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Animal production in the Caribbean and climate change concerns. Experience from the Caribbean in term of adaptation of local breeds

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Animal production in the Caribbean and climate change concerns

Experience from the Caribbean in term of adaptation of local breeds



INTRODUCTION

- **Very diversified production systems:**

Some specialized ranching systems / indoor systems
but mostly mixed farming systems,
where animal and crop production are complementary



- **No real « native Caribbean » livestock**

but shaped by various drivers:

Migration, natural selection pressure, agri-cultural usage
« Recent » tendencies to substitution / « improvement » programs



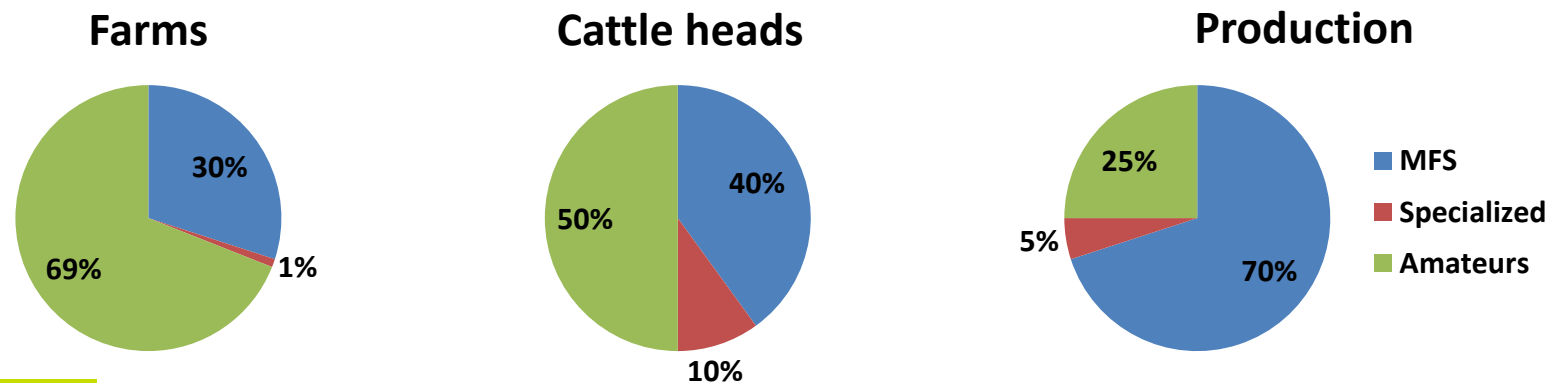
- **Impacts of climate / climate change :**

Direct climatic effects on animal welfare and production
Indirect effects through nutrition, parasitism, diseases
Impact on production systems

Animal production systems

Great diversity of animal production systems

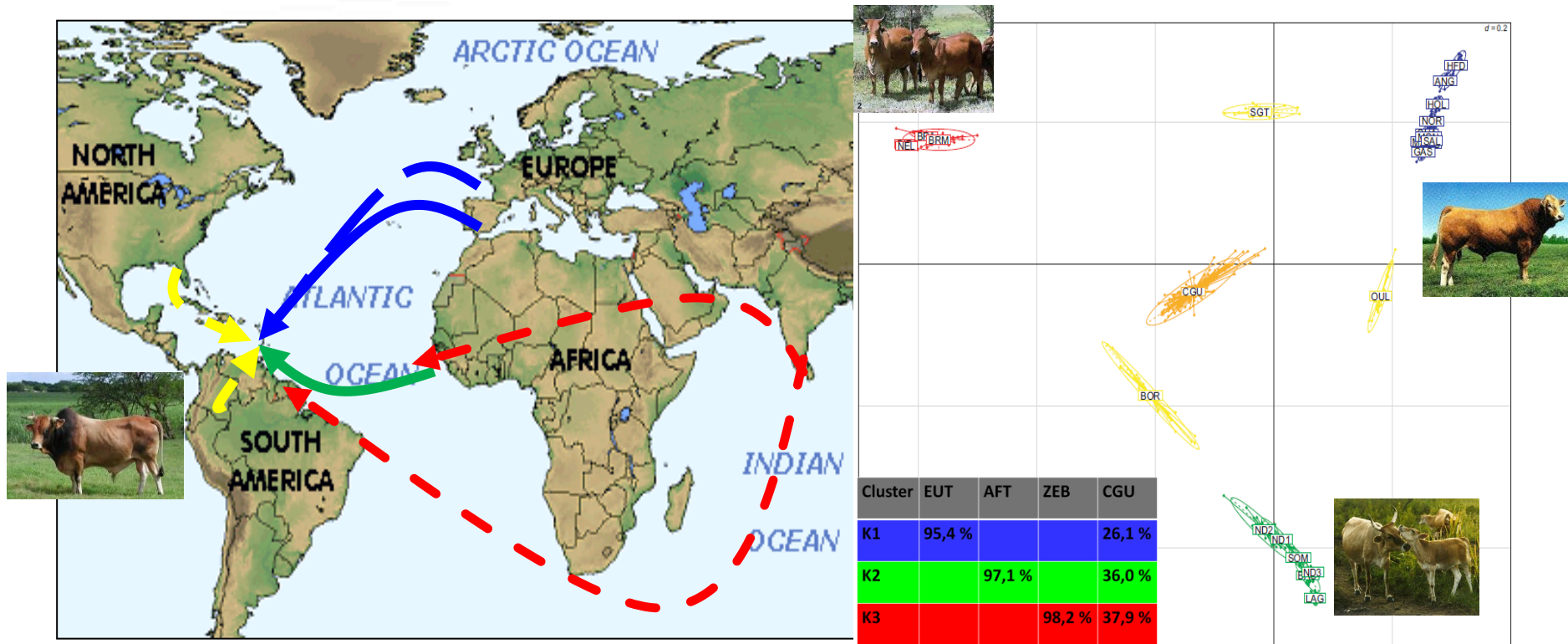
- Most of animal production comes from **mixed farming systems**, in small to medium farms with multi-purpose activities, where crop/livestock are more or less integrated
- **Specialized « Ranching »** (large pastoral lands, where available) **or in confinement** (stalls / feedlots) Crossbreeding or “improved” breeds often associated with improved animal production practices (AI, complementation, health control,...)
- **Backyard animal husbandry or free ranging animals (« amateurs »)** Local Creole cattle (goat, sheep, pig,...) remain the base of **traditional and “amateur” herds**, often maintained with less technical interventions, and thus achieving low productivity



Animal genetic resources

“Local” breeds shaped by a complex history

- Migration, admixture, selective pressure (natural or oriented), usages



- Recently influenced by imports of more productive / specialized international breeds:
 Zebus, Holstein, continental or british beef breeds; Wool sheep breeds (Dorset, Lacaune,...)
 Milk goat breed (Alpine, Toggenburg, Saanen,...), Boer; Commercial pig lines

Animal genetic resources

“Local” breeds linked to “transboundary breed” generic concept

Transboundary cattle

- Latin American origin**
 - Creole
 - Puerto Rican
 - Indo-Braslian
 - Nelore
- African origin**
 - Bonsmara
 - N'dama
- South Asian origin**
 - Gir
 - Sahiwal
 - Red Sindhi



Creole cattle from Guadeloupe

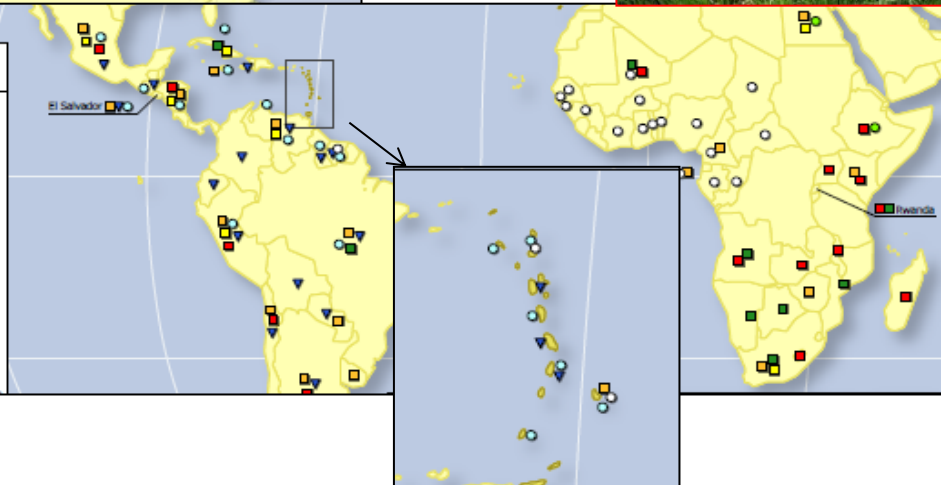
Brahman



Martinik hair sheep

Transboundary sheep

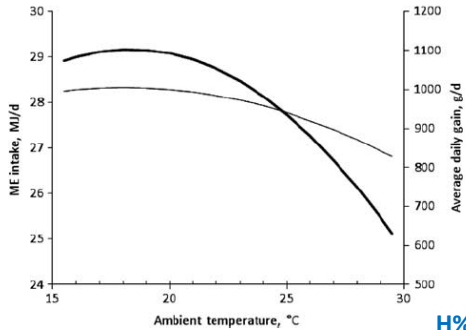
- Barbados Black Belly
- Criollo
- West African Dwarf
- Merino
- Romanov
- Suffolk
- Karakul
- Awassi



Creole goat : present in 24 countries
+ probably related to african breeds (West African Dwarf, Sahelian goat,...)

Constraints to animal production

Direct climatic effects on animal welfare and production

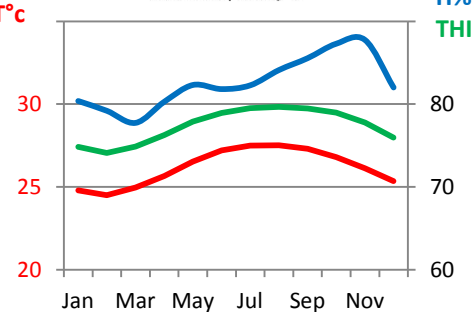


Major concern in tropical / sub tropical regions

Heat stress effect on fertility (AR: Collier, 2009; FL: Hansen, 2009)

Milk production (GA: Misztal, 2006, Australia: Hayes et al., 2011)

Pig (Brasil: Univ. Viçosa); Poultry (Venezuela: Univ. Central)



High heat and humidity all over the year (THI > 75 = mid to severe HS)

Few interest for climatic change : heat is already a problem !

Solutions to mitigate : (Renaudeau et al., 2012)

Building (shade, ventilation, water spraying, ...): effective, but costly

Animal feeding: improve nutrition with higher protein density (pigs) (Silva et al., 2009)

Adaptation of local breeds:

«Slick hair coat» in Romosinuano / Senepol (Olson, 2003; Flori, 2012)

Creole pig more tolerant than LW (Gourdine, 2013)

“PigHeat” Project



Constraints to animal production

Indirect effects on nutritive resources



More controversial

Negative	Positive
seasonal shortage	great variety of resources available
C4 less nutritious, rapid aging	high dry matter production potential

Solutions to mitigate

Irrigation (when water supply is available: competition with city, crops / lack of ponds)

Coping animal production cycle with seasonal variations of forage availability

Use of alternate feeding sources (crop residues, tree foliage, by-products, ...)

Reduce GHG emission: tannins and legumes, starch, rumen micro biome

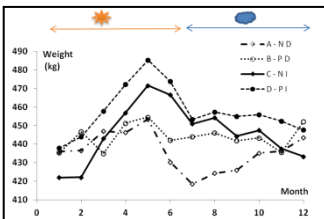
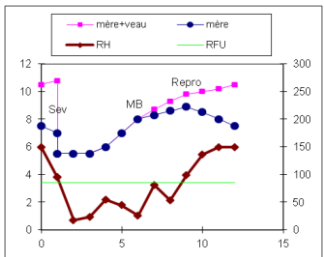
(Archimede, 2013) local breeds of ruminants (Martinik Hair Sheep vs Texel)

Adaptation

body reserves mobilisation/reconstitution

(Signature selection

“feed efficiency” (digestive, resources allocation, metabolic)



Constraints to animal production

Indirect effects on animal health status (and human)



- Incidence of internal parasites (prevalence, level of infestation)

Presence / spread of ticks and TBD (cowdriosis, dermatophilosis, babesiosis, ...)

Emergence of new diseases (vector borne: West Nile, infectious disease: influenza..)

- Strategies to mitigate:

- Tick control / eradication : failed or poorly sustainable (acaricide resistance)

- Integrated control of gastro intestinal parasites

- Adaptation :

- Creole cattle resistant to dermatophilosis

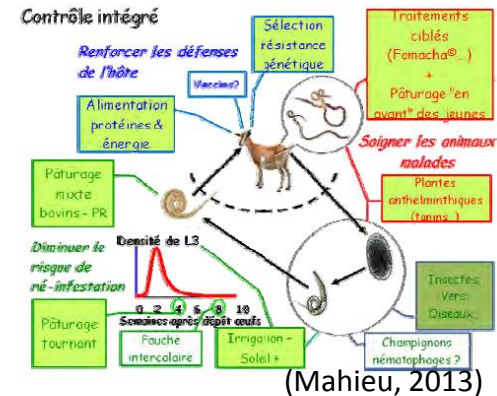
- Selection for GIS resistance in Creole goats

- QTL and functional aspects of resistance (in go)



Chr.	Traits	Position (cM)	Mean QTL effect	
3	PCV ₁₁	27	1.88	* IFNG
6	Weight _{216d}	3	0.95	*
5	Eosinophil ₁₁	0	4.60	* IL-3
8	Eosinophil ₁₁	81	1.34	**
9	PCV ₁₁	76	1.56	*
12	IgA-ESP ₁₁	12	1.04	*
14	Eosinophil ₁₁	67	1.36	*
18	PCV ₁₁	0	1.24	* IgE
22	FEC ₁₁	0	1.17	**
26	FEC ₁₁	3	1.07	**

*: P<0,05; **: P<0,01

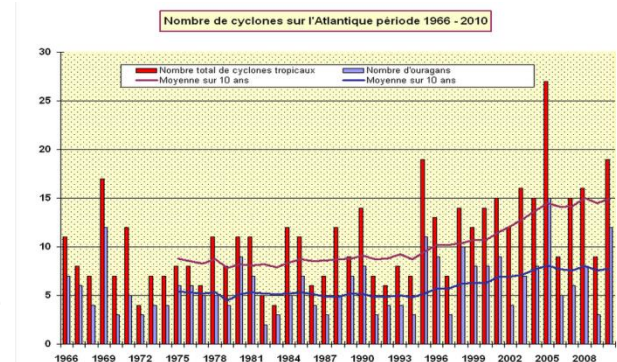


Constraints to animal production

Incidence of Global changes on agricultural systems

□ Higher concern about uncertainty and sudden climatic events:

- Frequency of storms and hurricanes
- More frequent and sudden floods
(Martinica rainfall in april 2013: 500 – 800 mm / 400 %)
- Sea submersion risks in lowlands
- More frequent and longer droughts / shortage



□ Great Importance of global changes, and impact on resilience of agricultural systems:

- Competition for crop production and human feed
- Limited availability of land (islands; urbanization; price of lands)
- Interaction with natural environment (forest, corral reefs)
- Energetic transition and inputs costs / scarcity (water, mineral fertilizers,...)
- Robustness of animals (variable environment, forage shortage, roughages,)

(global: Agrimonde prospective, local: Gaia-trop project)



Thank you for your attention !!



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