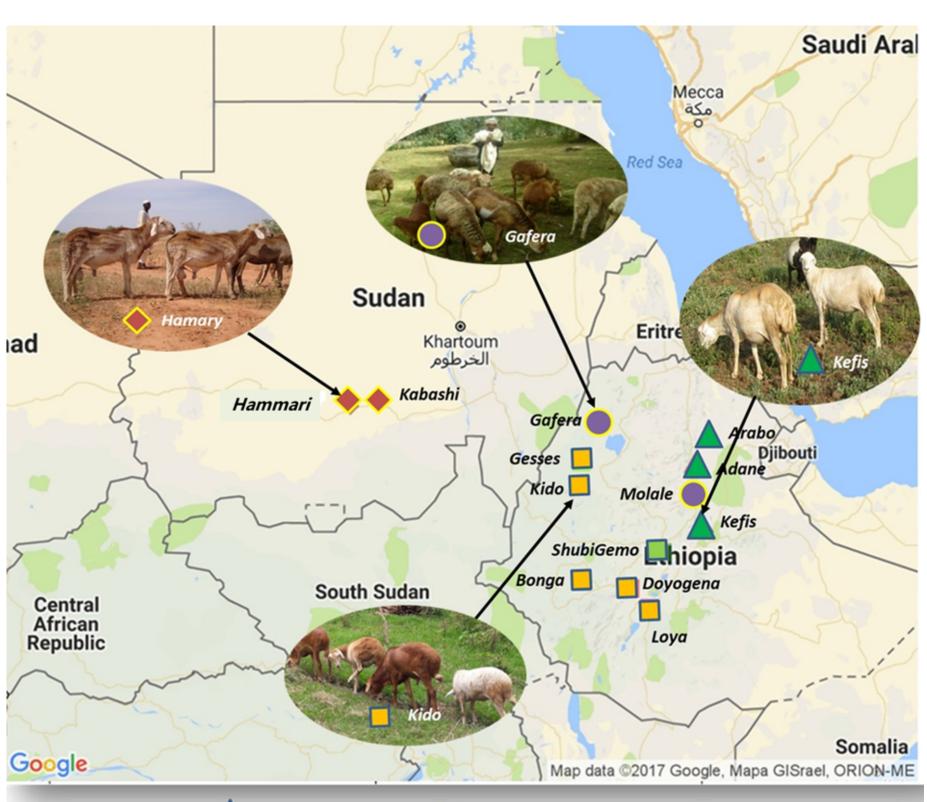
# Perspective

- Fat-tail is a unique adaptive trait found in indigenous sheep in Ethiopia whose genetic basis remains poorly understood.
- How animals will respond to altered temperatures and precipitation patterns under projected changes to climate depends largely on the genetic architecture of traits that are responsible for mediating local adaptation to current climate conditions.

## Approach

Using genome-wide 50K SNP genotypes, we determined the genetic basis of fat-tail in Ethiopian sheep using 3 selection signature approaches, hapFLK, ZFst and Rsb



🔶 Sudanese Thin-tailed 🔺 Ethiopian Fat-Rump 🔵 Ethiopian Short Fat-tailed 📃 Ethiopian Long Fat-tailed

-0.05	- 0.025	0.025	0.05	0.075 0.	0.125
	Short Fat-tailed				
		<u> </u>			0
0075 Fat-Rump				2	
0.025			•		
			<u>୍</u> ର 🕹 ବ୍	2	
0.05				~~~~Q	
<u>0.1</u>					
0.125				Long Fat-tailed	0 00
0.15					0
Thin-tailed sheep 0.075 - 0.05	- 0.025	0.025	0.05	0.075	1 0.125
💥 🏯 Thin-tailed sheep/		0.025 = 6.54 %	0.05	0.075	ł

Sheep cluster based on their tail phenotypes



ENVIRONMENTAL SUSTAINABILITY

# Mapping genomic regions and genes associated with the fat-tail, an adaptation trait in indigenous sheep

- Candidate regions associated with fat deposition and body temperature regulation identified
- Aim is to understand adaptation mechanisms that enable sheep to cope with feed, water and temperature stress



RESEARCH PROGRAM ON Livestock

Joram M. Mwacharo, ICARDA j.mwacharo@cgiar.org

Olivier Hanotte, ILRI o.hanotte@cgiar.org

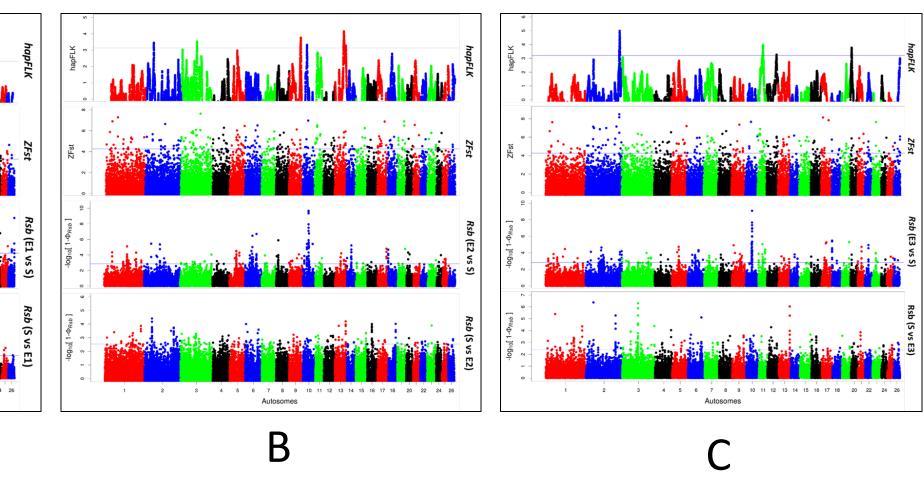
# Living within planetary boundaries

# Main findings

Eight candidate regions identified spanning genes associated with:

- Fat deposition (NPR2, HINT2, SPAG8),
- Skeleton structure and development (ALX4, HOXB13)
- Body temperature regulation (TRPM8)

Selection profiles between Ethiopian fatrump (A), long fat-tail (B) and short fat-tail (C) sheep vis a vis thin tailed sheep



## **Future steps**

Identify causative mutations associated with the candidate genes

## **Partners**

Debre Birhan Research Centre (DBRC), Ethiopia; Amhara Regional Agricultural Research Institute (ARARI), Ethiopia; University of Nottingham, UK







The CGIAR Research Program on Livestock thanks all donors and organizations which globally support its work through their contributions to the CGIAR Trust Fund: https://www.cgiar.org/funders/



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