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 pastural 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

- Creole goat: present in 24 countries and probably related to African breeds (West African Dwarf, Sahelian goat, etc.)
- Creole cattle: from Guadeloupe
- Martinik hair sheep
- Brahman
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

<table>
<thead>
<tr>
<th>Negative</th>
<th>Positive</th>
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<td>seasonal shortage</td>
<td>great variety of resources available</td>
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<td>C4 less nutritious, rapid aging</td>
<td>high dry matter production potential</td>
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- 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

  “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 gc
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!!