



King Faisal University

The Proceeding of 6th Conference of the
International Society of Camelid Research and Development

| ISOCARD-2023 |

"The Role of Camel in Food Security and Economic Development"



الجمعية الطبية البيطرية السعودية
Saudi Veterinary Medical Society



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The 6th Conference of the International Society of Camelid Research and Development (ISOCARD)-2023

“The Role of Camel in Food Security and Economic Development”

The Illumina® Agricultural Greater Good Initiative: Development of a Medium-Density SNP Chip for Camels

Bruno, S.¹, Senczuk, G.², Landi, V.³, Di Civita, M.², Brooks, S.⁴, Almathen, F.^{5,6}, Faye, B.⁷, Gaouar, SBS⁸, Piro, M.⁹, Kim, K.-S.¹⁰, Dadi, H.¹¹, Iglesias Pastrana, C.¹², Al-Haddad, H.¹³, Al-Abri, M.¹⁴, David, X.¹⁵, Eggen, A.¹⁵, Burger, P.¹⁶, Ciani, E.^{1*}

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AIM:

The 11th Illumina® Agricultural Greater Good Initiative focused on the design of a medium-density SNP chip for dromedaries.

METHODS:

The Illumina® NovaSeq technology was used to whole genome sequence 192 dromedaries from 19 countries with an average coverage of 30X. In addition, 22 publicly available dromedary whole genomes were added to the dataset. Raw data were analysed through the DRAGEN Germline Pipeline, using CamDro3 as reference genome (Genebank: GCA_000803125.3). The quality control was performed by PLINK software and, overall, 179 samples and 641,741 Single Nucleotide Polymorphisms (SNPs) passed the check. The performance of the 61K selected SNPs to be included in the array was assessed (i) by comparing the 61K patterns of genetic structure among the 179 samples with those generated, on the same animals, using a higher-density dataset (505K), and (ii) through polymorphism analysis of the 61K SNPs in 179 novel whole genomes from seven countries (including four additional ones). The technical validation of the SNP chip, based on SNP genotyping, is currently ongoing.

RESULTS:

The final SNP array design was composed by 61K biallelic loci including (i) 59K SNPs on autosomes, with an average distance of 32 kbps, and (ii) 1230 SNPs on chromosome X, both sets having minor allele frequencies ≥ 0.1 ; (iii) 77 SNPs on the mitochondrial genome, with an average distance of 200 bps; (iv) 832 SNPs from 47 genes with known functional relevance in other livestock species. The in-silico performance analyses confirmed the effectiveness of the tool.

CONCLUSION:

The SNP chip has already been manufactured by Illumina® and will be released in Q1 2023. Its adoption will contribute boosting genetic diversity and genome-wide association studies, as well as gene/genome-assisted selective breeding in this species.

KEYWORDS

Camelus dromedarius, Whole-genome sequences, Single Nucleotide Polymorphisms, SNP chip

CITATION

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