



Centre for
Tropical Livestock
Genetics and Health

Integrating genetic and genomic analyses to enhance health and productivity of Ethiopian indigenous chickens

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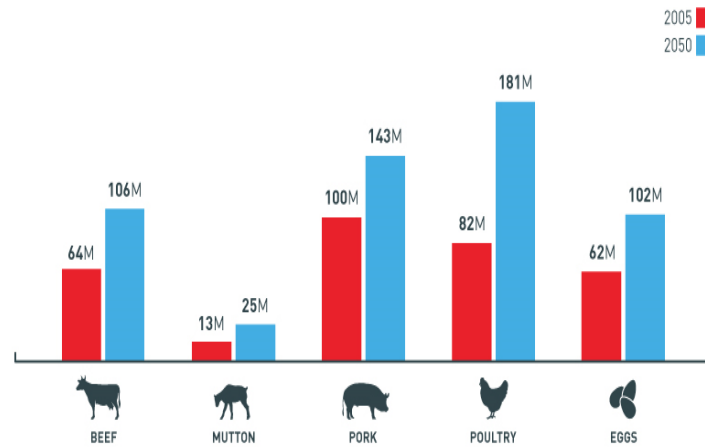


Poultry production

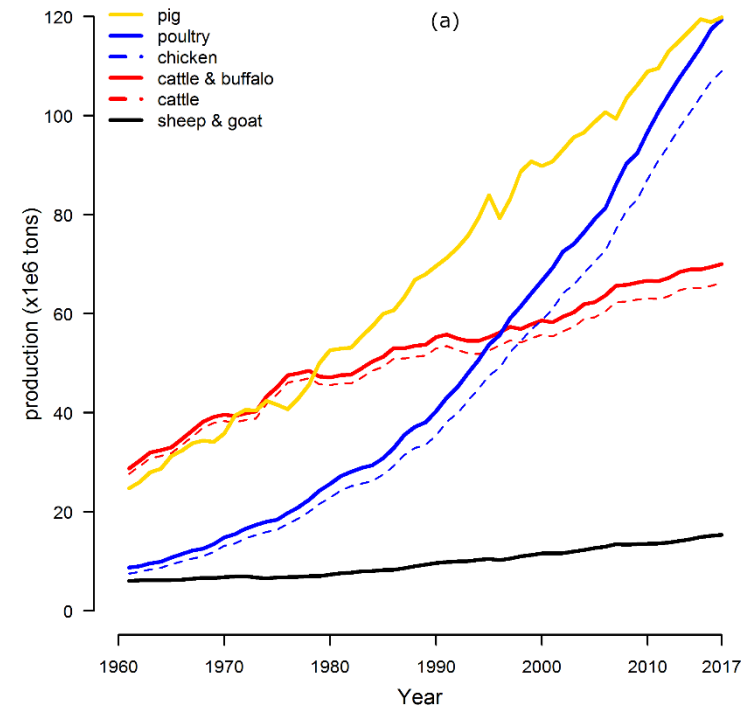
GLOBAL DEMAND FOR MEAT

2005 vs. 2050
(in tonnes)

PREDICTED GROWTH



Source: Food and Agriculture Organization of the United Nations, ESA Working Paper No. 12-03, p. 131



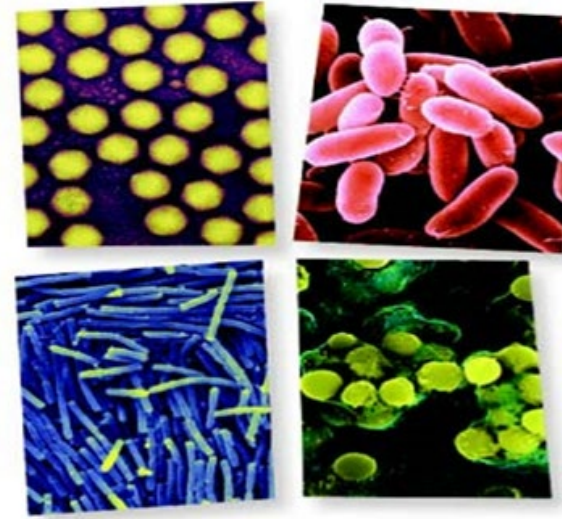


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Increase of infectious disease

- Huge losses (monetary-welfare)
- Food-safety –public health (zoonosis)
- High cost of preventive measures

***Breeding for improved disease resistance
and immune (vaccine) response***



Antibiotic



Resistance





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Improving production, health and immunity of Ethiopian village chickens





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Background (CH4D)

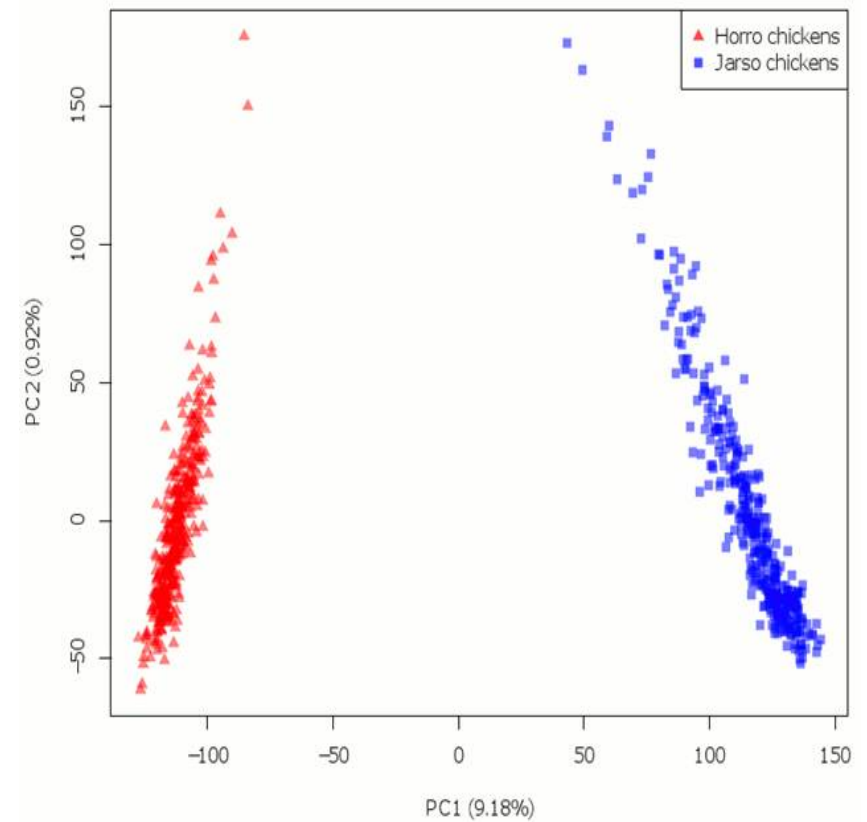
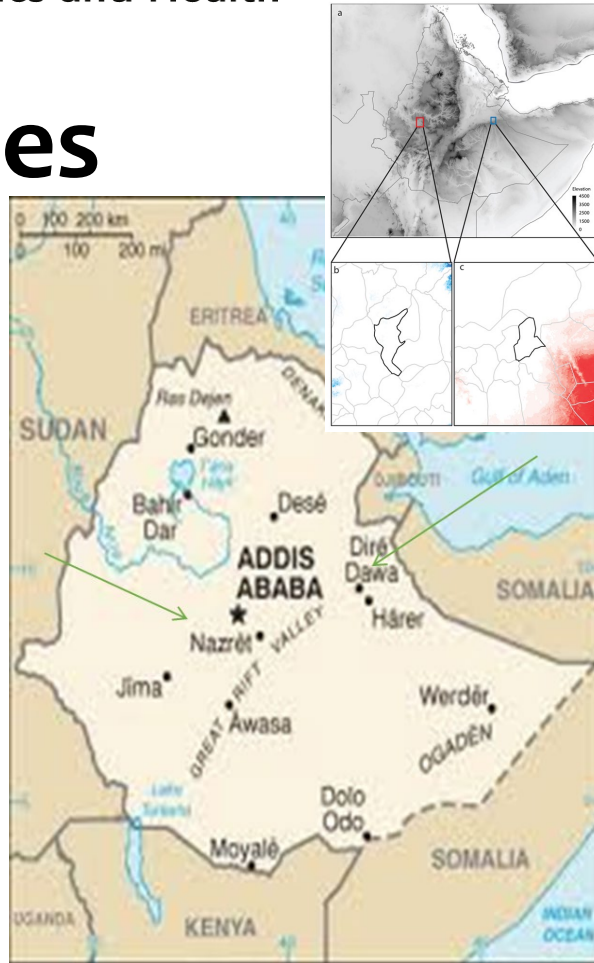


- Indigenous chickens:
 - well adapted
 - low productivity
 - infectious diseases

Is it also possible to select for enhanced antibody responses and resistance to infectious diseases?

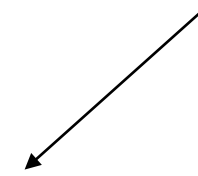
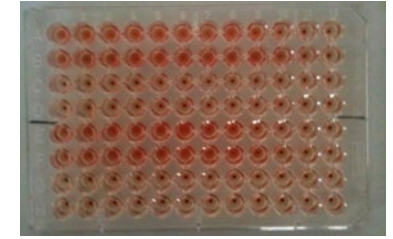


Ecotypes





Major infectious diseases-Phenotyping



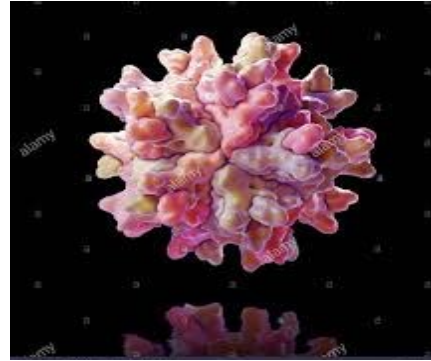
Fowl typhoid



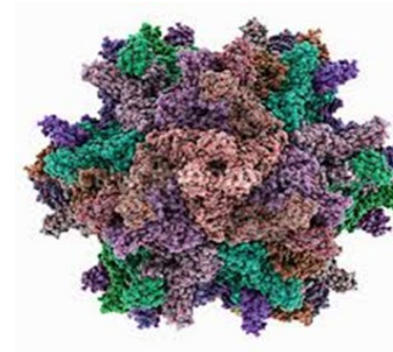
Fowl cholera



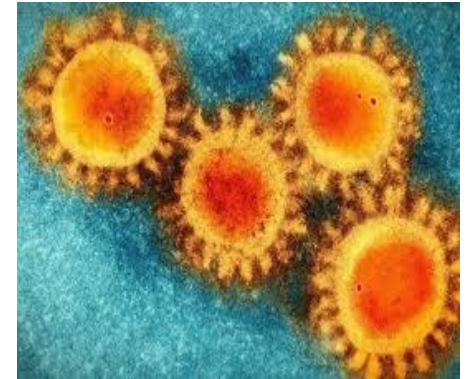
Infectious Bursal Disease



Marek's Disease



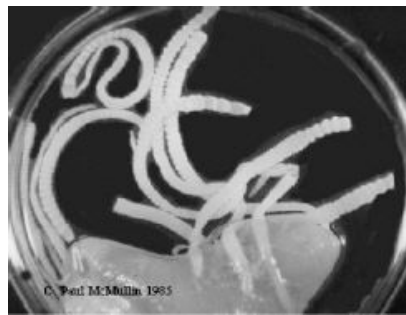
Newcastle Disease



Coccidiosis



Cestodes

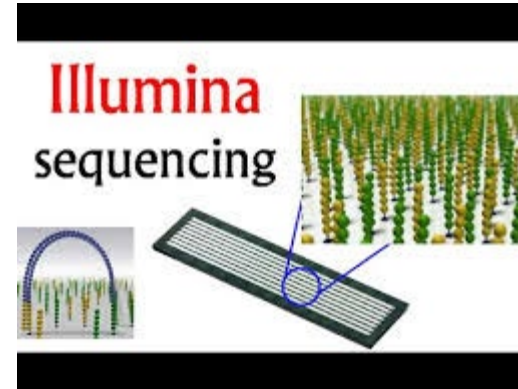


Ascarids





Genomic analysis



		Strongly agree/agree	Neither agree nor disagree	Disagree
Home - School Relationships	The communication between school and home (PT communications, school reports, newsletters, correspondence with teachers, etc.) is good.	94%	3%	3%
	The school meets my child's particular needs.	100%		
	Staff communicate about progressing the school with questions, a problem or complaint.	100%		
	Staff support learning/teaching outside of lessons.	91%	1%	
The Learning Experience	My child is well informed about how my child is getting on.	97%	2%	
	My child is making good progress.	100%		
	Teaching at school is good.	100%		
	Staff expect my child to work hard and do their best.	97%	3%	
Making a Contribution	The school/club supports homework.	77%	18%	
	The school makes sure my child is well prepared for the future.	90%	10%	
	The school gives my child opportunities to make positive contributions to their class group or school.	100%		
	The school gives my child opportunities to make positive contributions to the community outside school.	97%	3%	
Participation of Staff and Other Pupils	The school asks my child for their views about important things in school.	99%	1%	
	The school deals effectively with unacceptable behaviour.	93%	7%	
	The school teaches my child to respect people from different backgrounds, races, religions etc.	100%		
	Staff treat my child fairly.	100%		
Wellbeing	Pupils at the school behave well.	100%		
	My child is not bullied or harassed at school.	98%	1%	
	I think my school is a safe place for my child to work.	100%		
	The school encourages a healthy lifestyle.	90%	10%	
School Experience & Character	The school gives age appropriate information on how to keep safe with things as internet safety, sexual health/relationships, alcohol and drugs.	97%	3%	
	I like teachers at E Primary School to be strictive as a church school.	97%	3%	
	The removal of collective worship at school is appropriate for teachers of E Primary school.	99%	2%	
	The school is well led and managed.	100%		
	I would I am happy with my child's experience at school.	100%		

- Heritability and genetic parameters, GWAS, Selective Sweep analysis, WGS, pathway and network analysis, estimation of GEBVs, epidemiological modelling



Results

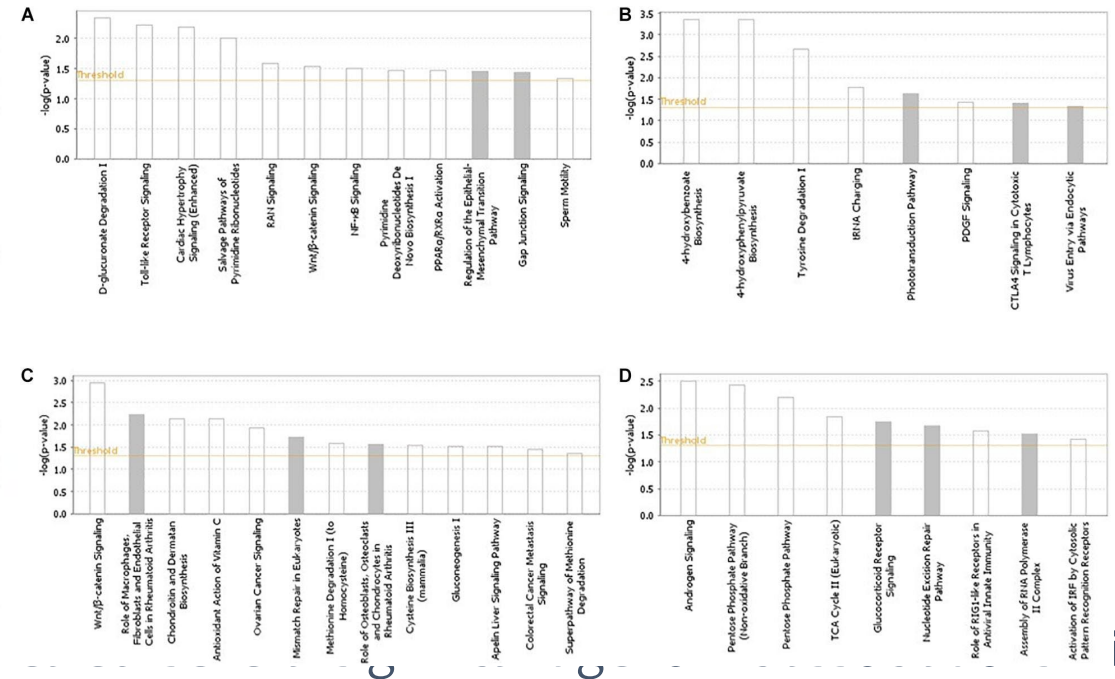
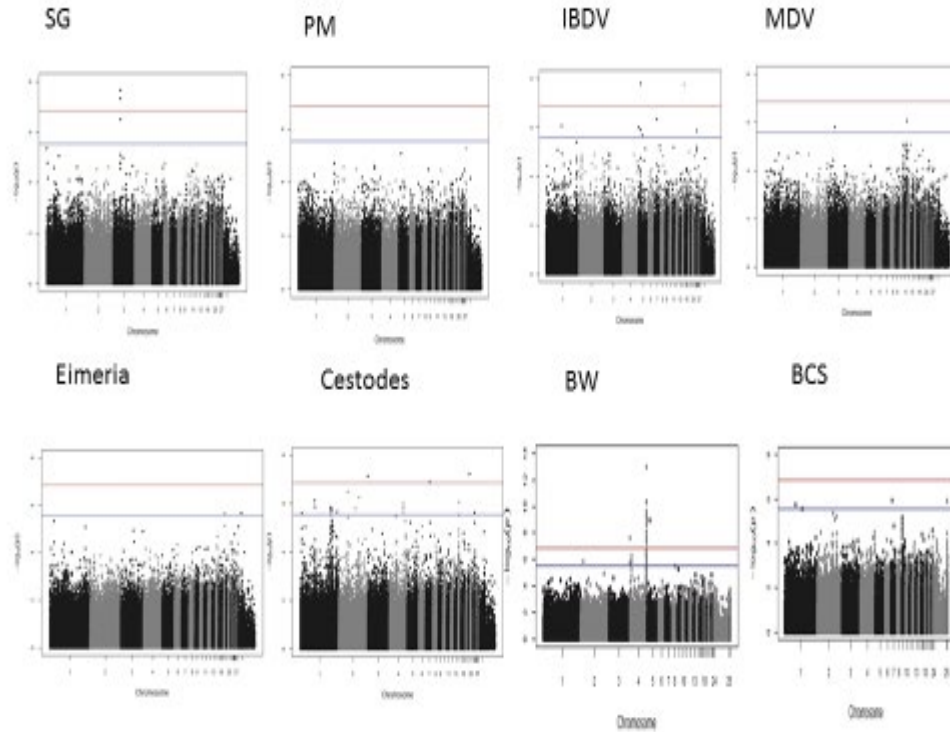
- The production, immune and health traits were moderately heritable

Trait	Heritability estimate (h^2)
PM	0.3
IBDV	0.46
MDV	0.42
Eimeria	0.22
Cestodes	0.31
SG	0.08
Body Weight	0.45
BCS	0.14



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- Genetic variants of interest highlighted through the WGS analysis in several immune related genes for all the antibody response and parasitic infection traits

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Results

- The production, immune and health traits were moderately heritable
- No significant genetic correlations between production and health traits
- Interesting genetic correlations among immune traits
- The separate and joint analysis identified revealed several significant genomic associations with these traits
- Genetic variants of interest highlighted through the WGS analysis in several immune related genes for all the antibody response and parasitic infection traits
- Across-ecotype analysis resulted in moderate to high GEBV reliability (0.37–0.80) depending on the trait
- Genomic prediction accuracies from the across-ecotype analyses were not higher compared to within-ecotype



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Identification of SNP Markers for Resistance to Salmonella and IBDV in Indigenous Ethiopian Chickens

August 2014

DOI:10.13140/2.1.4230.3366

Conference: 10 th World Congress of Genetics Applied to Livestock Production

Projects: [Chicken Health for Development \(CH4D\)](#) · [Chicken Health for Development](#) · [Chicken Health and development](#)

Genetics Selection Evolution
RESEARCH ARTICLE
Open Access
CrossMark
Genome-wide association studies of immune, disease and production traits in indigenous chicken ecotypes
Androniki Psifidi^{1*}, Georgios Banos², Oswald Matika¹, Takele T. Desta³, Judy Bettridge⁴, David A. Hume¹, Tadelle Dessie⁵, Rob Christley¹, Paul Wigley⁴, Olivier Hanotte^{1,5} and Pete Kaiser¹

nature sustainability
Article | Published: 15 October 2018
The role of local adaptation in sustainable production of village chickens
Judy M. Bettridge, Androniki Psifidi, Zetalem G. Terfa, Takele T. Desta, Maria Lozano-Jaramillo, Tadelle Dessie, Pete Kaiser, Paul Wigley, Olivier Hanotte & Robert M. Christley
Nature Sustainability 1, 574–582(2018) | Cite this article

frontiers in Genetics | Systems Biology Archive
Articles
ORIGINAL RESEARCH article
Integrating Genetic and Genomic Analyses of Combined Health Data Across Ecotypes to Improve Disease Resistance in Indigenous African Chickens



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Conclusions

- Genetic variation for immune, health and production traits
- Improvement of production and health traits simultaneously is feasible



Village chickens: a climate smart farming system

Village chickens are the preferable choice in Sub-Saharan Africa



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BILL & MELINDA
GATES *foundation*





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Thank you

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