

Analysis of Genes Affecting Ascites Susceptibility in Broilers



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Collaborators: Nicholas
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Credits

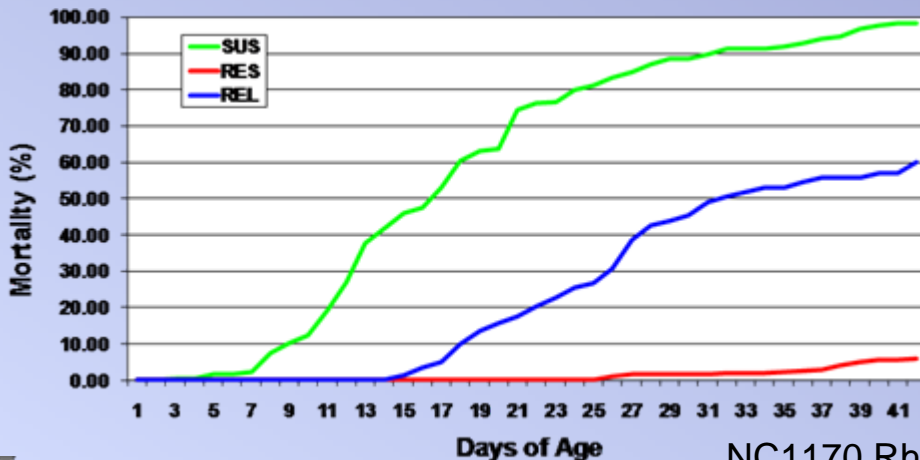
- Graduate Students: Sriram Krishnamoorthy, Sharath Munnaluri, Khaloud AlZahrani, Brenda Flack, Nyoman Fitri
- Adnan Al-Rubaye: qPCR analysis of candidate genes (P0607)
- Shatovisha Dey: AGTR1 and UTS2D SNPs (P0608)
- Sohita Ojha: Sperm mobility and PGC cultures. (P0599)
- Undergraduates: N. Brooke Peeples, MariAlison Murry, Lynde DeLung, Joshua Blaylock
- Funding: NIH NHLBI R15, Arkansas Biosciences Institute, NIFA-AFRI

Contents

- Review of Background
- Proposed Work for 2011
- What we got done

Ascites

- Water belly
 - Rapid growth under poor conditions
 - Hypoxia, dust, rapid early body growth
 - Losses about \$10M/yr
 - Control with ventilation and feed restriction
 - Physiology and histology similar to human PAH
- Anthony: Genetically selected breeder lines for >14 generations using sib selection and hypobaric chamber



Line	Simulated Altitude	Percent Survival
RES	12,000 ft	93%
REL	12,000 ft	40%
SUS	8,000 ft	2%

GWAS Project

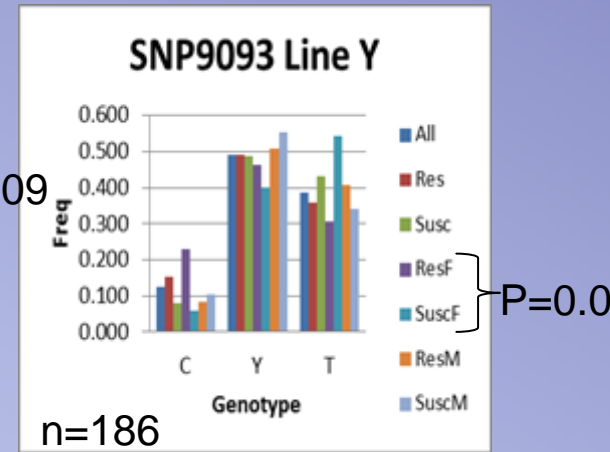
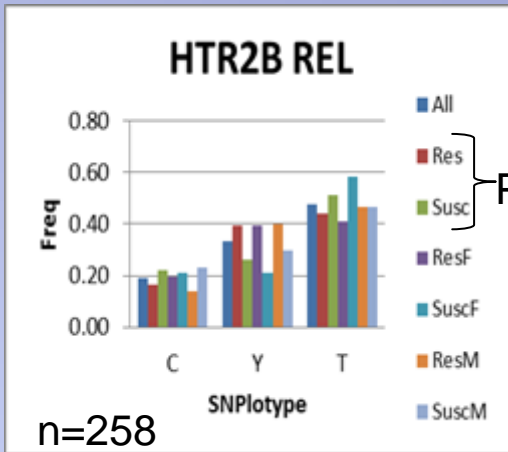
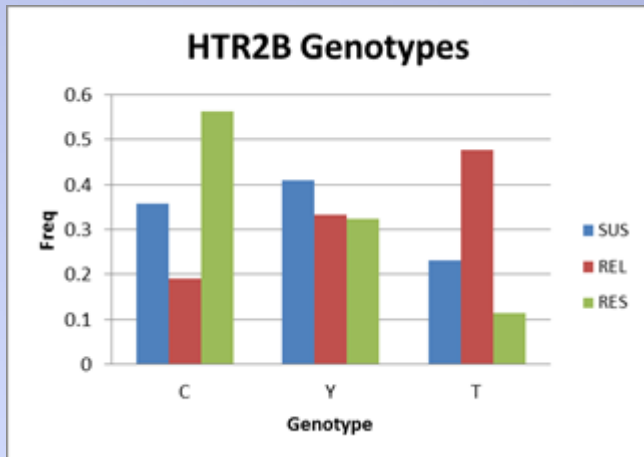
- NRSP8/NC1007 USDA project
- Identified 8 chromosomal regions
- Used VNTRs to further analyze these regions
 - 5 confirmed in one or more populations
- Identified candidate genes in 3 regions based on PAH in humans or mice
 - Gga 9:13-14 Mbp
 - AGTR1
 - UTS2D
 - Gga 9: 16 Mbp
 - HTR2B
 - Gga 2:2 Mbp
 - ACE

Plans for 2011

- New phenotyped population of SUS
 - Genotype for VNTRs
- New GWAS for REL samples
- Complete ACE resequence
- SNPlotyping for HTR2B and AGTR1
 - SUS and REL

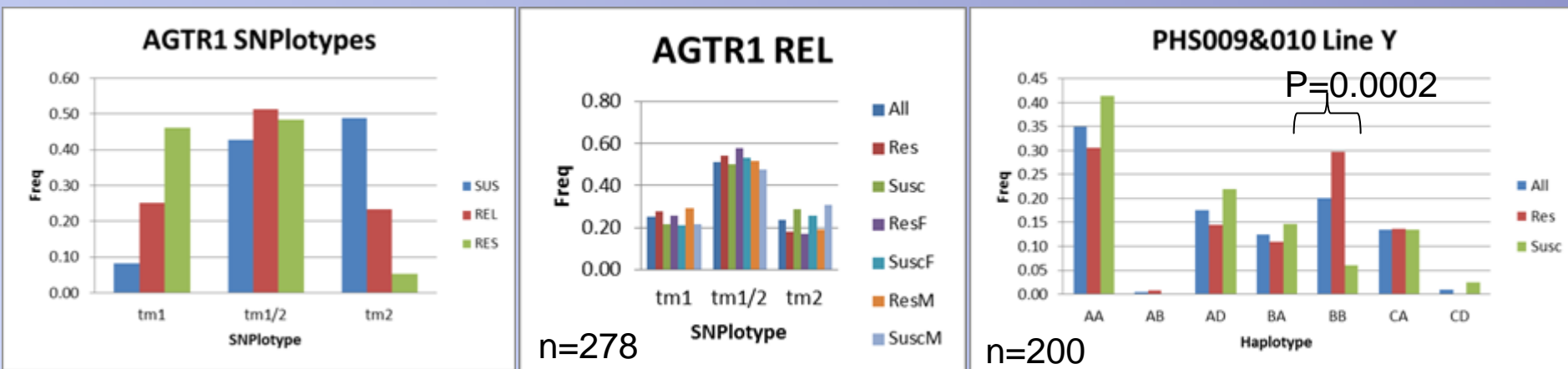
HTR2B

- 3 exons; Exon 3 is only coding exon
 - SNP early in Exon 3
 - SNP frequencies markedly different in 3 commercial lines



AGTR1

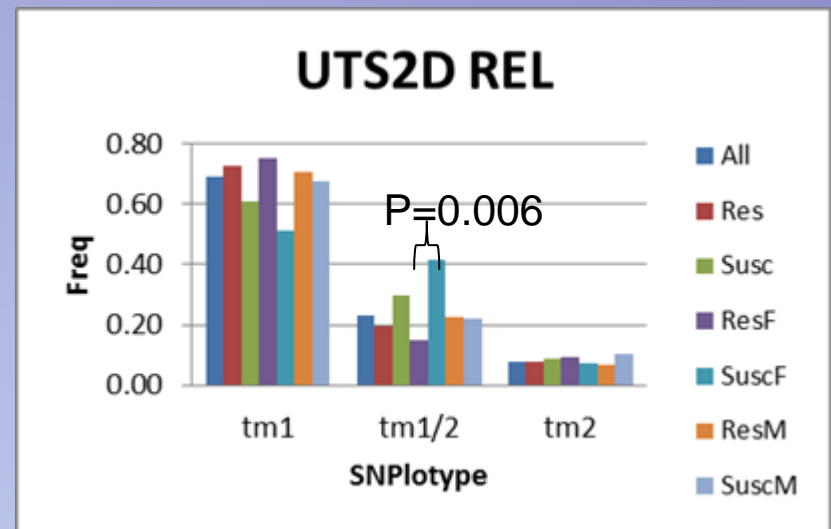
- Identified two alleles based on 16 SNPs distinct from JF (tm2 is WL)
- No significance in REL or 3 commercial lines
 - Different from data from VNTRs



UTS2D

- 5 exons; sequenced intron 3
 - 12 SNPs defining 5 alleles (4 non-JF\
 - WL and 3 others in our lines
 - SNPlotyping underway
 - Female association in REL

		Position													
Line	DNA	4086	4140	4155	4192	4198	4269	4282	4300	4316	4431	4495	4528	4539	4547
	JF	G	TAA	-	C	A	G	A	T	T	G	G	C	C	T
	WL	G	GAG	A	C	G	A	A	T	C	A	G	C	A	C
SUS	281#	KAR	a	C	G	A	R	Y	T	G	G	C	C	C	T
RES	8301#	KAR	a	Y	G	A	A	Y	Y	R	G	Y	M	Y	
RES	8415A	TAA	-	T	G	G	A	C	T	G	A	C	C	C	T
RES	8465A	TAA	-	T	G	G	A	C	T	G	A	C	C	C	T
RES	8496#	KAR	a	Y	G	R	A	Y	Y	R	R	C	M	Y	
RES	8550#	KAR	a	C	G	R	A	Y	T	G	R	C	C	C	T
RES	8553#	KAR	a	C	G	R	A	Y	T	G	A	Y	C	C	T
SUS	609A	TAA	-	T	G	G	A	C	T	G	A	C	C	C	T
SUS	739R	TAA	-	Y	G	R	R	C	T	G	R	C	C	C	T
SUS	760G	TAA	-	C	G	A	G	C	T	G	G	C	C	C	T
SUS	785#	KAR	a	C	G	A	R	Y	Y	G	R	C	C	C	T
SUS	789#	KAR	a	Y	G	R	A	Y	T	G	R	C	C	C	T
SUS	852G	TAA	-	C	G	A	G	C	T	G	G	C	C	C	T
SUS	907#	KAR	a	Y	G	R	A	Y	T	G	A	Y	C	C	T
SUS	1090R	TAA	-	Y	G	R	R	C	T	G	R	C	C	C	T



Current Understanding

- Some of our loci are relevant in commercial lines
- Major loci are not shared in all lines
 - Need to do higher density screen
- Some loci affecting ascites in broilers are shared with PAH in mammals

Work planned for 2012

- Determine expression levels of candidate genes in affected tissues
 - Lung, kidney, heart
- Expanded sequence of promoter regions for candidate genes
- Further SNP analysis in experimental and commercial lines
- New GWAS in REL