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Rapid Communication: Nucleotide Sequence of Ovine Mitochondrial Genes for tRNA Glycine and Cytochrome c-Oxidase Subunit III¹

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Name of Sequence. Ovine mitochondrial genes for tRNA glycine and cytochrome c-oxidase subunit III.
Species. *Ovis aries*, Merinolandschaf breed.

Origin of Clone. Mitochondrial DNA (mtDNA) was extracted from sheep liver tissue, digested with *EcoRI/XbaI*, and cloned into pUC18. The 1,130-bp fragment containing the entire tRNA glycine (MTTG) and cytochrome c-oxidase subunit III (MTCO3) and part of the ATP synthase 6 (MTATP6) and NADH-dehydrogenase subunit 3 (MTND3) coding region was subcloned into pBluescript II KS (Stratagene, La Jolla, CA) as 710-bp *EcoRI/BamHI* and 420-bp *BamHI/XbaI* fragments. Both inserts were sequenced using a Sequenase 2.0 kit (USB, Cleveland, OH) and M13 universal and reverse sequencing primers.

Comparison with Related Sequences. The ovine mtDNA sequence coding for MTTG and MTCO3 has 86.5% similarity with the bovine (Anderson et al., 1982) and 80% with the equine (Xu and Arnason, 1994) homologues.

Sequence Data. The MTCO3 gene is flanked by the partial MTATP6 gene sequence (nt 1–74) at the 5'-end and the MTTG gene by the partial MTND3 gene sequence (nt 928–1,130) at the 3'-end. The predicted MTCO3 protein consists of 261 amino acids.

EMBL/GenBank Accession Number. U85910.

Comments. Cytochrome c-oxidase (EC 1.9.3.1) is the terminal enzyme of the mitochondrial electron transport chain. Nucleotide positions 110 (C→T), 587 (G→A), 746 (A→G), and 834 (A→G) were polymorphic in another sheep of the same breed. The transition at position 834 causes an amino acid replacement of methionine to valine in the deduced MTCO3 protein. Structural variation in mitochondrial genes such as MTCO3 could explain cytoplasmic effects on performance traits of farm animals that were recently linked to mtDNA polymorphisms (Schutz et al., 1994; Boettcher et al., 1996).

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Key Words: Sheep, Mitochondrial DNA, Transfer RNA Glycine, Cytochrome c-Oxidase

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GAATTCGCAGTGGCTATAATTCAGCCTATGTATTTACCCCTTAGTGTATACCTG 60
CATGATAACACATAATGACACACCAAAACCCACGCTTATCACATAGTAAACCCCAAGCCCT 120
      M T H Q T H A Y H M V N P S P
GACCTCTCACAGGAGCACTATCTGCCCTCCTAATAACATCTGGTCTCATCATATGATTTTC 180
W P L T G A L S A L L M T S G L I M W F
ACTTCAACTCAACAGCTCTACTAATCTGGCCCTAACAACAATATACTTACAATATACC 240
H F N S T A L L T L G L T T N M L T M Y
AGTGATGACGAGATGTATTCGAGAAAGCACCTTCCAAGGCCACCATACTCCGGCTGCC 300
Q W W R D V I R E S T F Q G H H T P A V
AAAAGGCCCTTCGTACAGGAATGATTTCTTTCCATCTCCGAGTCTATTCTTTACTG 360
Q K G L R Y G M I L F I I S E V L F F T
GATTTTCTGAGCCTTCTACCCTCAAGCCTTGCCTCCACACCCGAACCTAGGCGGTGCT 420
G F F W A F Y H S S L A P T P E L G G C
GACCTCCAACAGGATTCACCCACTTAATCCCTTAGAGCTCCCACTACTCAACACCTCTG 480
W P P T G I H P L N P L E V P L L N T S
TCCTTCTAGCCTCAGGAGTATCCATTACTTAGCTCACCATGCCCTCATAGAAGGGAACC 540
V L L A S G V S I T W A H H S L M E G A V
GTTACACATGTTTACAGCCCTATTCACTACCGACTAGGCGTGTACTTTTCACTGT 600
R Y H M L Q A L F I T I A L G V Y F T L
TACAGGCATCAGAGTATTATGAAGCACCCCTTCAATCTCAGACGGAGTTTACGGTTCAA 660
L Q A S E Y Y E A P F T I S D G V Y G S
CTTTCTTCGTAGCTACAGGATTCACGGCTCCATGTCATCATCGGATCCACCTTCTCTAA 720
T F F V A T G F H G L H V I I G S T F L
TTGTCTGCTTCTTCGCCAATTAATAATTTTCACTTCACTTAGTCACTTTCGGTTTCG 780
I V C F F R Q L K F H F T S S H H F G F
AAGCCGTGCTGATACACTGACACTTCGTAGATGTAGTATGACTTTTCCCTCATATATCCA 840
E A A A W Y W H F V D V V W L F L Y M S
TCTACTGATGAGGCTCATGCTCTTTTAGTATTAATTAGTACAACCTGACTTCCAATCAGTT 900
I Y W W G S *
AGTTTCGGTCTAATCCGAAAAAGAACAATAAACCTTATAATTACTCTCTCACTAAGTTC 960
ACGCTAGCTACATTACTCGTAACCATCGCATTCTGACTTCCCAACTGAACGTGTATTCA 1020
GAAAAACAAGCCCATACGAATGTGGATTTGACCCCACTAGGGTCTGCTCCCTCCCTTC 1080
TCTATAAAATTTCTCTAGTAGCCATCAGATCTCTCTTTTGTATCTAGA 1130
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Figure 1. Nucleotide sequence of the ovine mtDNA containing complete coding regions for cytochrome c-oxidase subunit III (nucleotides 75–858) and tRNA glycine (underlined). The stop signal, which is completed by polyadenylation, is marked by an asterisk.

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