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Session 24. Selection in harsh environments

Interaction between genotype and environment for cattle growth in the tropics : implications for selection

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Background of the topic (1/3)

- Tropical environment induces contrasted breeding conditions, more or less unfavourable, due to :
  climate, pathogens, feeding resources, management , animal genetic resources

- These components should be taken into account in selection programs for tropical regions

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Background of the topic (2/3)

- Beef cattle: selection mainly based on growth at pasture
  (Lobo and Madalena, 2000; Plasse et al., 2002; Burrow et al. 2004)

- Correlations between the growth at pasture and adaptation traits (ticks, internal parasites, heat tolerance, ...)
  (Burrow et al., 2001, 2006)

- Adaptive traits are taken into account as a whole in the selection objective, or separately *(Prayaga et al., 2006)*

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Background of the topic (3/3)

- Phenotypic plasticity: expression of different phenotypes in different environments *(de Jong and Bijma, 2002)*

- Correlations between traits vary according to the selection environment *(Castillo et al., 2002)*

- Higher importance of the GxE interaction in the tropics
  (Menendez Buxadera and Mandonnet, 2006; Ceron-Munoz et al., 2004)

- Magnitude of GxE interaction increases when the difference in environmental conditions becomes larger *(Pegolo et al., 2006)*

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Aim of the study

GxE Interactions

- Analyse the GxE interaction on growth traits in tropical conditions
  in two different fattening systems (intensive *vs.* pasture)
  with a local beef cattle breed (Creole cattle of Guadeloupe)
- Investigate relationship with other traits
- Application of Multivariate analysis and Random Regression Model to study genetic parameters of growth in various environments

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Materials and methods

- 516 animals from 27 sires born between 1998 and 2005 *(still in progress)*
- Suckling period at pasture, with a weaning age of 212 days
- After weaning:
  intensive feeding regime (IFR) (284 animals; 149 M / 135 F)
  pasture (232 animals; 100 M/132 F)
- Animals regularly weighted every 15 days
  (on average: 17 weights/ animal)
- Random regression model: comparison between feeding system along the whole fattening period

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Results and discussion

- Basic results

Variable	Intensive feeding regime Mean	StDev		Pasture Mean	StDev
Birth weight	27	4.41		27	4.34
Weaning weight	155	29.79	ns	159	26.64
Suckling ADG	606	139.22		626	120.39
Weight at 9 months	176	35.59		172	27.93
Weight at 12 months	237	48.81		201	37.87
Weight at 15 months	297	54.58	**	246	50.29
Weight at 18 months	342	59.26		287	56.83
Fattening ADG	678	161.91		413	153.63

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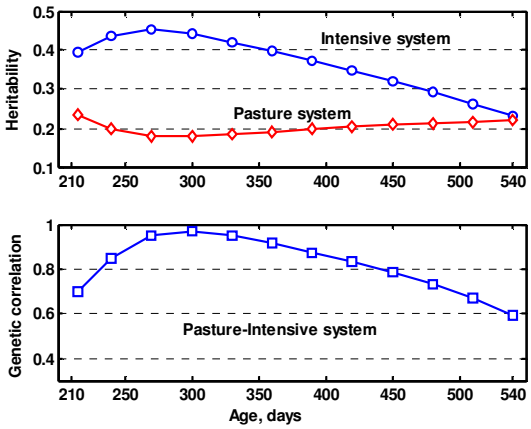
Results and discussion

- Genetic parameters (Random regression analysis)



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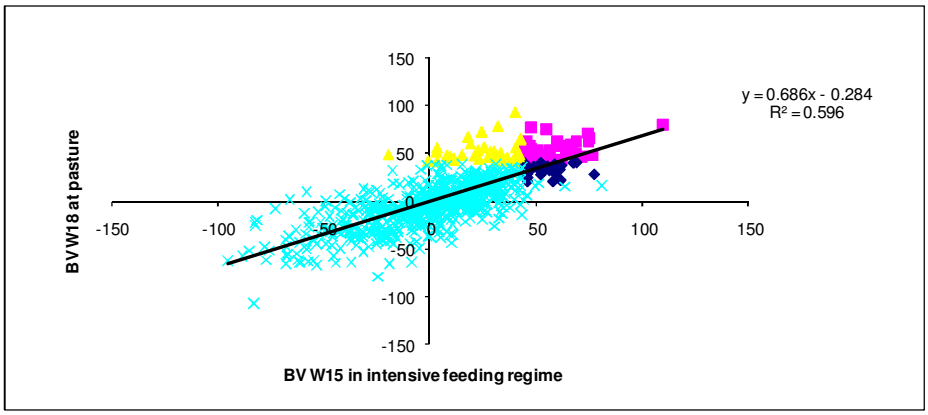
Results and discussion

- Breeding value estimations



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Conclusion

- Confirmation of the GxE interactions on growth in tropical climate
  (Barwick et al., 2006)

- Consequences :
  - Relative response to selection : 60 %
  - Choose the selection model according to the production system

- Relationship with other traits under investigation:
  - ingestion and digestion of different feeds
  - body composition and morphological development

- *Genetic markers ?*

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Thank you for your attention

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