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Current state of phen- and genomic resources in large camelids

Pamela Burger¹, Elena Ciani², Cesare Mosconi³, Ismail Boujenane⁴, Jean-Michel Astruc⁵, Bernard Faye⁶, Gaukhar Konuspayeva⁷, Brian Wickham³

¹Department of Integrative Biology and Evolution, Vetmeduni Vienna, Research Institute of Wildlife Ecology, Vienna, Austria

²Dipartimento di Bioscienze, Biotechnologie e Scienze Farmacologiche, Università degli Studi di Bari Aldo Moro, Bari, Italy

³ICAR, Roma, Italy

⁴Département de Productions et Biotechnologies Animales, Institut Agronomique et Vétérinaire Hassan II, Rabat, Morocco

⁵Service Evaluation Génétique. Département Génétique et Phénotypes, INRA, Castanet-Tolosan, France

⁶Campus International de Baillarguet, CIRAD-ES, UMR SELMET TAC/112A, Montpellier, France

⁷Biotechnology Department, Al-Farabi Kazakh National University, Almaty, Kazakhstan

Large (Old World) camelids, dromedary and Bactrian camel, have gained constant economic interest during the last decade, due to the need for increased milk and meat production in arid environments. In addition, there is demand for top-quality camel wool products and fast racing camels in the high-end markets of Western and Middle Eastern countries, respectively. As one of the last species to be domesticated, dromedaries and Bactrian camels were traditionally used for riding, transport and local milk and meat consumption, e.g., in some Arabian societies dromedary milk never would be sold, only given as a gift. While modern transport has replaced the traditional usage of camels in cross-continental caravans, increasing desertification as well as constant population growth rises the value of Old World camels as successful food producing animal under harsh conditions. However, traditional animal breeding technologies, applied to other livestock since the late 1960ies, enter the world of large camelids very slowly; not to mention modern genomic selection, which is now state-of-the art in cattle, pig and sheep breeding.

The fast development of next generation sequencing technologies made it possible to enter the genomic area and follow up with the genomic resources available for other livestock. In terms of reference genomes, there are assemblies available now on chromosome-level for *Camelus dromedarius*, and on scaffold-level for *Camelus bactrianus* and *Camelus ferus*, respectively. However, there are still the tools missing for large-scale genomic studies to screen hundreds of animals, i.e., no commercially available SNPchip exists.

In terms of phenomic resources, the traditional management and extensive animal husbandry system in dromedary and Bactrian camels poses some difficulties to a standardized collection of phenotypes. Except from a number of large camel (dairy) farms, e.g., in United Arab Emirates, China or Kazakhstan, where animal identification and regular performance recording is practiced on different quantitative and qualitative levels, the systematic collection of milk and meat traits (if done at all) is confined to local farms or, in the best case, to regional associations. The lack of standardized animal identification and recording systems under national breeders' associations shows the need for international cooperation; like the European Union funded ARIMnet2 project CARAVAN (Toward a

CAMEL tRANSnational VALUE chain) linking scientists and breeders in Mediterranean countries including Algeria, Tunisia, Morocco, Spain, France and Italy.

In this presentation we will assess the status quo of phenomic and genomic research in large camelids and identify the next steps to start closing the gap with other livestock, in terms of knowledge and genomic assisted breeding practice.

Keywords: Old World camels, dromedary, Bactrian camel, phenotype, genotype