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8 WCGALP August 17th, 2006, Belo Horizonte-Brasil

Characterization of blood immunoglobulin responses to *Haemonchus contortus* in resistant and sensible creole kids naturally infected with gastrointestinal strongyles

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ALIMENTATION
AGRICULTURE
ENVIRONNEMENT



Introduction 1

- > **Control of gastrointestinal nematode** : a challenge for the sustainability of small ruminant production in humid tropics
- > **Creole goats** : - resistance to strongyles is genetically controlled
 - genetically original resource possessing favorable allele for adaptation
- **Good model for the characterisation of mechanisms and gene of resistance**

Material and methods

Herd management

- > INRA Experimental farm – Guadeloupe (FWI)
- > Flock grazed on pasture and naturally infected with *H. contortus*, *T. colubriformis* and *O. columbianum*
- > After weaning: drenching every 8 weeks
- > Faecal samples collected at 7 and 11 month of age for genetic evaluation since 1995

Material and methods

- > 2 extreme groups of 5 animals (7 months of age)
- > Average breeding values on faecal egg counts (FEC) distant of 0.88 genetic standard deviation
- > FEC at 7 months 4 times lower in resistant kids compared to sensibles kids
- Parasitological and immunological parameters measured on the 2 extreme groups 7 and 8 weeks after drenching

Material and methods

Data collected

- > Necropsy and worm counts occurred on week 8
- > FEC, PCV and eosinophil concentration estimated at week 7 and 8
- > Immunoglobulin (Ig) G, A, E humoral responses against *H. contortus* estimated by ELISA at week 7 and 8

Material and methods

Statistical analyses

- > Effect of kids resistance status tested by the non parametric Kruskal-Wallis test**
- > Correlations between parameters estimated with Spearman rank coefficients**

Results

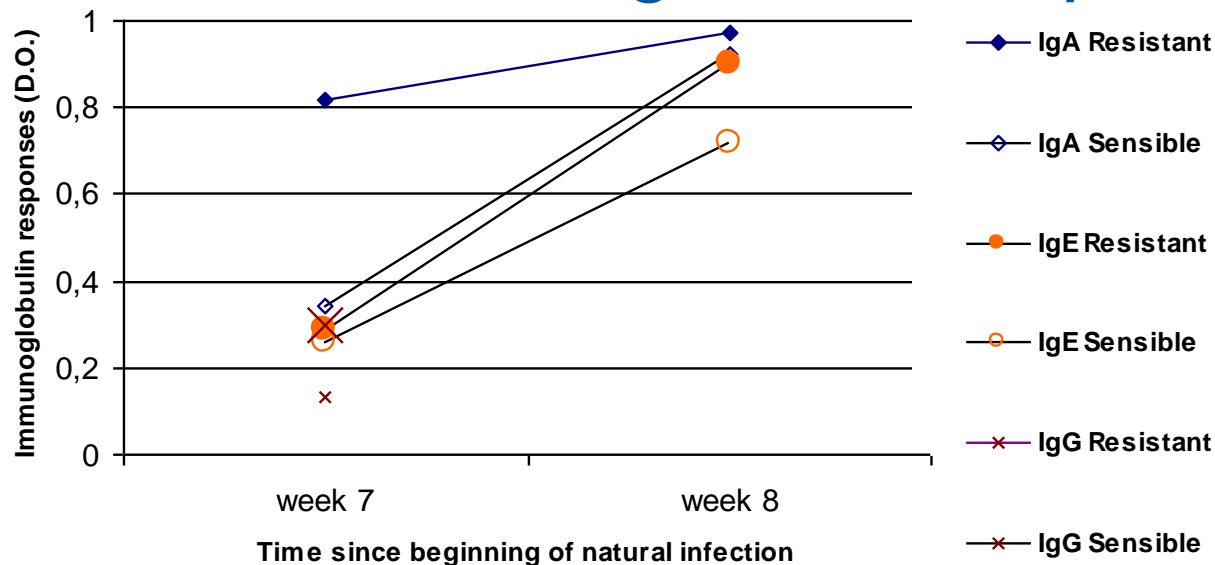
Characterization of kids in resistant or sensible

Kid status	LFEC Breeding Value ($\log(\text{epg}+15)$)	Phenotypes Week 7 of reinfection			Phenotypes Week 8 of reinfection	
		Average FEC at 210d (epg)	PCV (%)	EOS (cells/ ml)	FEC (epg)	LW at slaughter (kg)
Resistant	-0.215	204	24	198	1104	10.7
Sensible	0.134	924	20	384	2592	8.6
KWtest ⁽¹⁾ significance	**	**	°	ns	ns	ns

(1) Kruskal-Wallis test significance ° $P < 0.1$; * $P < 0.05$; ** $P < 0.01$; ns not significant

Results

Evolution of immunoglobulin response



>FEC low (week 7) : higher levels of IgA and IgG in resistant animals
IgE no significant differences

>FEC increased (week 8) : higher levels of IgE in resistant animals
Significant increase in the serum level of Ig

➤ Induction of Ig response not dependent on the worm burden but on prolificacy of female worms?

Results

Characteristics of *H. contortus* worm burden measured at Week 8 of reinfection

Kid status	L4	Juvenile worms	Adult worms	Female prolificacy	Juvenile/adult ratio	Total worm burden
Resistant	198	2126	216	59	36.5	2342
Sensible	10	636	733	83	2	1370
KWtest (1) significance	**	*	ns	ns	***	ns

(1) Kruskal-Wallis test significance * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$; ns not significant

>20 times more L4 in resistant kids

>juvenile/adult ratio 15 times higher in resistant kids

➤ resistance occurred by controlling worm maturation?

Results

- > **IgG and IgA at week 7 positively correlated with the number of immature worms (0.61 $P < 0.10$ and 0.78 $P < 0.01$)**
- > **Lower FEC in resistant animals at week 7 and 8 not correlated with female prolificacy measured at week 8.**
- **Ig : an indicator of the number of immature worms?**
- **the precise function of Ig in the control of worm maturation?**

Conclusion

- > Results on immunological response to strongyles in goats are very scarce
- > Despite a reduced genetic segregation between resistant and sensible kids and the complexity of working in natural infection :
 - Intensive immune response against *H. contortus* occurred in more resistant kids
 - Underlying mechanisms of delayed worm maturation and lower prolificacy?