



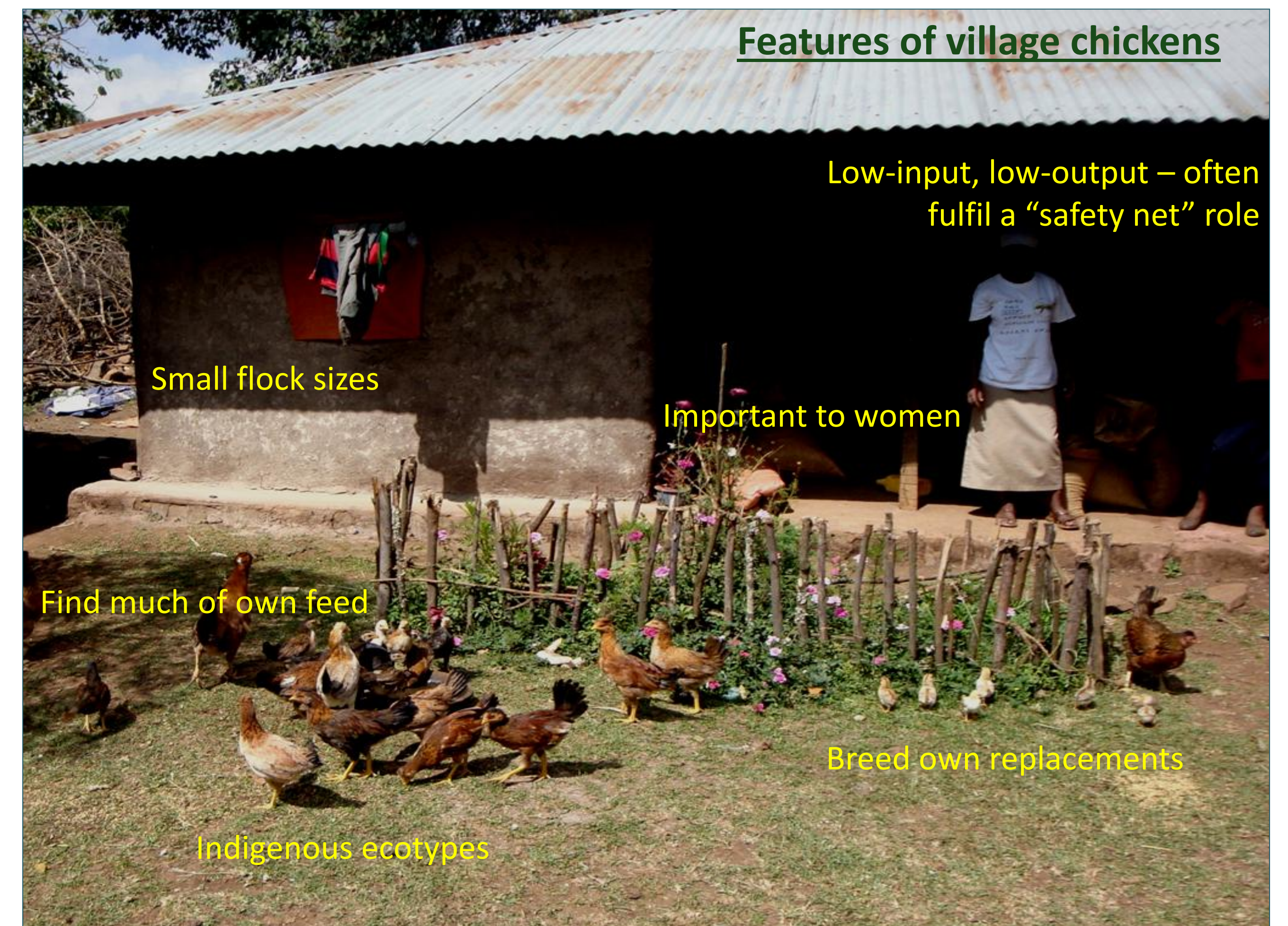
Chicken Health for Development



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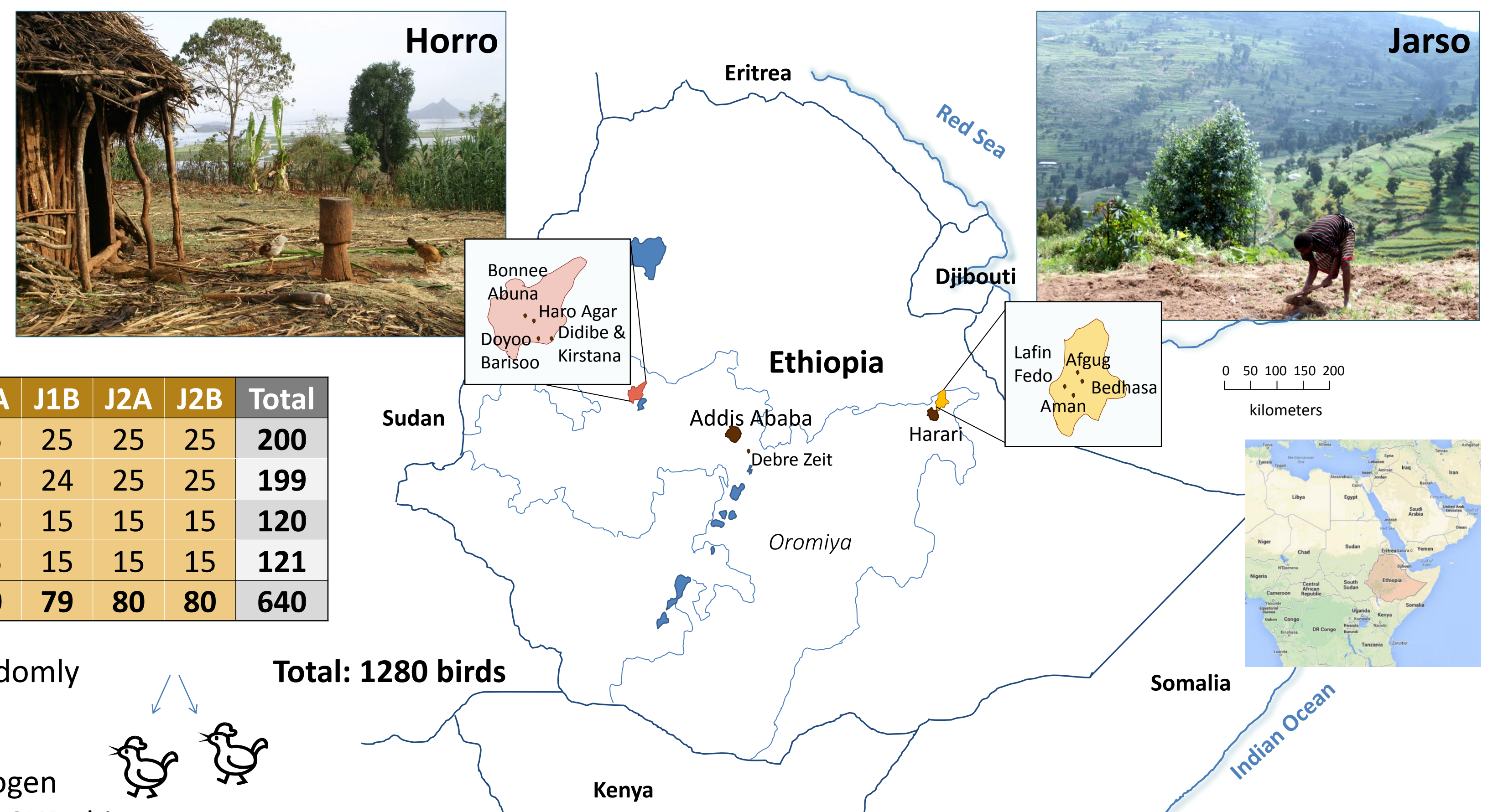
- Chickens are important to millions of poor smallholder farmers for their nutritional, economic and social functions, as well as aiding resilience in vulnerable agricultural livelihoods
- Recognition of their importance has led to their being a focus of numerous development programmes by both governments and NGOs, often based on distributing exotic, high-producing birds to enhance outputs. However, these birds have often failed to thrive in the scavenging environment
- Ethiopia currently has a breeding programme based on an indigenous ecotype, with the aim of developing a more productive bird which is adapted to the local conditions
- The Chicken Health for Development (CH4D) project was established with the aim of informing the breeding programme as to important genetic traits, such as disease resistance, which need to be retained in the “improved” indigenous birds, and help develop strategies to incorporate these into future interventions
- The project has combined socio-economic and bird genetic data with screening for infectious diseases, to build up a picture of the whole agro-ecological system
- We contend that local and regional differences in bird genetics, disease epidemiology and social, cultural and economic factors are likely to influence the success of any future intervention, and that local adaptation is an important feature which requires consideration



The study was carried out in two regions in the central Ethiopian highlands, known *a priori* to have social and cultural differences, and expected to have no mixing of the chickens between the two areas

Repeated cross-sectional studies were carried out in eight villages, supported with data collected during rapid rural appraisals and socio-economic questionnaires

Each village was visited 4 times, and different households were randomly selected



Agro-ecological systems

In both areas, most eggs are used to rear more chicks, so are rarely consumed. Farmers in the largely Muslim Jarso region rarely eat chicken



Predation of chicks is a major constraint to chick-rearing in Jarso.

Farmers minimise losses by rearing chicks over the rainy season, to utilise vegetation cover

Horro farmers rear more broods per year, and rear continually from September to May

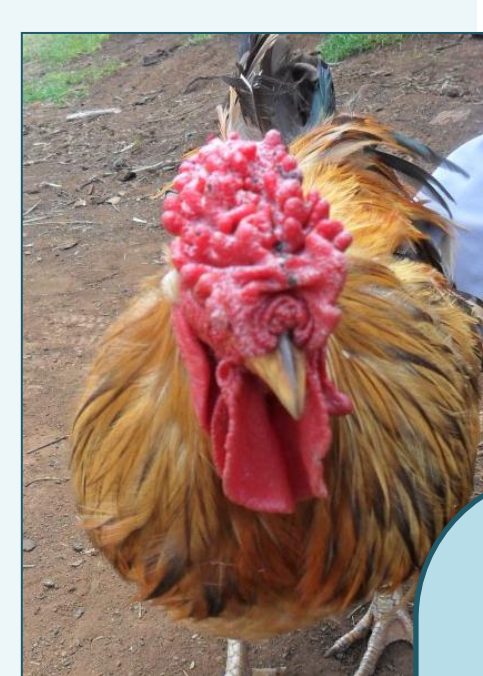
Horro is predominantly Christian, and most families consume chicken on religious holidays.

Birds (normally cocks) are sold and consumed, although consumption rates are still very low

Large body sizes and elaborate “rose” combs are prized, and increase the market value

Population age structure and dynamics are markedly different between the two regions

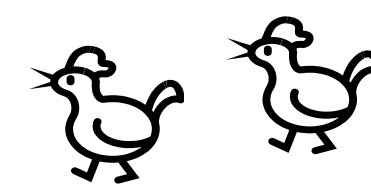
This may be due to both market demands, and system adaptation to local pressures (such as predators and feed availability)



640 Households	H1A	H1B	H2A	H2B	J1A	J1B	J2A	J2B	Total
May 2011	25	25	25	25	25	25	25	25	200
Oct 2011	25	25	25	25	25	24	25	25	199
May 2012	15	15	14	16	15	15	15	15	120
Oct 2012	15	15	16	15	15	15	15	15	121
Total	80	80	80	81	80	79	80	80	640

2 birds of over 6 months of age were randomly selected from each household flock

Blood and faeces were collected for pathogen screening and genetic analysis using 600K SNP chips



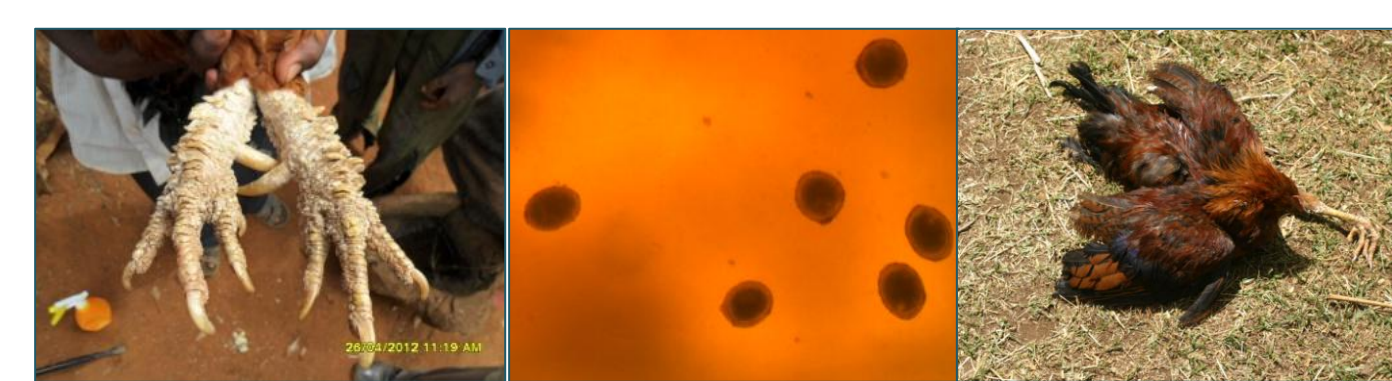
Total: 1280 birds

Infections and their interactions

A number of endemic infections are tolerated by these birds, including bacterial, viral and parasitic infections.

Infection prevalence varied little between regions, after other risk factors were taken into account. Sex, body condition and breeding status all influenced infection risk and parasite burdens, as well as survival

No single infection was associated with decreased survival rate, but birds rarely supported multiple infections



Rates of death from disease were around **three times higher in Horro** than Jarso, with higher mortality during the rainy season

This may be an ecological trade-off, as birds which invest more in growth and reproduction are more susceptible to disease morbidity

The rose comb phenotype is present in both populations, but more common in Horro, where we identified a highly significant association with a set of SNPs. Its greater cultural significance may have led to a higher rate of selection in this region

Conclusions

Different constraints, aims and opportunities for chicken production exist in these two regions

Despite superficial similarities in the appearance of the village production system, both the system and the birds were, in fact, highly locally adapted

A one-size-fits-all approach to improved production may not be sustainable in all locations, but will require local adaptation

Local farmers will need to be empowered to make choices and trade-offs when implementing future interventions, in order to meet their own objectives