



Genome regions and metabolic processes associated with tick resistance in beef cattle

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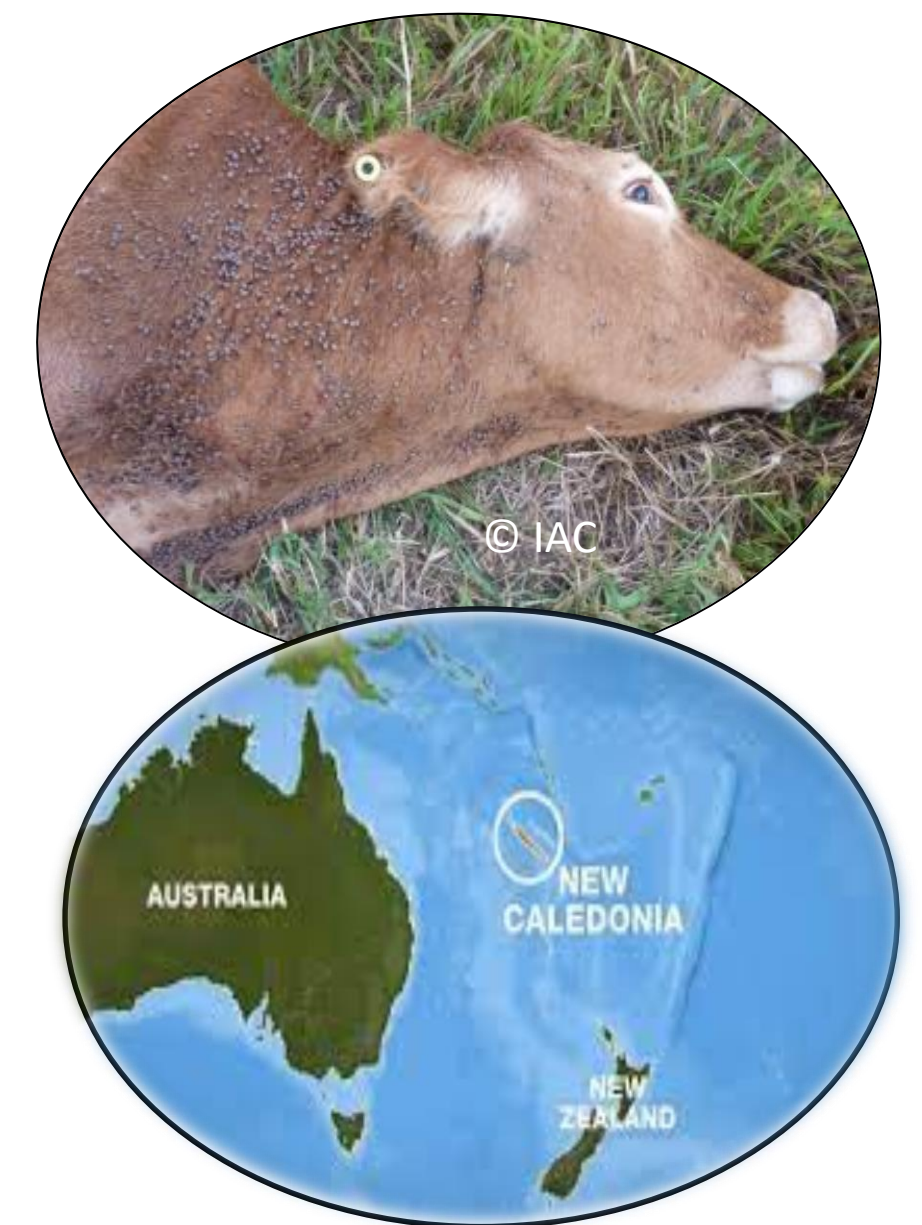
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Introduction

Ticks cause significant production losses in cattle. The parasite is a severe issue in tropical and sub-tropical areas and new regions will become at risk in the future due to climate change.

Is there a genomic control and what are the metabolic processes involved in host resistance ?

→ let's investigate through the example of the French New Caledonia



Phenotypes

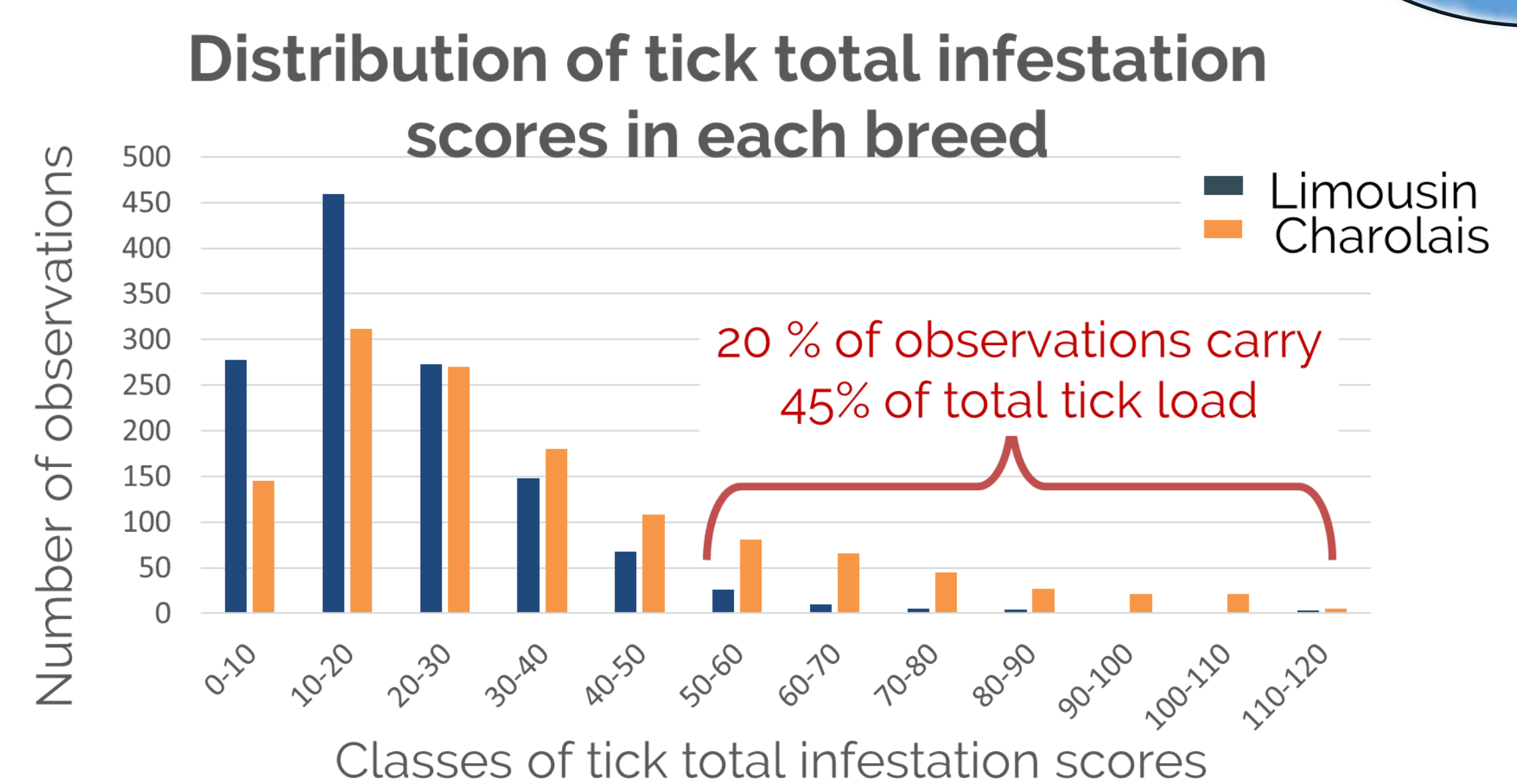
- ❖ 3 scores: load of adult ticks, load of juvenile ticks, total score
- ❖ 16 commercial farms with regular visits from 2014 to 2021



302 Charolais animals
1,281 scores given



556 Limousin animals
1,273 scores given



Take home message

Tick resistance has a polygenic control. This study, despite a low number of animals, identified promising associated genome regions and metabolic processes which can pave the way for future investigations

Associated genome regions

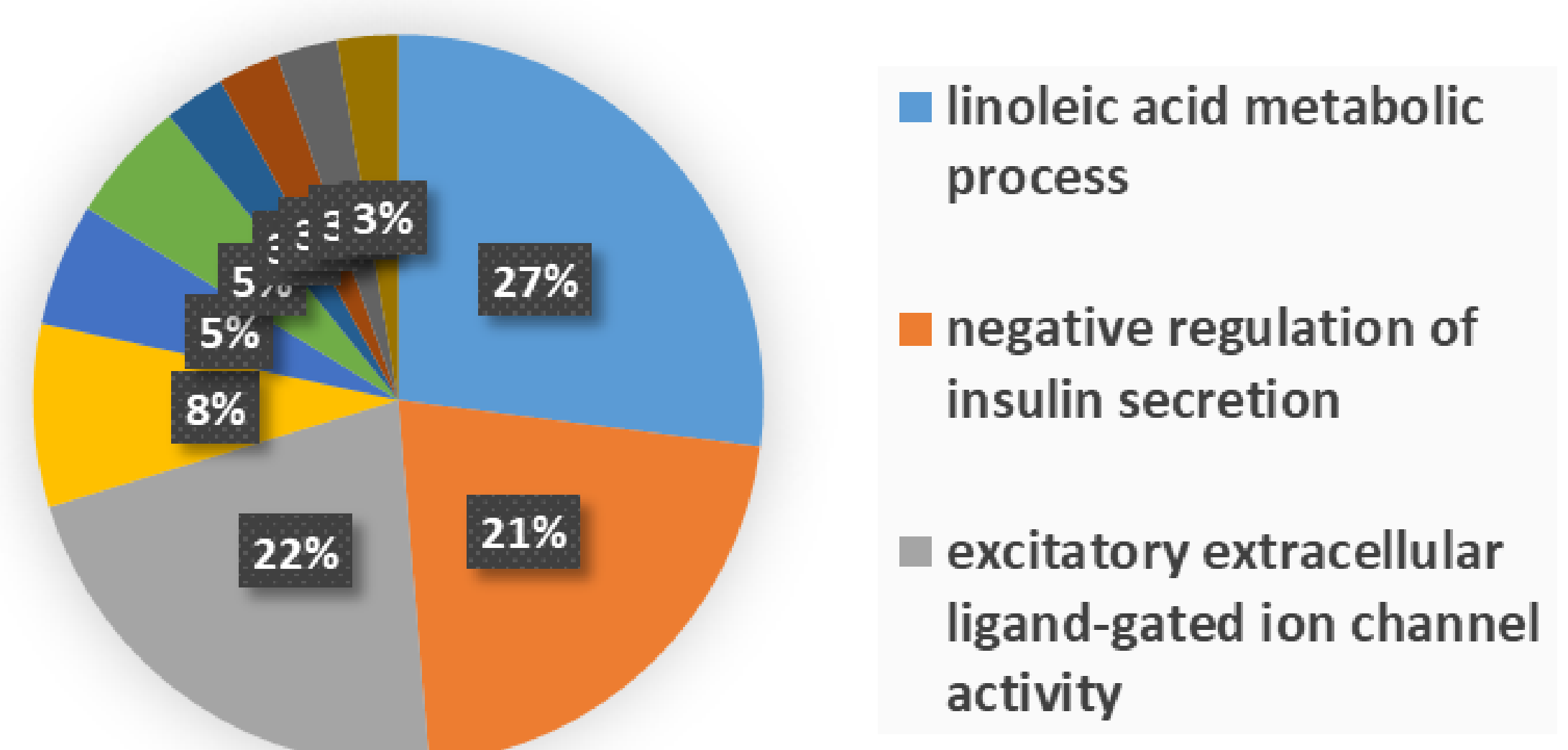
- ❖ Animals genotyped with the 50K EuroGMD SNPchip
- ❖ GLM applied to correct performances by fixed effects (sex, age, herd, technician and period) and residuals averaged by animal
- ❖ GWAS performed with GCTA software

Chromosome	Position (Mb)	Associated trait(s)	Probability (max SNP)	Breed
1	155	Juveniles	10 ⁻⁶	Limousin
2	74	Juveniles	10 ⁻⁶	Charolais
2	80	Juveniles, total	10 ⁻⁶	Charolais
3	77-79	Adults	10 ⁻⁹	Limousin
9	82	Adults	10 ⁻⁷	Limousin
10	10	Adults	10 ⁻⁸	Limousin
11	31	Adults	10 ⁻⁶	Limousin
11	72-80	Adults, juveniles, total	10 ⁻¹¹	Limousin
12	22	Adults	10 ⁻⁶	Limousin
13	72-77	Adults, total	10 ⁻¹¹	Limousin
15	36	Adults	10 ⁻⁷	Limousin
15	43	Juveniles, total	10 ⁻⁶	Charolais
16	73	Adults	10 ⁻⁷	Limousin
19	22-26	Juveniles	10 ⁻⁶	Limousin
19	40	Adults	10 ⁻⁷	Limousin
21	31	Juveniles	10 ⁻⁷	Charolais
24	51	Adults	10 ⁻⁷	Limousin
27	14	Juveniles	10 ⁻⁶	Charolais

Associated metabolic processes

- ❖ Genes within 1Mb of GWAS peaks
- ❖ Gene ontology with cytoscape software

Over-represented processes (% terms per group)



- 13 associated regions in Limousin and 5 in Charolais
- Some regions matching previous literature (other breeds)
- 37 terms from 9 groups are over-represented
- The most over-represented process is known to play a role in skin firmness

