Phylogenetic analysis of Sarda goat inferred from mitochondrial DNA

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1. Introduction

Autochthonous goats may be a profitable way of marketing natural resources without endangering the environment. The molecular analysis provides useful information for their conservation.

2. Message

The aim of this research was to investigate mitochondrial DNA (mtDNA) of Sarda goat.

3. Methods

The mtDNA sequences of 19 Sarda goats, 6 of crossbred (Maltese x Sarda) and 50 of five breeds (Alpine, Maltese, Nubian, Saanen, Arbi) were studied. A 778 bp D-Loop mtDNA fragment was sequenced. The obtained sequences (between positions 15746-16450) were aligned with the complete sequence of *C. hircus* mtDNA (GenBank: AF533441) by ClustalX software. Using the software MEGA v4.0 were identified 53 haplotypes. Haplotype diversity (hd), nucleotide diversity (π), average number of nucleotide differences (k) were calculated using DnaSP v4.2.

4. Results

The different breeds analysed displayed a moderate haplotype diversity. The Sarda goat showed a high nucleotide diversity. In order to evaluate which of the goat mitochondrial haplogroups the Sarda breed belonged to, all 75 mtDNA sequences that we examined were analysed with 197 published sequences. A neighbour-joining tree of 272 goats was constructed using Kimura 2-parameter distance model with 1000 bootstrap replications by MEGA v4.0. All sequences belong to haplogroup A, the most represented in the world for the number of haplotypes.

Table 1: Sample size, numbers of haplotypes, parsimony informative sites, singleton and polymorphics sites for each breed used in this study.

Breed	Sample size	N haplotypes per breeds	Parsimony informative sites	Singleton sites	Polymorphic sites
Alpine	10	7	18	10	28
Maltese	10	8	12	21	33
Nubian	10	8	21	5	26
Saanen	10	9	13	18	31
Sarda	19	14	26	9	35
Sarda/Maltese	6	3	9	6	15
Arbi	10	9	10	26	36

Table 2: Values of haplotypes diversity, nucleotide diversity (include standard deviations) average number of nucleotide differences for each breed in this study and across these 6 breeds.

Breed	Haplotypes diversity (hd) ± s.d.	Nucleotide diversity (π) ± s.d.	Average number of nucleotide differences (k)
Alpine	0,956 ± 0,059	0,0138 ± 0,0019	9,733
Maltese	0,933 ± 0,077	0,0135 ± 0,0017	9,511
Nubian	0,956 ± 0,059	0,0141 ± 0,0142	9,911
Saanen	0,978 ± 0,054	0,0130 ± 0,0013	9,178
Sarda	0,965 ± 0,028	0,0153 ± 0,0010	10,795
Sarda/Maltese	0,733 ± 0,155	0,0101 ± 0,0023	7,133
Arbi	0,978 ± 0,054	0,0145 ± 0,0014	10,178

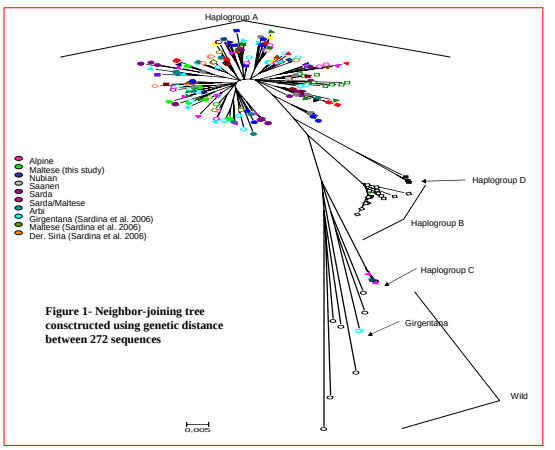

Figure 1- Neighbor-joining tree consctructed using genetic distance between 272 sequences

5. Conclusions

These results may be useful to improve the knowledge of the genetic structure of Sarda goats for its improvement.