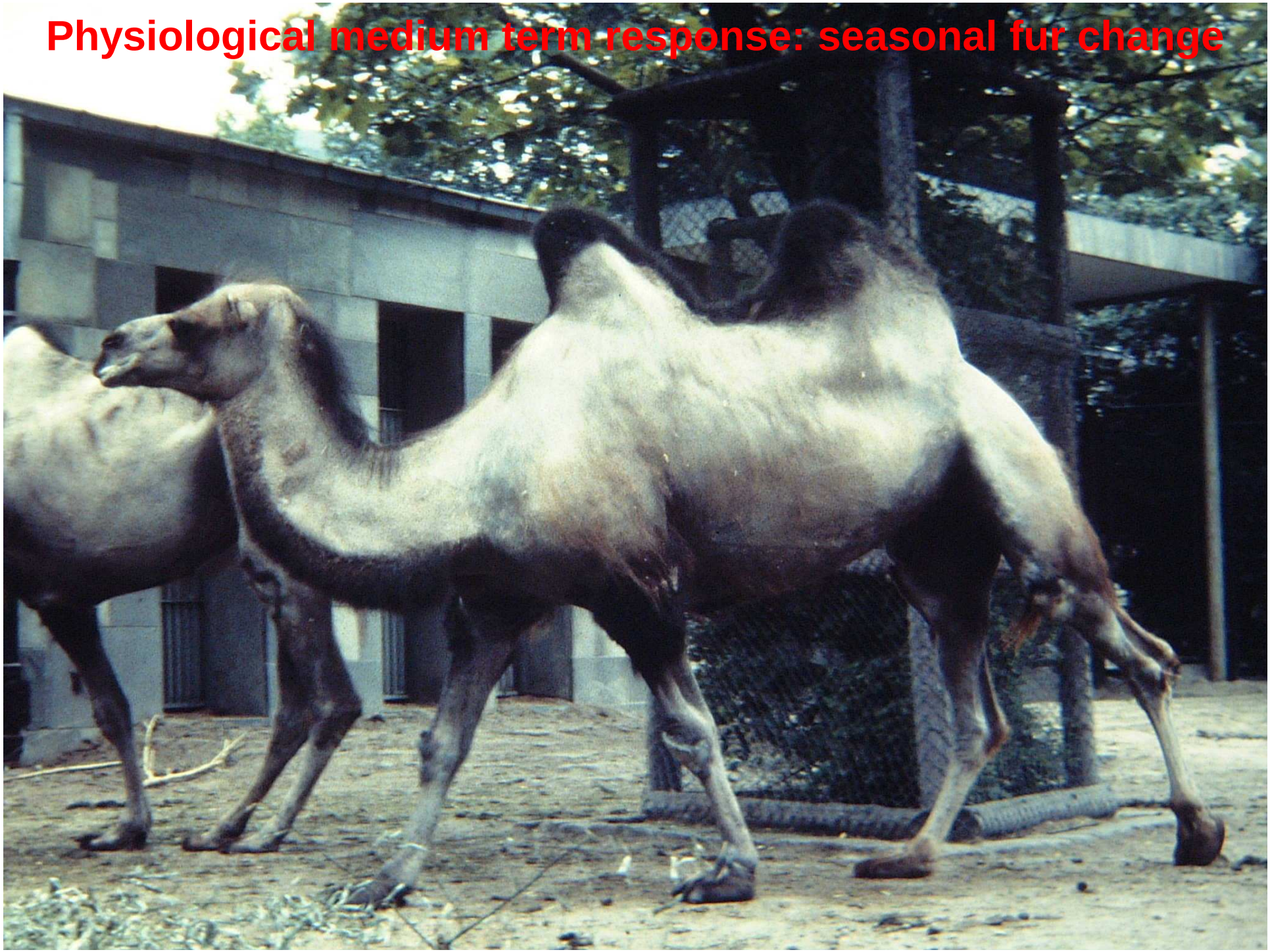
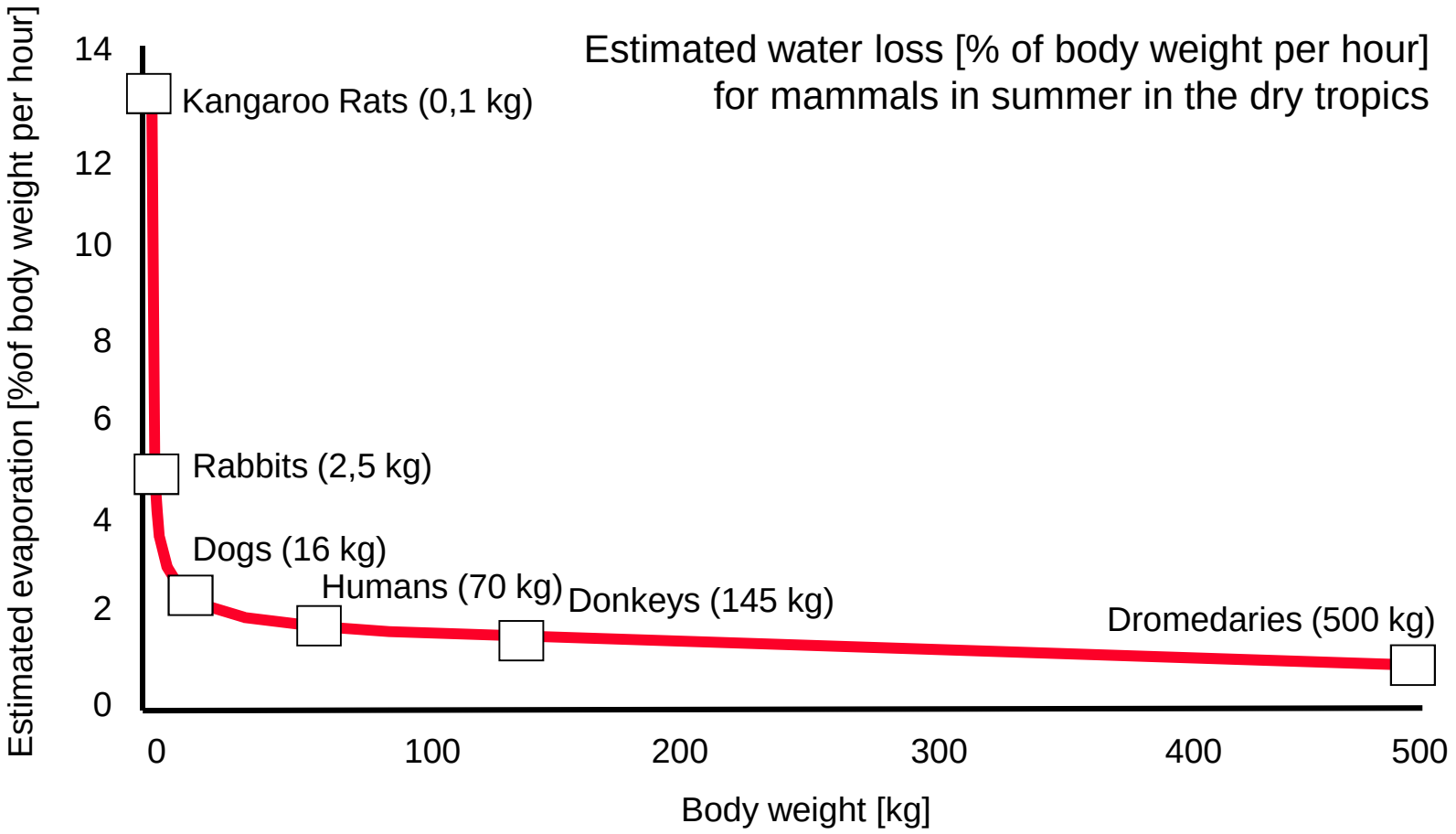


Long term genetic response: adaptation



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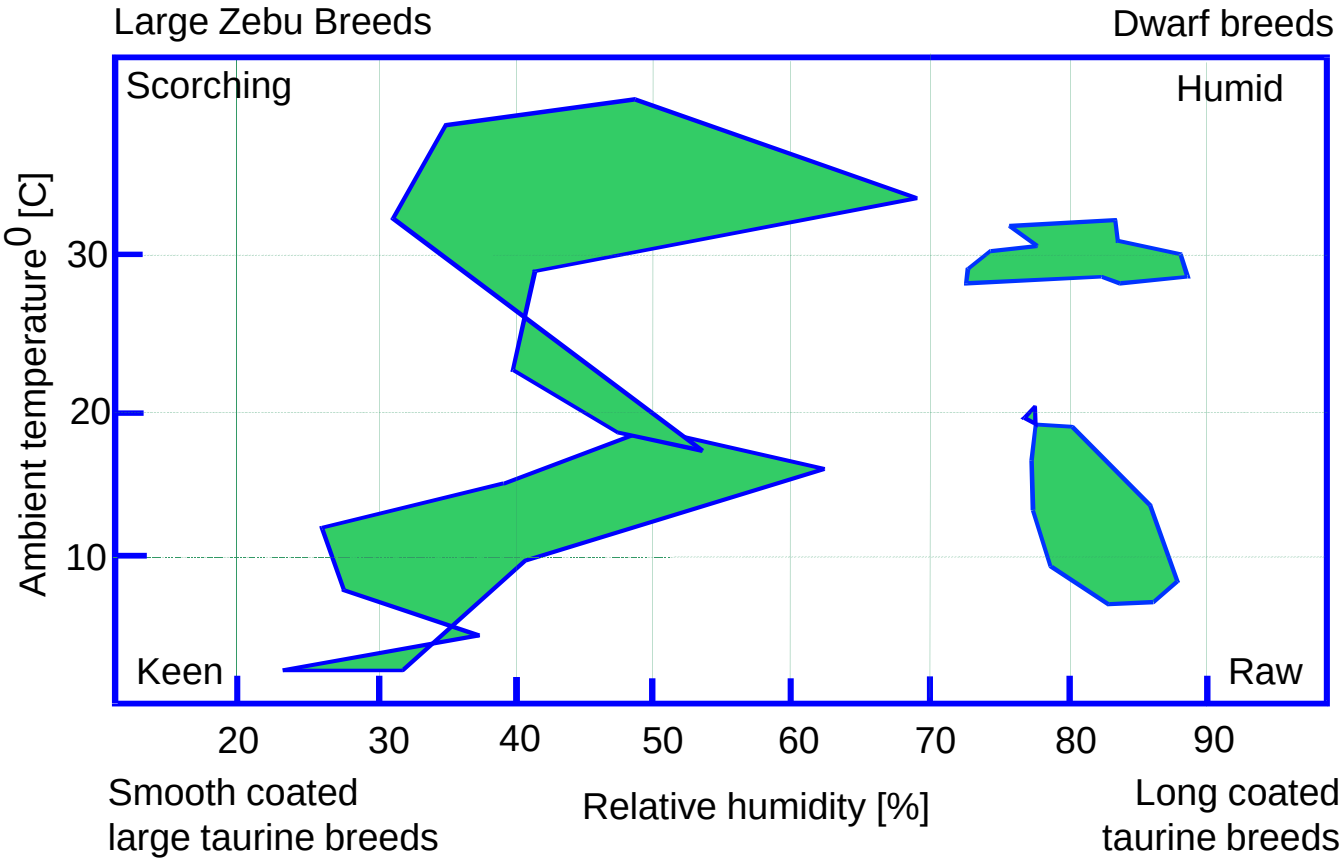
Bio-climatic specialisation of various cattle breeds



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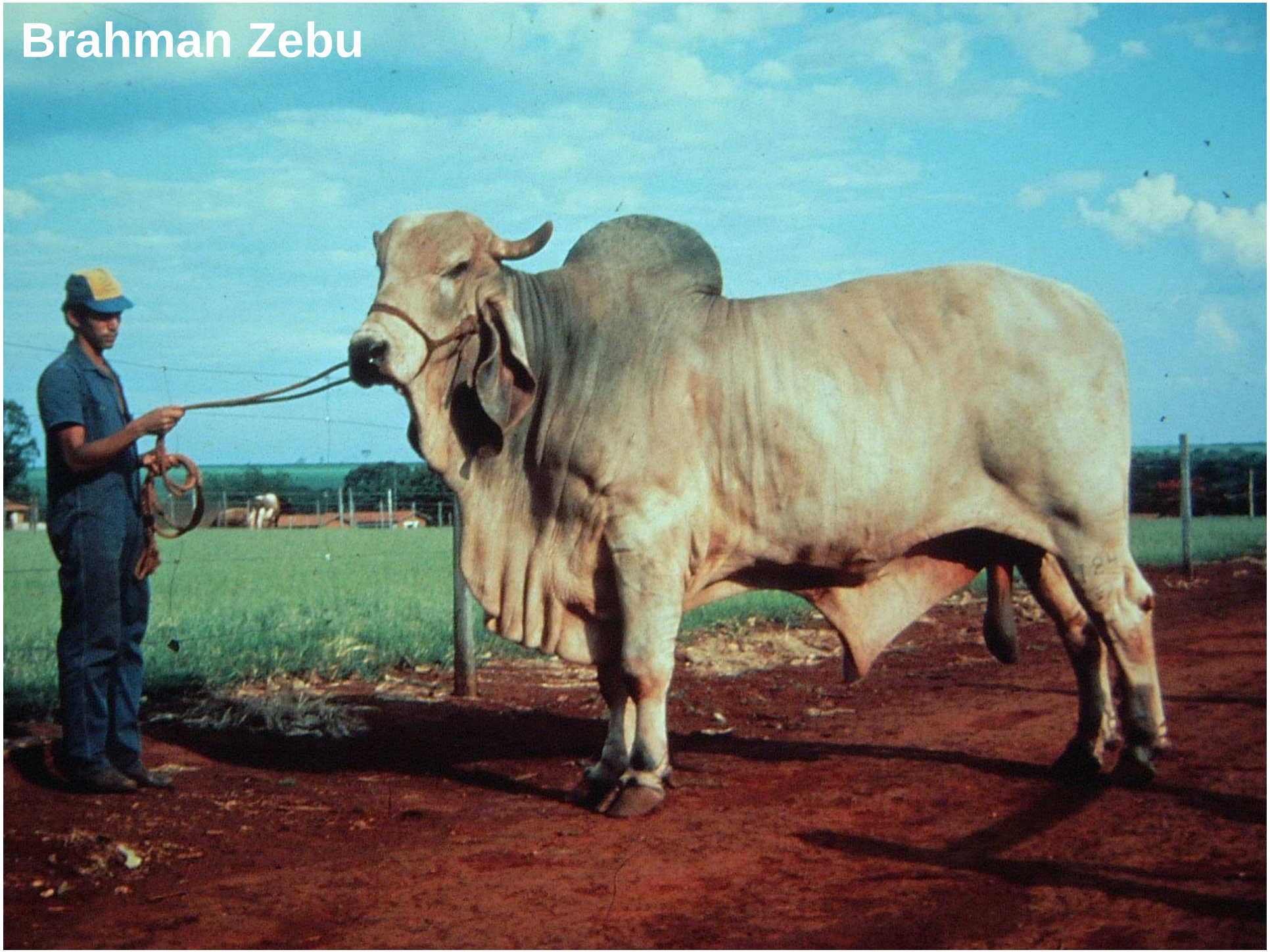
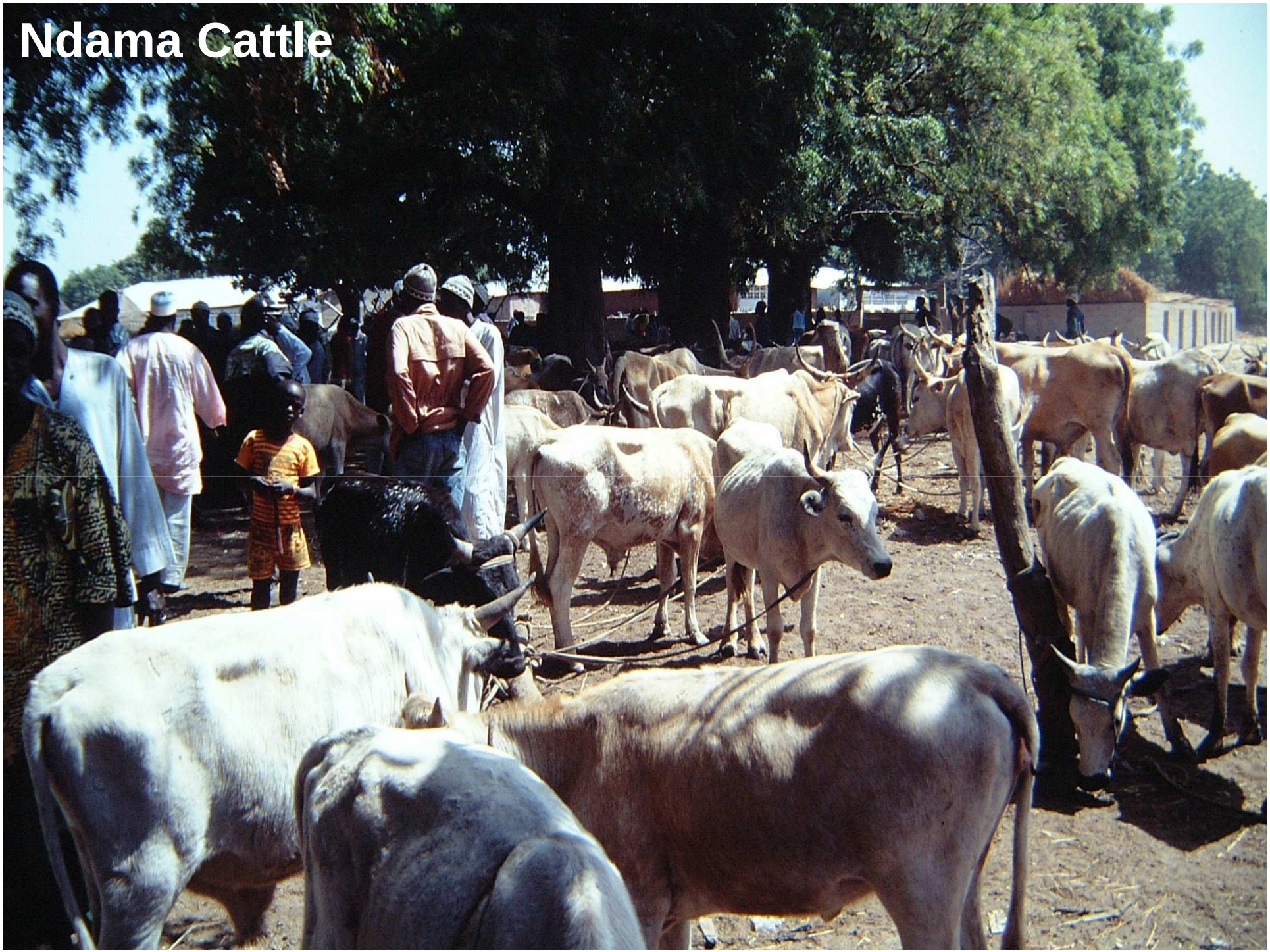
Brahman Zebu



Ndama Cattle




Highland Cattle


Charolais

Sheep breeds typical for some bio-climatic regions

Goat breeds typical for some bio-climatic regions

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