

Part II: Tick-borne diseases of livestock in North Africa, present state and potential changes in the context of global warming

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Several Tick-Borne Pathogens

Virus, Bacteria, Nematodes,
Protozoa (piroplasms)

M A Darghouth and A Bouattour

Why enzootic diseases?

Epizootic diseases

Interest international community (+ national efforts)
Threat international trade (++ countries exporting
animals + animal productions)

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Enzootic diseases

"Chronic losses"

Threat to self reliance and to food sovereignty
(++ countries importing animals + animal productions)

Piroplasmoses of livestock

Importance

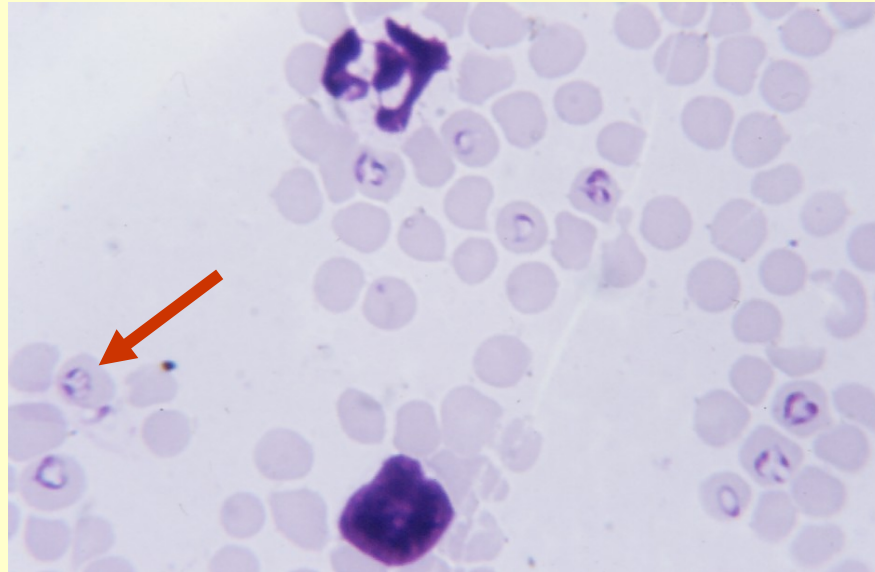
Severe clinical forms (febrile haemolytic anaemia)
Production losses (asymptomatic infections)
Zoonotic infection: *B. divergens*

Transmission

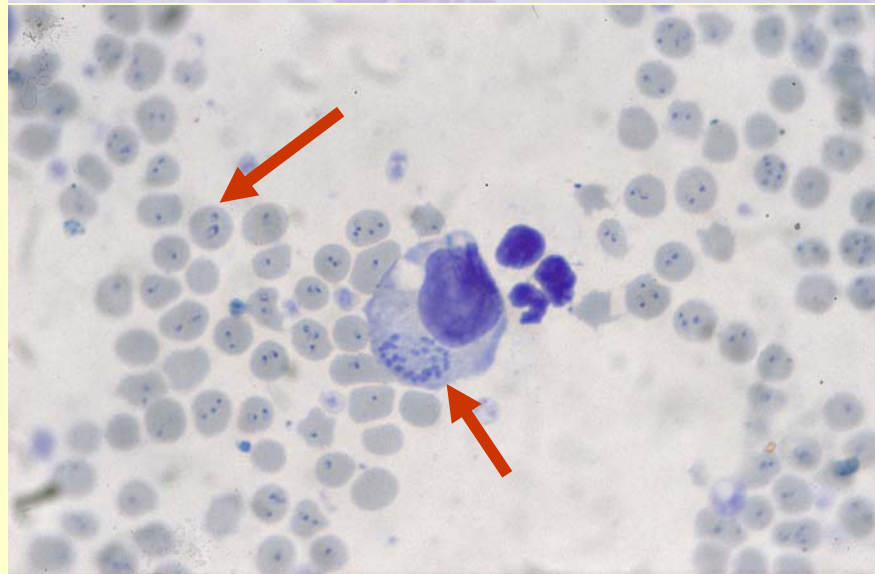
One to few natural vectors tick species
Several experimental vectors species

Piroplasms:

Babesia



Theileria



Species of Piroplasms of livestock in North Africa

Cattle:

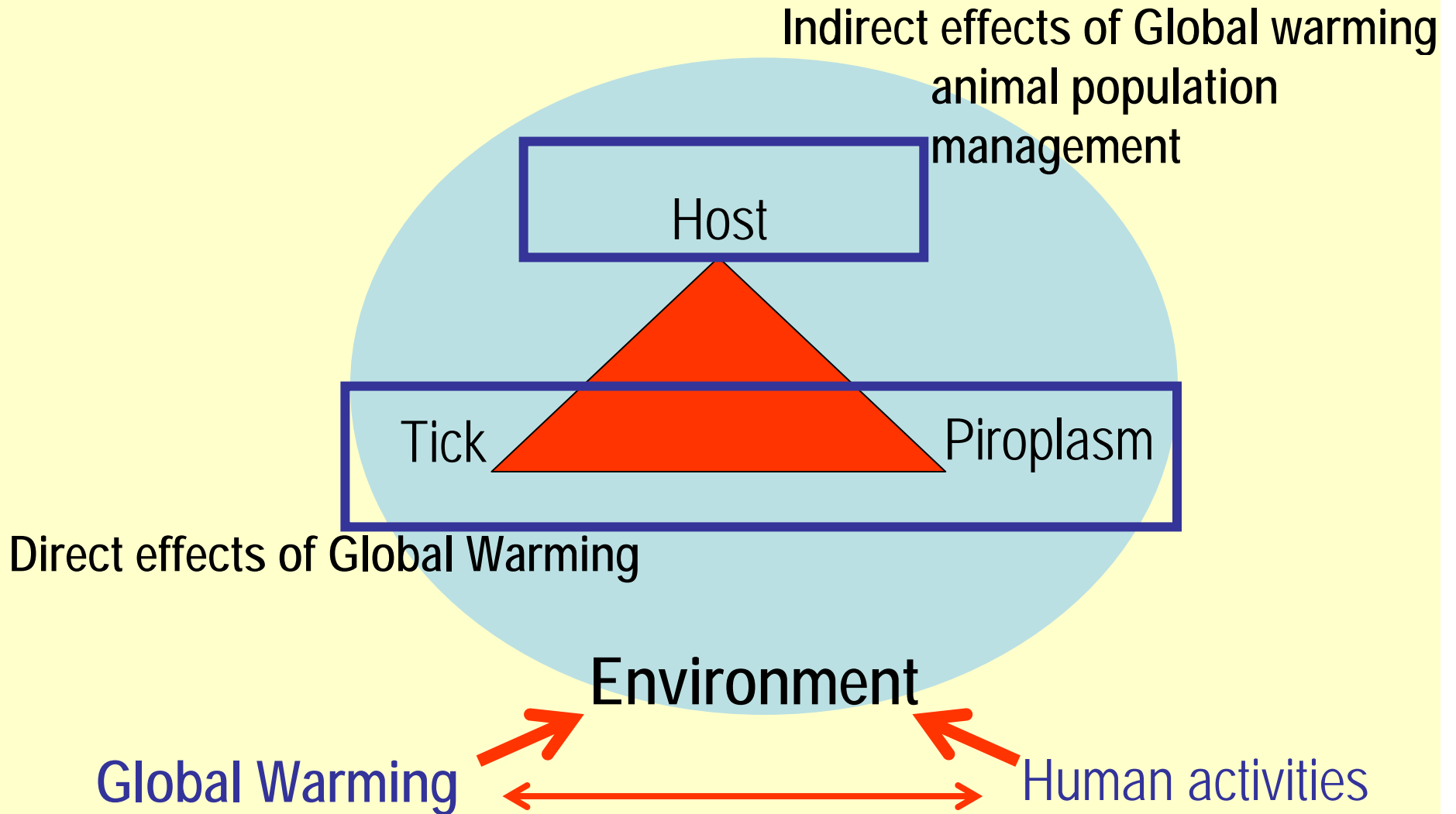
Theileria: T. annulata, T. buffeli/orientalis

Babesia: B. bovis, B. bigemina and B. divergens
(Tunisia, Algeria, Morocco)

Small ruminants:

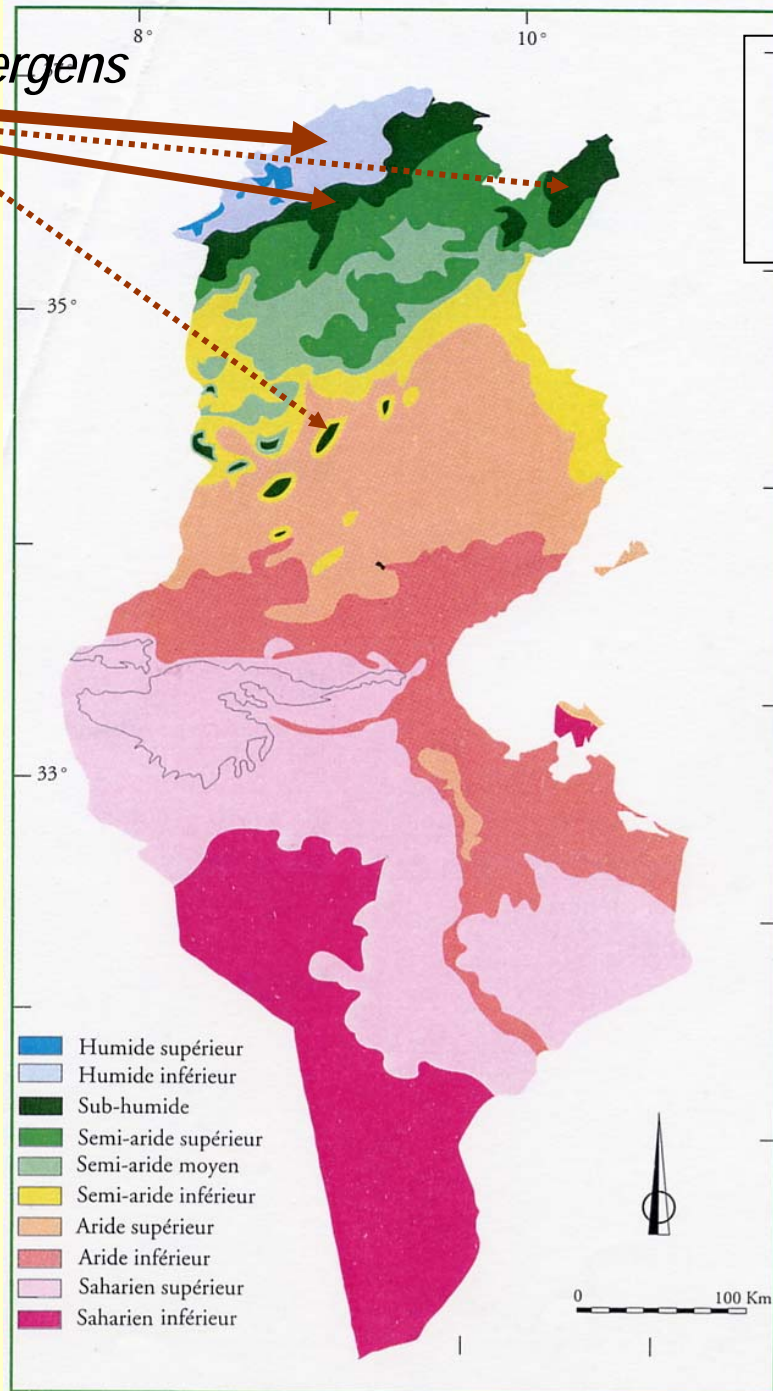
Theileria: T. lestoquardi ? (Libya), T. ovis

Babesia: B. ovis (Tunisia Algeria, Morocco) B. motasi
(Morocco , Libya)



Interactions determining the epidemiology of piroplasmoses

B. divergens



↓ *B. divergens*,
T. orientalis
Sub-humid

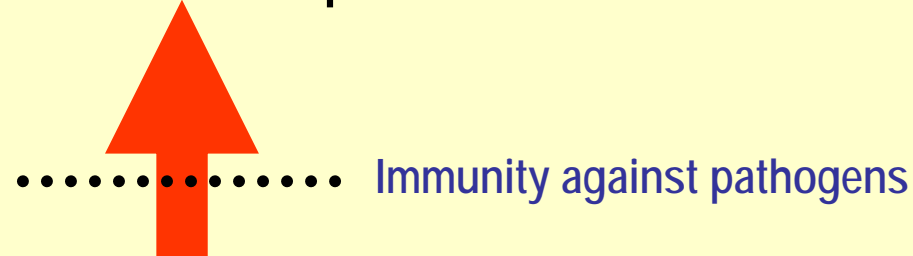
↓ *B. bovis*
B. ovis
Semi arid

↓ *T. annulata*
Arid

Distribution of piroplasms in Tunisia

Different endemic states

Probability infection + quantum infection



Tick burdens

Abundance, seasonality

Immunity to ticks

Exposure animals to ticks

+

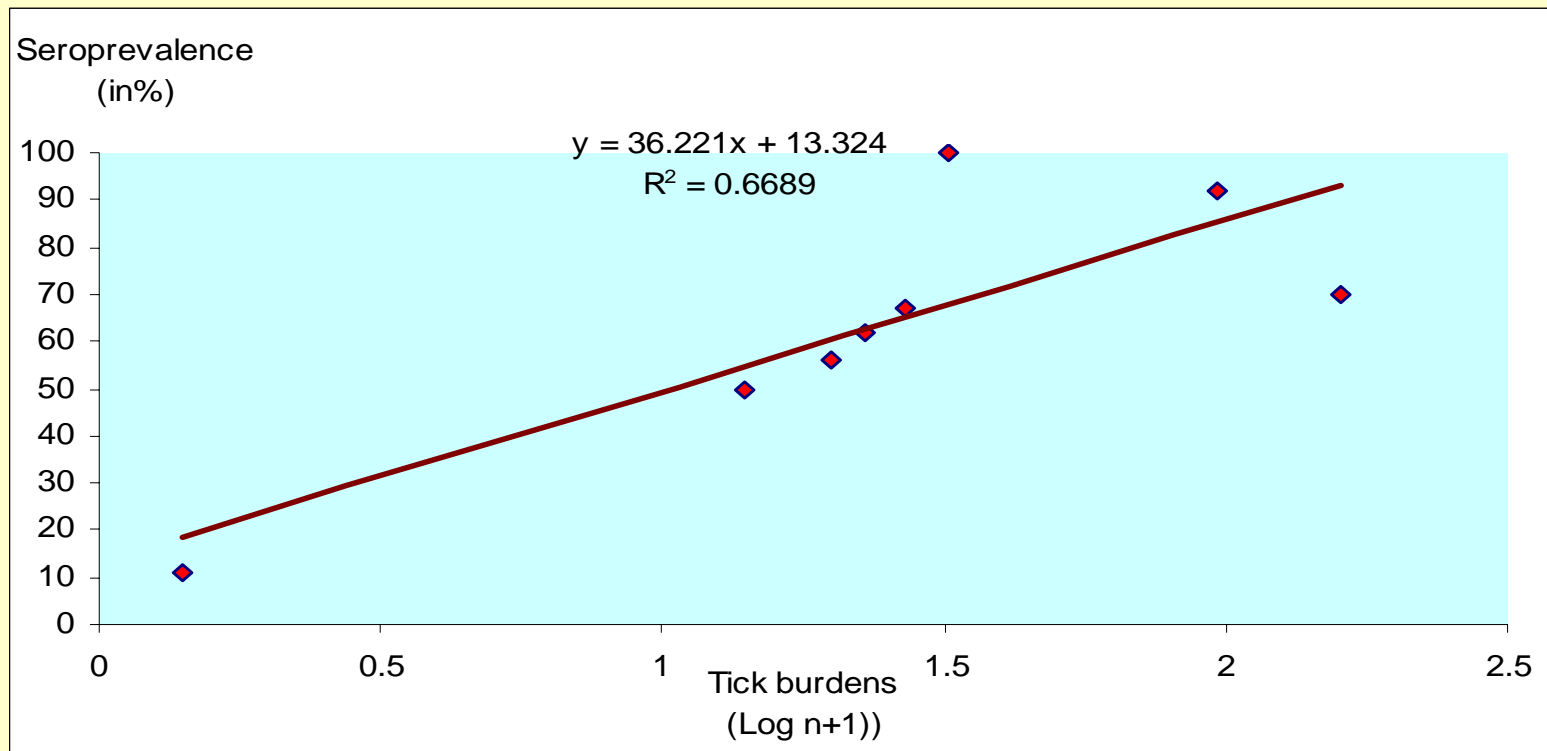
Tick infection rate / intensity

Parasitemia host

Vectorial capacity (tick species)

Development pathogen/vectors tick

Factors conditioning the endemic states for piroplasmoses



Seroprevalence to *T. annulata* and vector tick burdens

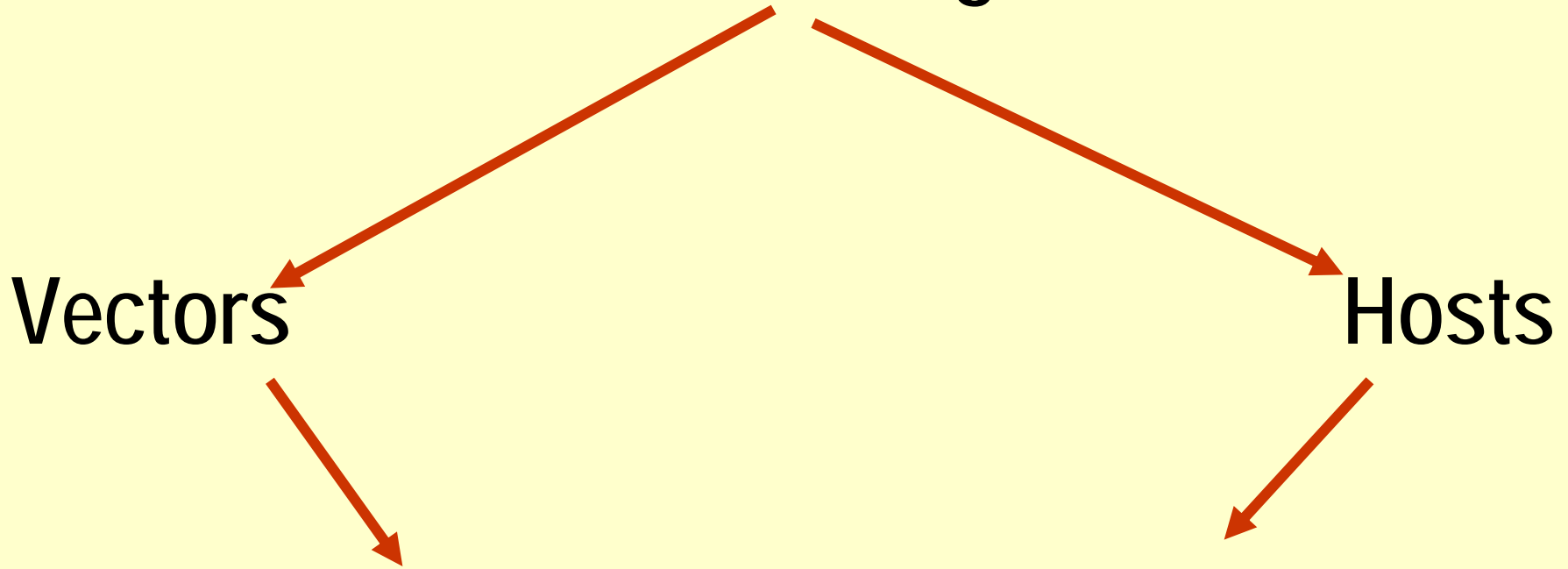
**Potential epidemiological changes
for livestock piroplasmoses
in North Africa**

Climatic changes

Vectors

Hosts

Epidemiological changes



1. Risks associated to new vector tick species

New pathogens:

T. lestoquardi / H. anatolicum

Cowdriosis/A. variegatum?

Change in transmission modalities endemic disease :

T. annulata / H. anatolicum

versus

T.annulata / H. detritum

2. Modifications piroplasms distribution

Reduction of endemic zones

B. divergens/ Ixodes ricinus

Extension of endemic zones

T. annulata if / H. dromedarii (occurring Mauritania)

B. ovis / R. turanicus (experimental vector)

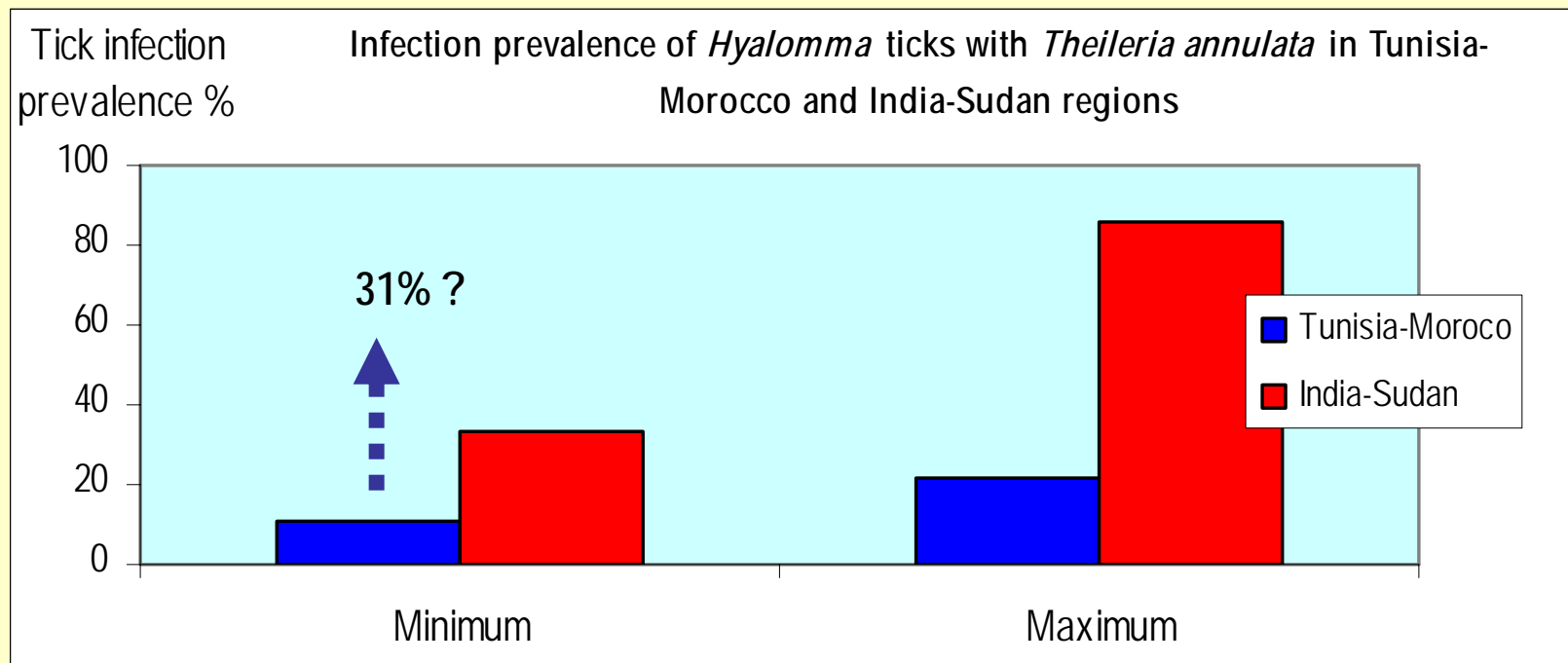
3. Modification seasonality patterns

Longer disease seasons: piroplasms/ "summer" ticks

Shorter disease seasons: hygrophilic ticks (ex: B.divergens/I.ricinus)

4. Quantum of infection (dose dependant diseases)

T. annulata in *H. detritum* and *H. anatolicum*



H. detritum : summer/autumn tick, phase hibernation,
H. anatolicum: active throughout the year

5. Hosts related changes

Density animals:

biodiversity

decrease/increase (drought) influence tick population

Circulation between regions (food quest, trade):

introduction ticks/pathogens in new regions (seeding)

Centre and South toward North

5. Hosts related changes

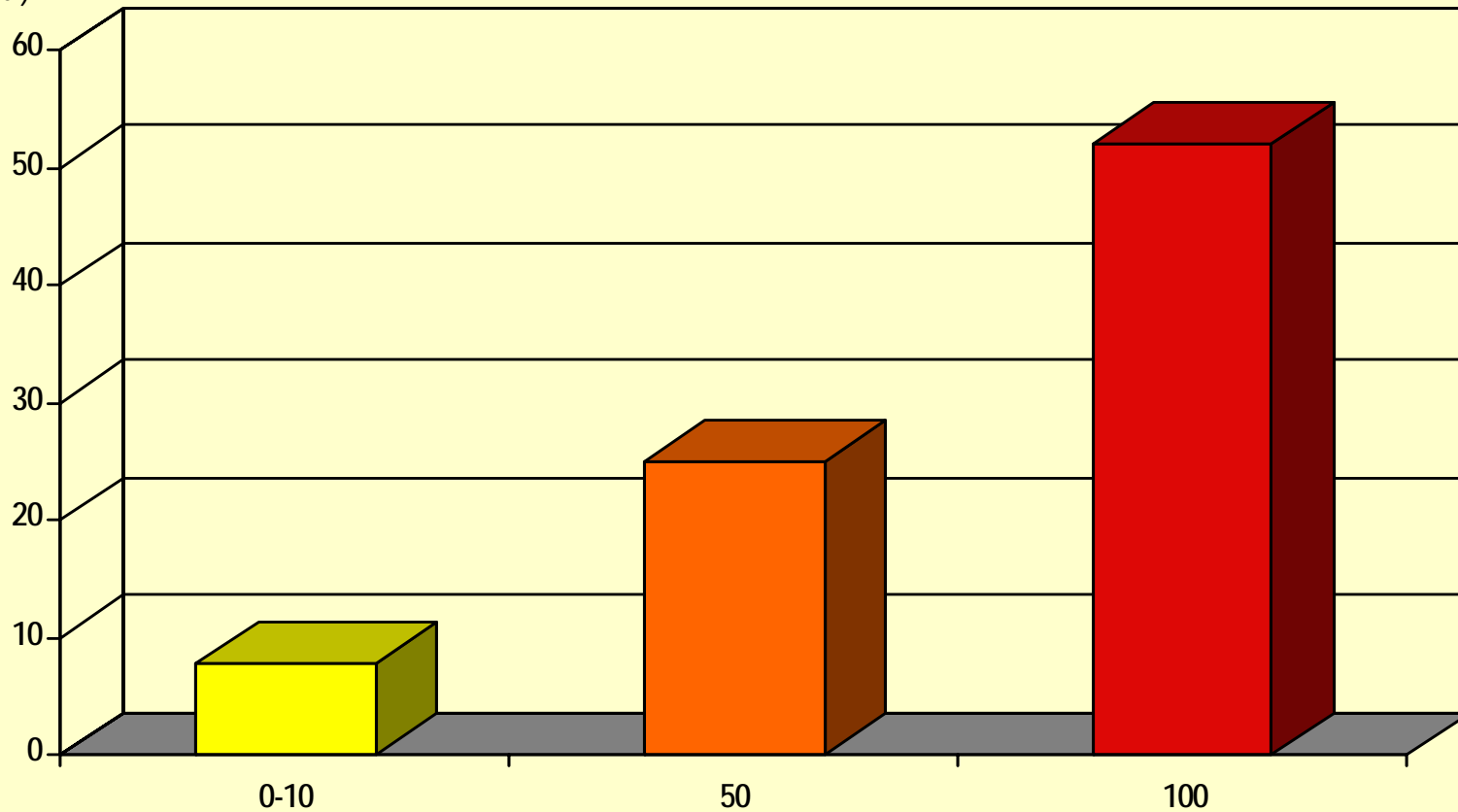
Nutrition (less resources):

*priority food / animal health
deficiencies (global/selective): effect on immunity*

Modification profile herds:

*Better resilience of small stockholders/big farms
Animal breeds (genetic resistance)
Management, landscape*

Incidence of
theileriosis (%)



Proportion of calves with black and white coat (%)

Incidence of clinical tropical theileriosis following diffusion of black and white cattle phenotype in the same endemic farms (1991-2000)

Are we facing new epidemiological challenges ?
(epidemiological stress)

New diseases ?

New epidemiological features?

Changes in endemic states?

Are they all due to climate?

Capacity of adaptation farmers

Preparedness veterinary services

Climatic changes

Emergence new diseases
Emergence new epidemiological patterns

Epidemiological stress

Scientific (+ national) community and institutions

Preparedness veterinary services
Capacity of adaptation farmers