

Genetic characterization of a small closed island population of Norwegian coastal goat

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Norwegian coastal goat

- national and endangered breed
- meat production
- extensive production system
- Western Norway

- Today:
 - 1 **managed** pop
 - 1 feral pop



Norwegian coastal goat - today



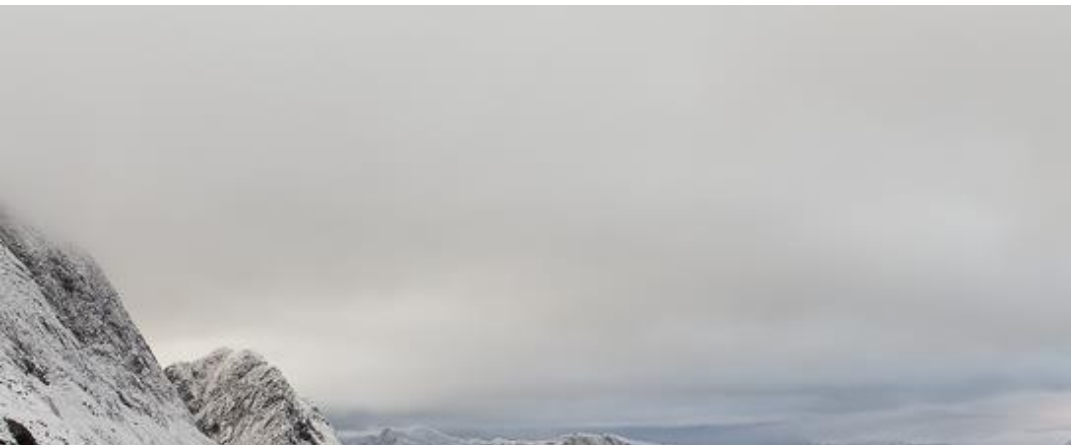
Skorpa



Skorpa



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Main aim

- Feral population
- Census size ca. 150 individuals
- Disputed status:
 - No legal owners



Main aim

- Feral population
- Census size ca. 150 individuals
- Disputed status:
 - No legal owners
- Describe genetic diversity
- Compare to:
 - managed Coastal goat population (Selje)
 - Norwegian dairy goat



Methods

- Managed Coastal goat - Selje N=37
 - Feral Coastal goat - Skorpa N=7
 - Norwegian dairy goat (reference) N=52
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- 50K Illumina Goat SNP chip
 - 45772 SNPs after quality control (MAF <0.02, >10% missing data indiv/marker, HWE<0.0001, only autosomes)



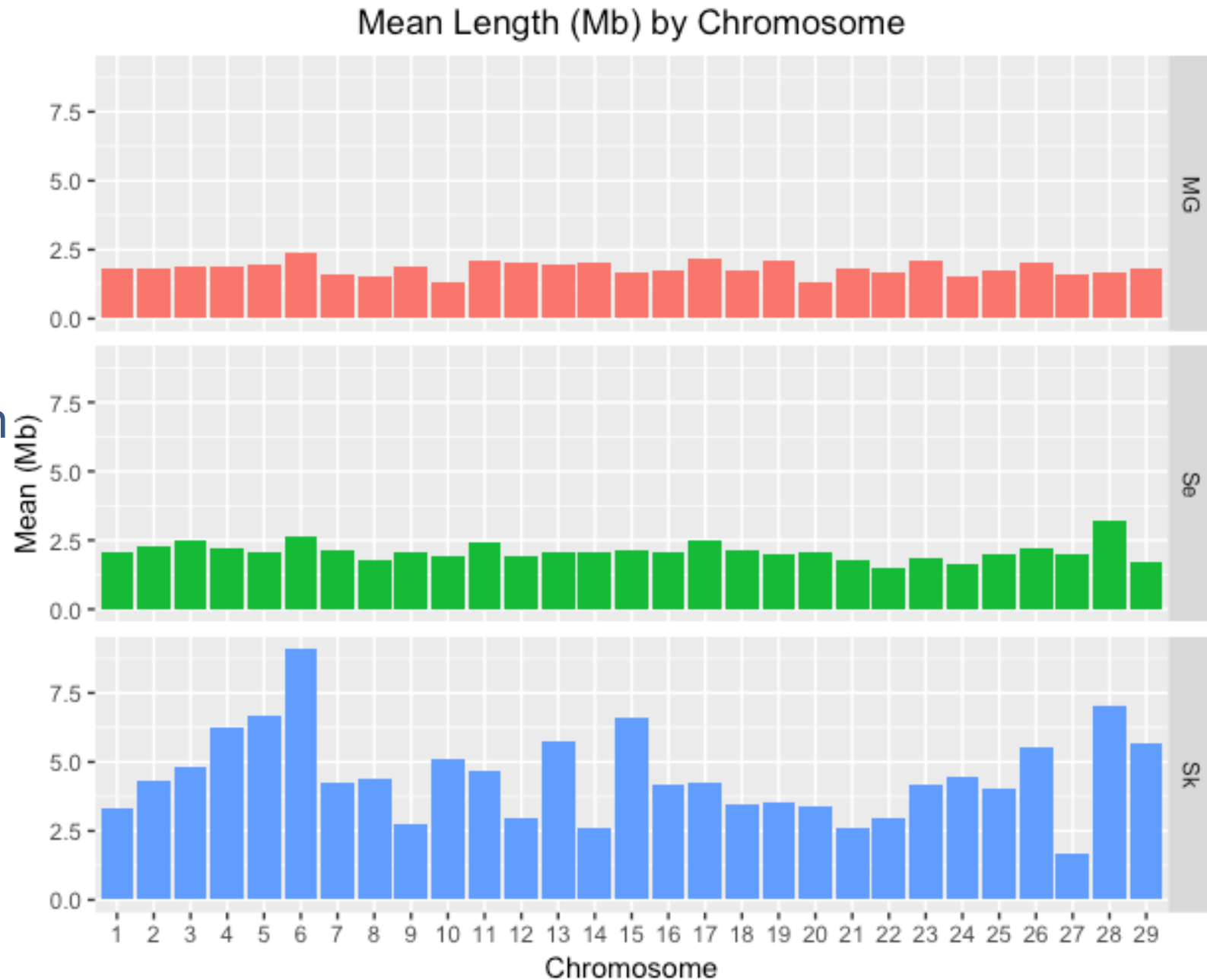
Inbreeding - heterozygosity

Pop	P_n	Het _o	Het _E	D	F_{HOM}	F_{ROH}
Norwegian Dairy goat	0.868	0.419	0.388	0.305	-0.067 ± .066	0.074 ± .033
Managed Coastal goat (Selje)	0.989	0.365	0.365	0.292	0.023 ± .108	0.115 ± .093
Feral Coastal goat (Skorpa)	0.677	0.387	0.363	0.211	0.290 ± .040	0.347 ± .038

- Fewer segregating loci in the feral pop
- Heterozygosity similar in managed and feral pop
- Inbreeding: higher in feral pop

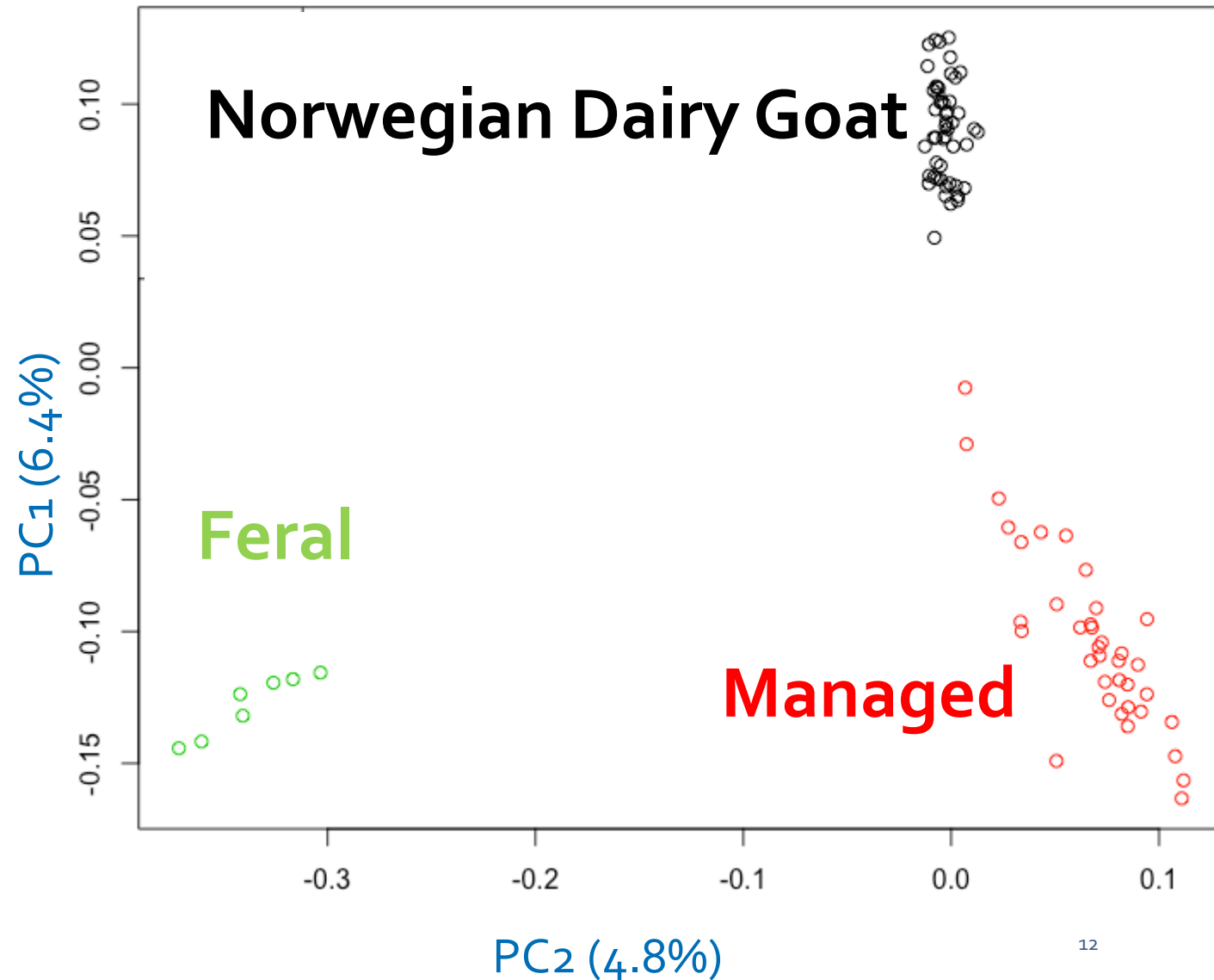
Inbreeding - RoH

- RoH on average longer in feral pop
- Larger proportion of genome covered by RoH in feral pop



Population differentiation – PCA

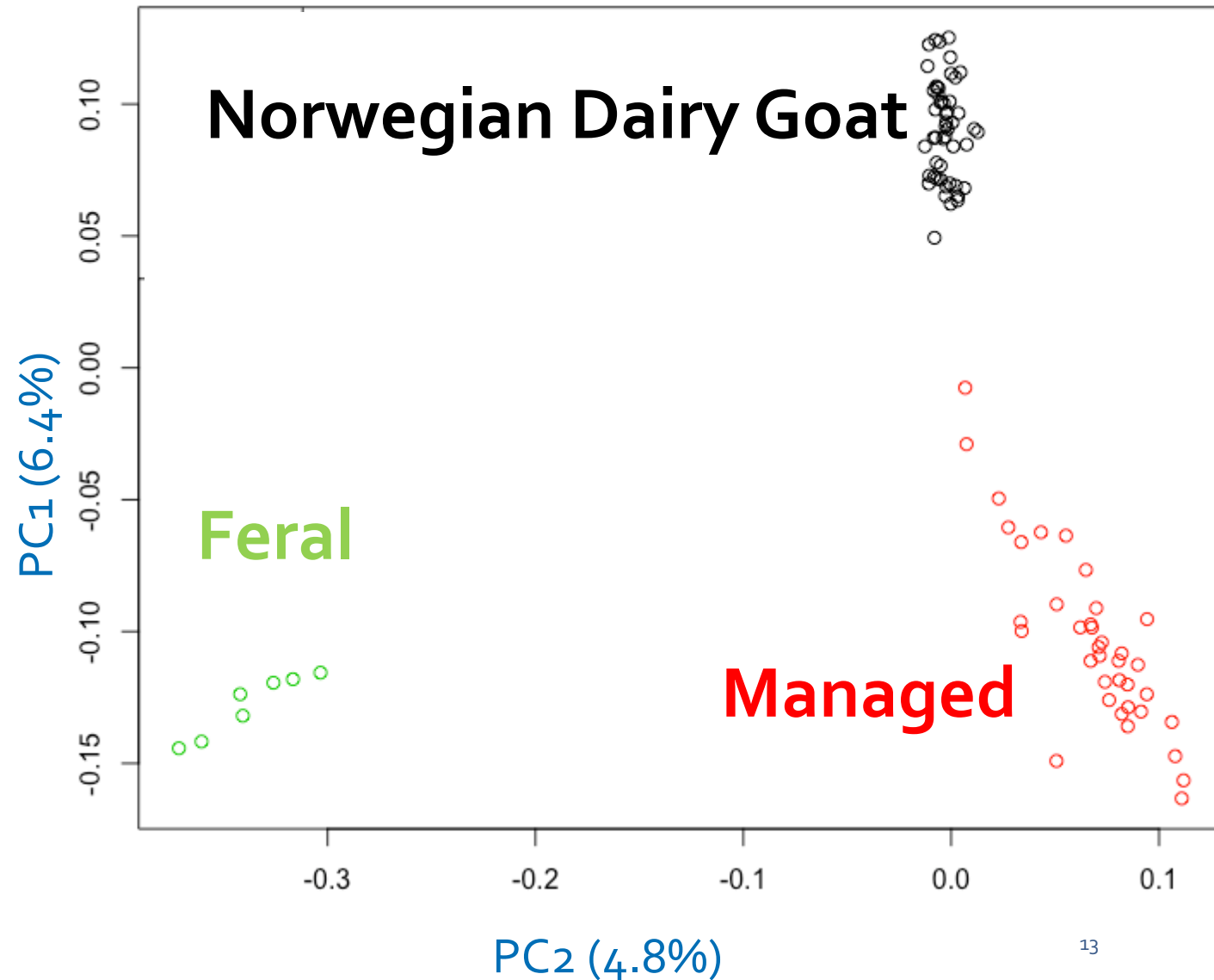
- 3 pops clearly separated
- Managed pop closer to dairy goat than feral pop



Population differentiation – Fst

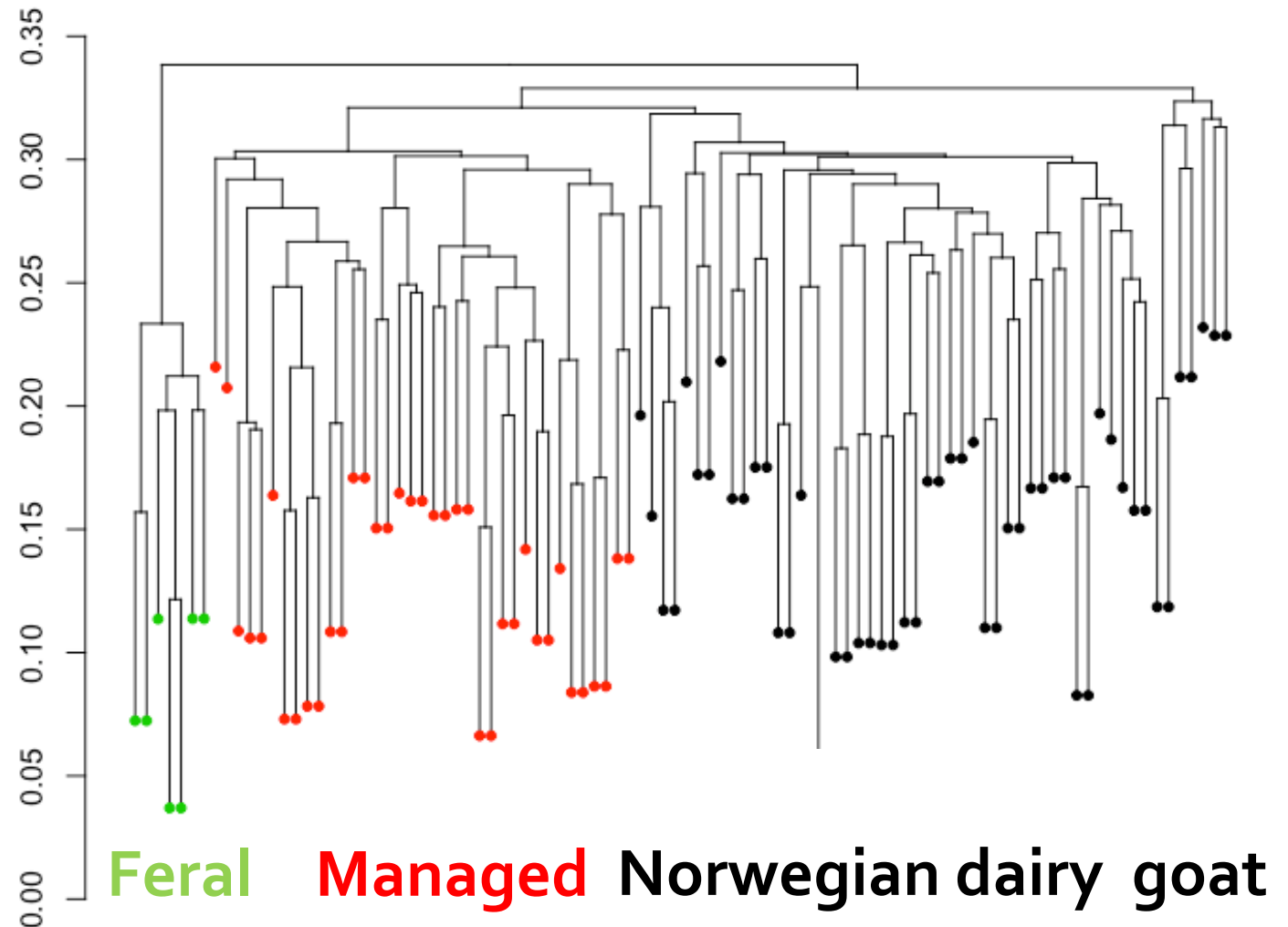
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	Dairy	Managed
Managed	0.053	
Feral	0.152	0.155



Population differentiation – cluster analysis

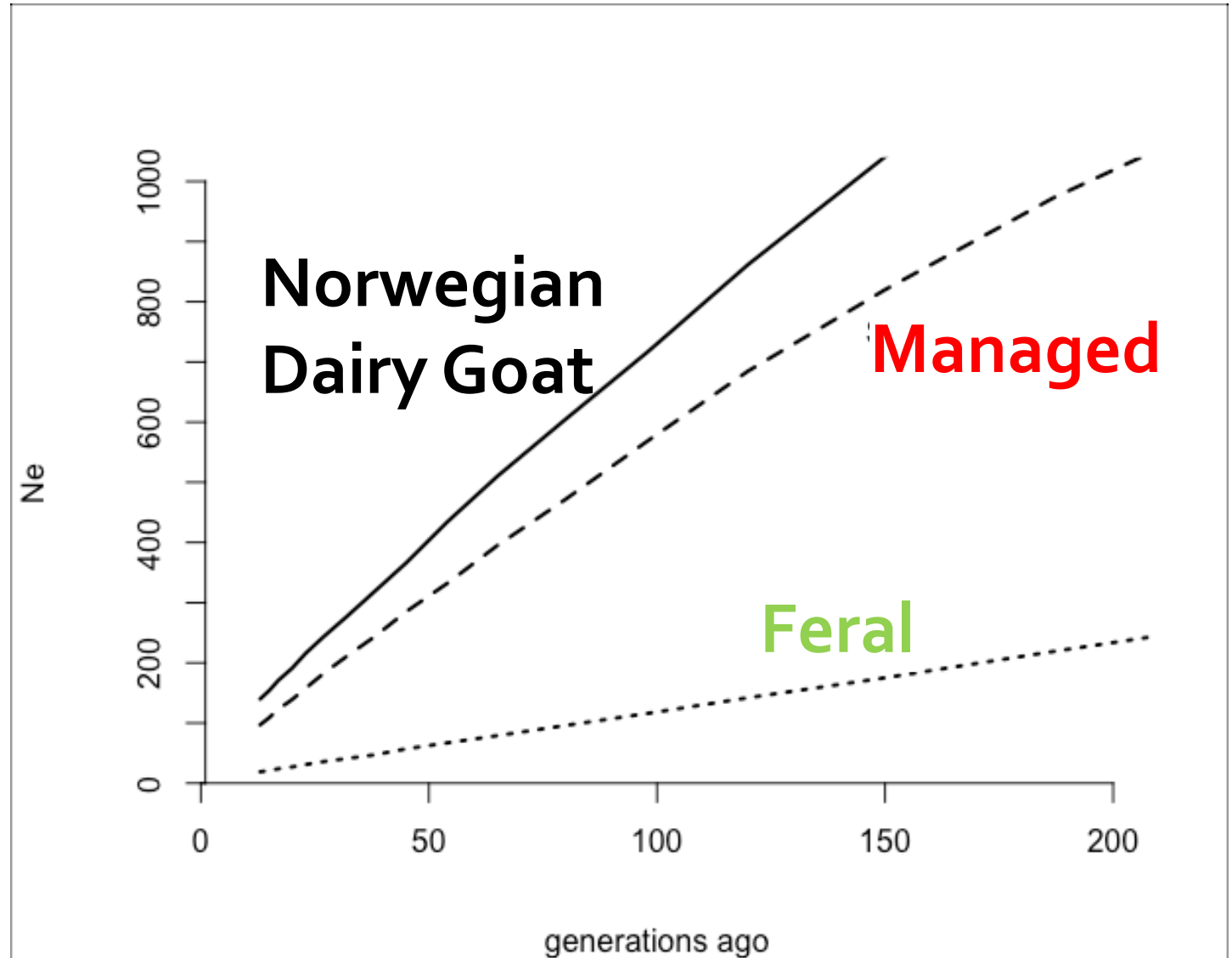
- 3 pops clearly separated
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Historical population size

- N_e much lower in feral than managed
- feral: < 50 for the last 40 generations



➔ $N_e <$ than recommended for maintaining genetic diversity in short term





Diversity – core set analysis

- Diversity lost in an optimised set, when excluding one breed at a time
- Diversity lost:
 - Norwegian Dairy goat: 5.64%
 - Managed Coastal goat population: 0.67%
 - Feral Coastal goat population: 0.01%

What does this mean for the feral goats?

- The three populations/breeds clearly separated
- Feral pop has a negligible marginal contribution to overall genetic diversity
- Inbreeding 
- N_e 

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- Is it genetic drift or natural selection?

What to do?

- Unsustainable situation
- Introduce genetic diversity to the feral population?
- Norwegian authorities will write management plan





Thank you!

Photos: Ingar Støyle Bringsvor

<http://ingarsfuglebilder.blogspot.com>