

# Cow milk-derived extracellular vesicles can reflect the metabolic status of lactating

## COWS

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## Introduction

- High-yielding dairy cows are more prone to negative energy balance, leading to metabolic disorders such as insulin resistance (IR)
- Detecting IR in cows involves invasive sampling and complex procedures thus, it is imperative to discover novel methods to improve the diagnosis
- Extracellular Vesicles (EV) are membranous, nano-sized particles released by cells with important roles in intercellular signaling
- EVs derived from biofluids have great potential for therapeutic and diagnostic use

## Objective

- To compare Milk Extracellular Vesicle profiles (MEV) of dairy cows with different insulin resistance status.

## Methodology

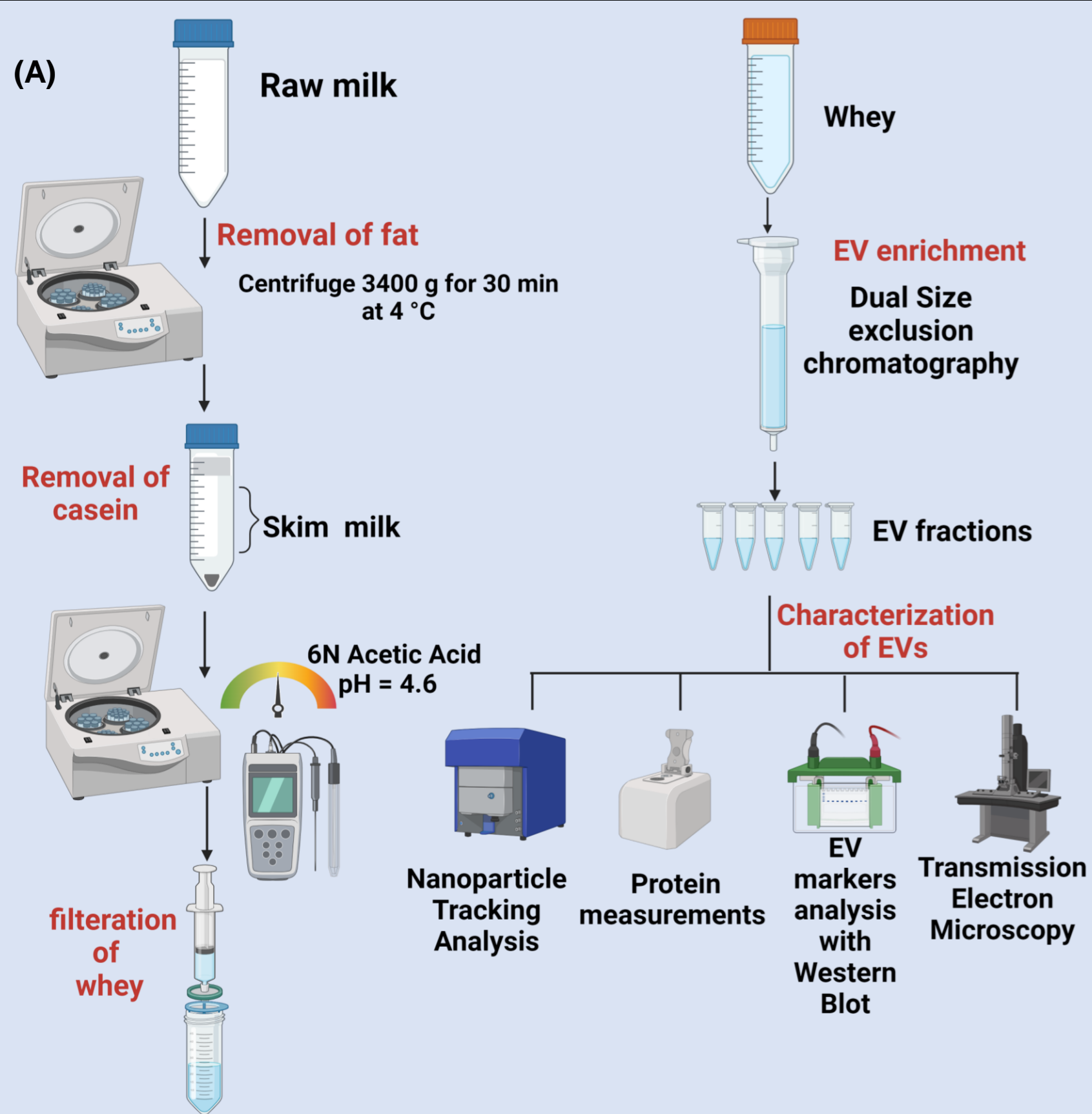


Fig 1: (A) MEVs enrichment using SEC and characterization based on ISEV guidelines

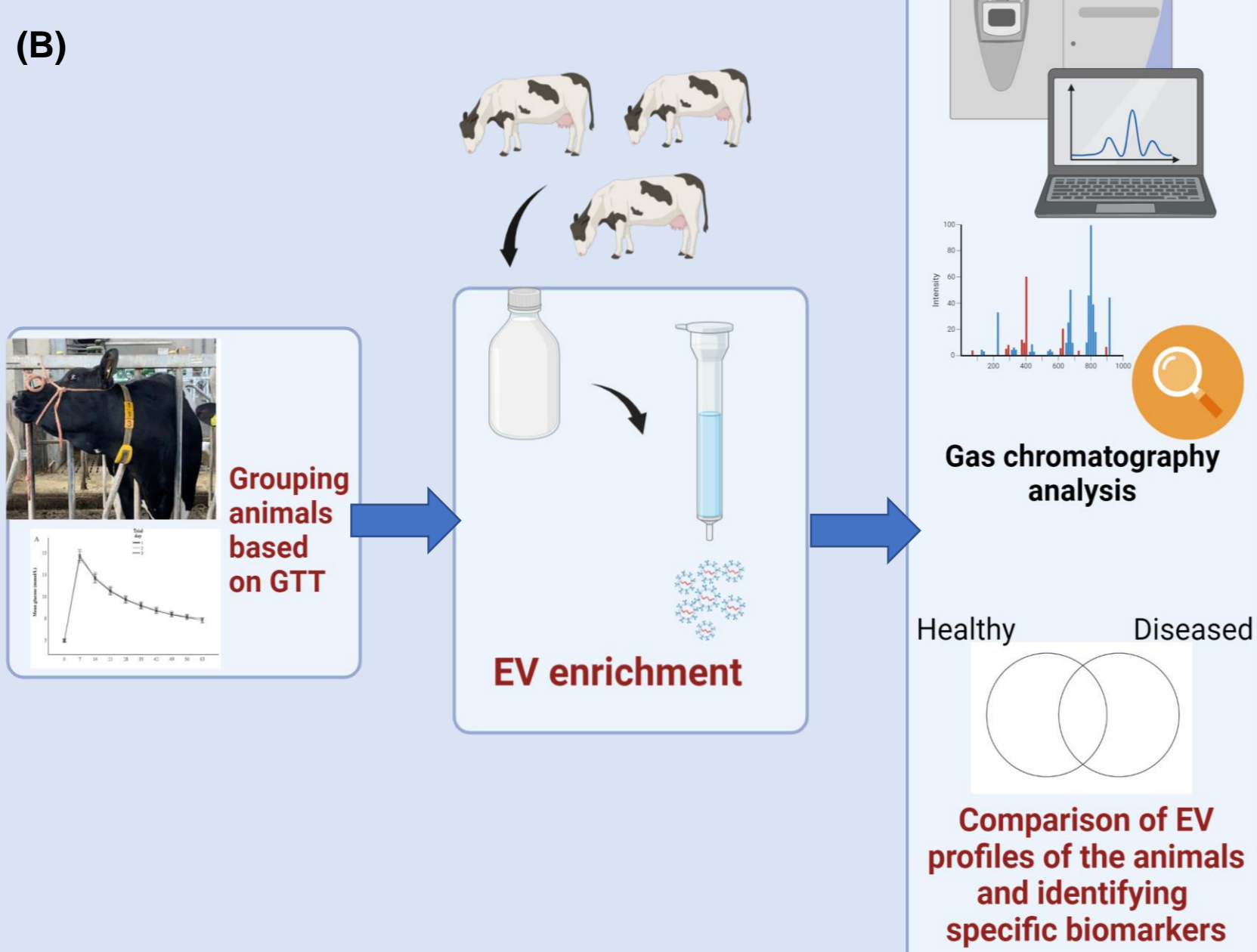


Fig 1: (B) Workflow of the experiments conducted

## Results

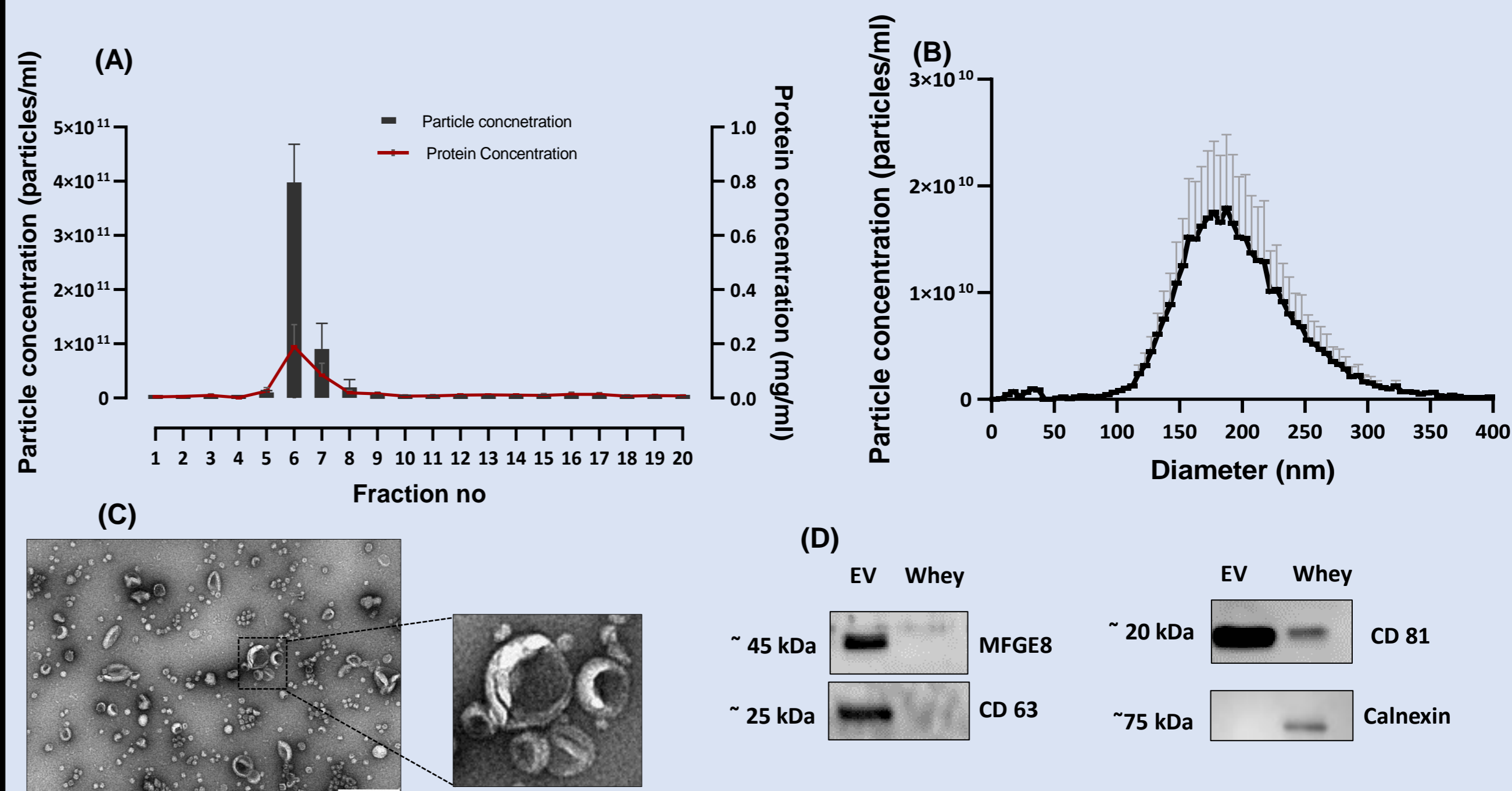


Figure 2: (A) Number of particles present in each fraction 1-20. Fraction 5,6,7,8 indicated the highest particle concentration. Figure (B) Size distribution of enriched nanoparticles. Highest number of particles reported in the size range of 150-200 nm. (C) Transmission Electron Microscopic image of enriched EVs. Figure (D) EV markers analysis with Western Blot. Enriched EVs are positive for CD63, CD81, MFGE8 and negative for Calnexin which indicates the purity.

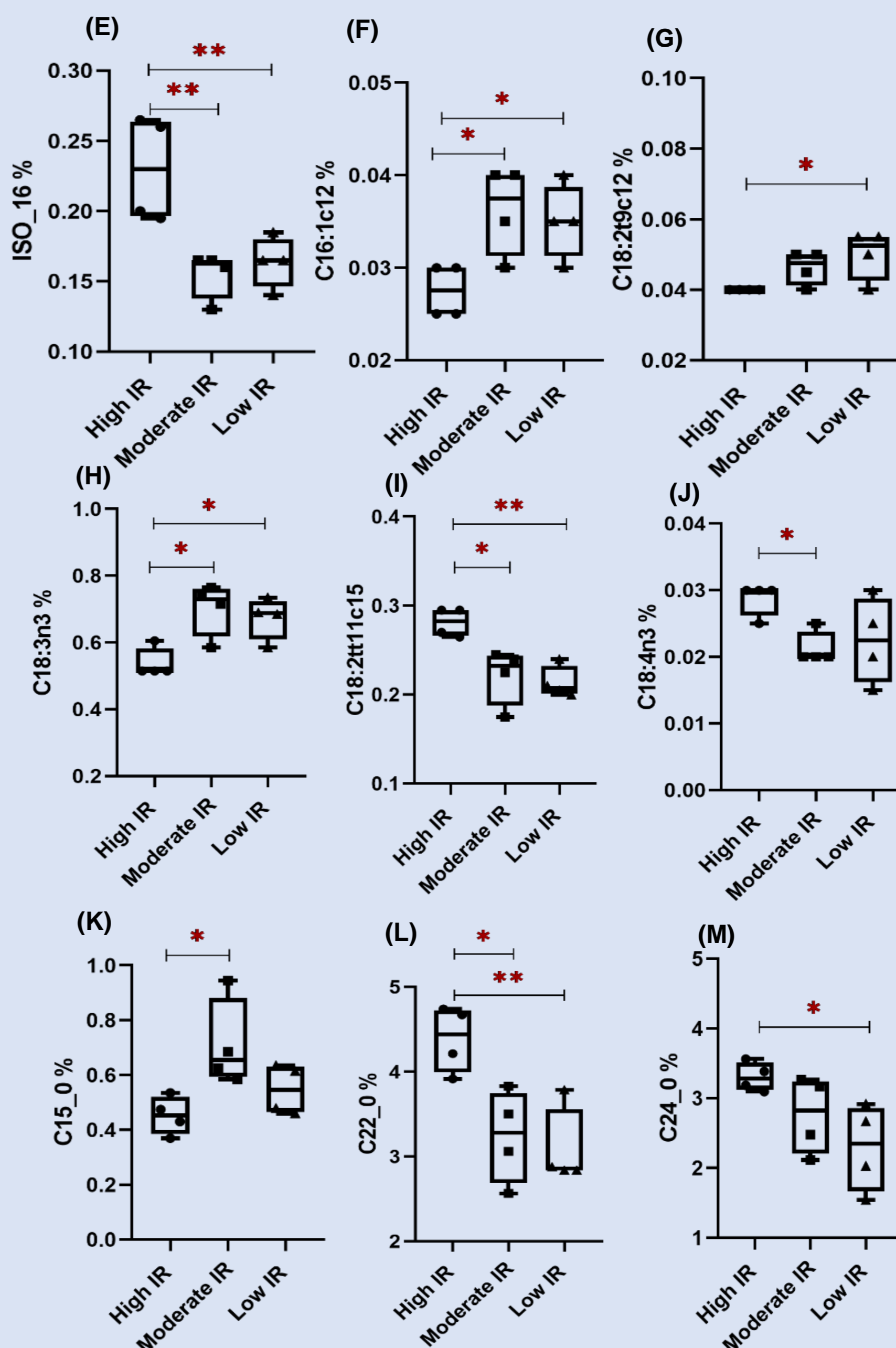


Figure 2: Fatty acid percentages from total fatty acid contents that were differently detected in milk and MEV samples among the IR groups.

(E) ISO<sub>16</sub>% concentrations among high, moderate and low IR groups. (F) C16<sub>1c12</sub>% concentrations among high, moderate and low IR groups (G) C18<sub>2t9c12</sub>% concentrations among high, moderate and low IR groups (H) C18<sub>3n3</sub>% concentrations among high, moderate and low IR groups (I) C18<sub>2t11c15</sub>% concentrations among high, moderate and low IR groups (J) C18<sub>4n3</sub>% concentrations among high, moderate and low IR groups (K) C15<sub>0</sub>% concentrations among high, moderate and low IR groups. (L) C22<sub>0</sub>% concentrations among high, moderate and low IR groups. (M) C24<sub>0</sub>% concentrations among high, moderate and low IR groups. (\*p ≤ 0.05)

## Conclusion

- MEV-FA profile may have the potential to serve as promising bioindicators of cow metabolic disease conditions warranting in development of IR-specific, non-invasive, early-stage biomarkers.

## Acknowledgements



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