Conservation priorities for Ethiopian sheep

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Presentation outline

I. Sheep production in Ethiopia
II. Genetic diversity
III. Priorities for conservation

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I. Sheep production in Ethiopia

■ Importance

- 18 – 24 million sheep

- High importance in alpine areas
- Less in high potential areas
- Mainstay of pastoral livelihood

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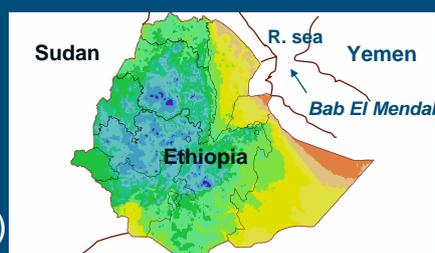WAGENINGEN UR

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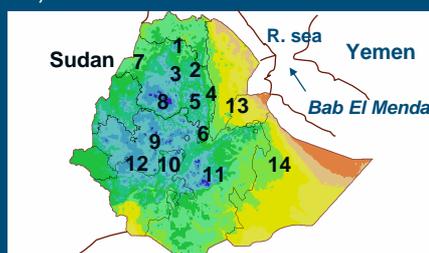Genomics Centre**

■ History:
- 3 waves of introduction
- fat-, thin-tailed & fat-rumped

■ Production environment
- Diverse ecology (18 zones)
- Diverse ethnic community
- Diverse production system

Sudan

R. sea   Yemen

Bab El Mendal

Ethiopia

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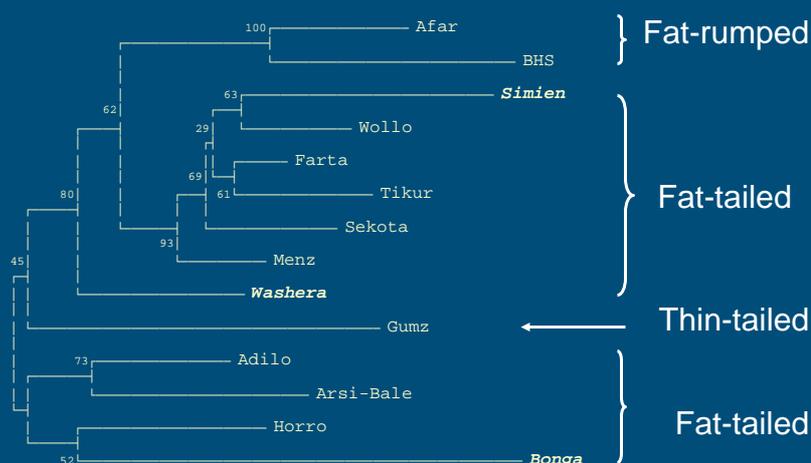**Animal Breeding &
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II. Genetic Diversity

- 14 traditional breeds & 672 individuals sampled
- Sampling criteria:- traditionally recognized pops.
  - phenotypically distinct
    - ecological consideration
- Genotyped using 17 microsatellite markers
- + Morphology, farmers' opinion, flock structure

Sudan R. sea Yemen
1
7 3 2
8 5 4 13 Bab El Mendal
9 6
12 10
11 14

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Dendrogram constructed from Nei genetic distance

100 — Afar   } Fat-rumped
BHS

63 — *Simien*
62
29 — Wollo
69 — Farta
80 61 — Tikur   } Fat-tailed
Sekota
93 — Menz
45
Washera

— Gumz   ← Thin-tailed

73 — Adilo
— Arsi-Bale   } Fat-tailed
— Horro
52 *Bonga*

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The four morphotypes (tail types)

Thin-tailed

Short-fat-tailed

Fat-rumped

Long-fat-tailed

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Proposed classification of Ethiopian sheep

Breed groups (6)
1. Short-fat-tailed (sub-alpine)
2. Long-fat-tailed (sub-humid HL
3. Thin-tailed (sub-humid LL)
4. Fat-rumped (arid lowland)
5. Washera
6. Bonga

Breeds (9)
- Simien & Sub-alpine
- Horro & Arsi-Bale
- Gumz
- BHS & Afar
- Washera
- Bonga

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III. Conservation priorities – status of breeds

Meassures of degree of endangerment

Breed	Population ('000)	No. Rams	Cross-breeding	Pure stock	Extinction probability
Gumz	50.9	0.70	+++	-	0.80
Simien	347.6	0.25	-	-	0.53
Adilo	407.7	0.09	-	-	0.60
Bonga	517.5	0.07	-	-	0.60
Tikur	525.3	1.00	+	-	0.53
Farta	555.6	0.27	++	-	0.67
Afar	681.9		-	+	0.33
Sekota	732.3	1.00	-	-	0.40
BHS	906.2		-	++	0.40
Menz	971.4	1.45	+++	+++	0.60
Washera	1227.7		-	-	0.40
Wollo	1395.9	1.20	+++	-	0.67
Horro	3409.3	0.34	-	++	0.47
Arsi	6345.1	1.07	-	-	0.40

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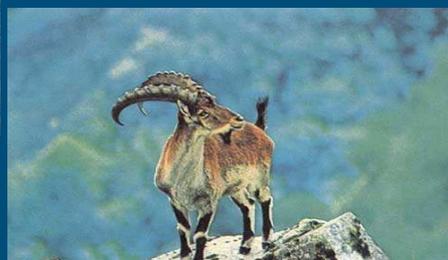

■ **Approaches used to set priorities**

1. Weitzman (1992) measure of diversity
2. Eding (2001) measure of diversity
3. Degree of endangerment/extinction probability
4. Current breed merit (economic, ecological, cult.)

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Contribution of non-safe breed to diversity of Safe+1 set

Breed (i)	Weitzman diversity		Eding diversity	
	V (S)	Gain %	Div (S)	Gain %
Full set	1.27		0.9286	
Safe set	0.51		0.9066	
Safe + 1:				
Simien	0.65	26.7	0.9190	1.37
Gumz	0.65	27.4	0.9147	0.89
Bonga	0.68	31.9	0.9146	0.88
Tikur	0.58	13.9	0.9107	0.45
Farta	0.55	7.7	0.9106	0.44
Wollo	0.57	10.4	0.9092	0.29
Menz	0.56	9.9	0.9078	0.13
Adilo	0.47	13.2	0.9051	0.00

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- **Simien sheep**
- **- In danger of habitat loss**
- **- Cohabit Simien Mountain Park with *Walia ibex***

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Overall ranking of breeds

Breed	Extinction probability	Breed merit			Ranking		
		Economic value	Cultural value	Ecological value	Weitz man	Eding	Overall ranking
Simien	0.53	++	++	+++	2	1	1
Bonga	060	-	-	-	1	2	1
Gumz	0.80	-	+	+++	3	4	1
Farta	0.67	++	+	++	14		2
Menz	0.60	+++	+++	+++	13		2
Tikur	0.53	++	++	+++	10		2
Wollo	0.67	+++	++	++	11		2
Afar	0.33	+++	+++	+++	8	3	3
Arsi	0.40	+++	+	-	5		3
BHS	0.40	+++	+++	+++	4	6	3
Horro	0.47	+++	+	-	6		3
Washe	0.40	+++	++	-	7	5	3
Adilo	0.60	+	-	-	9		4
Sekota	0.40	-	-	+++	12		4

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