

# Sequestration methods for environmental contaminants in order to reduce the exposure for food producing animals in Kazakhstan

Ainissa Akindykova<sup>1,2</sup>, Stefan Jurjanz<sup>2</sup>, Celine Cakir-Kiefer<sup>2</sup>, Almagul Baubekova<sup>1</sup>

<sup>1</sup>Faculty for Biology and Biotechnology, Al-Farabi Kazakh National University, Almaty, Kazakhstan

<sup>2</sup>UR AFPA, INRA-Université de Lorraine, Vandoeuvre, France

## Introduction

In Kazakhstan, polluting mining and heavy industry are the main factor of the economic development. This can be a risk for the contamination of Food producing animals which lives generally in extensive conditions.

Kazakh population consumes large amounts, especially of dairy products, raising the question of Food safety. Therefore, the contamination with heavy metals (HMs) or Persistent Organic Pollutants (POPs) is a real issue in Kazakhstan and needs methods to avoid or at least reduce their bioavailability in Food.

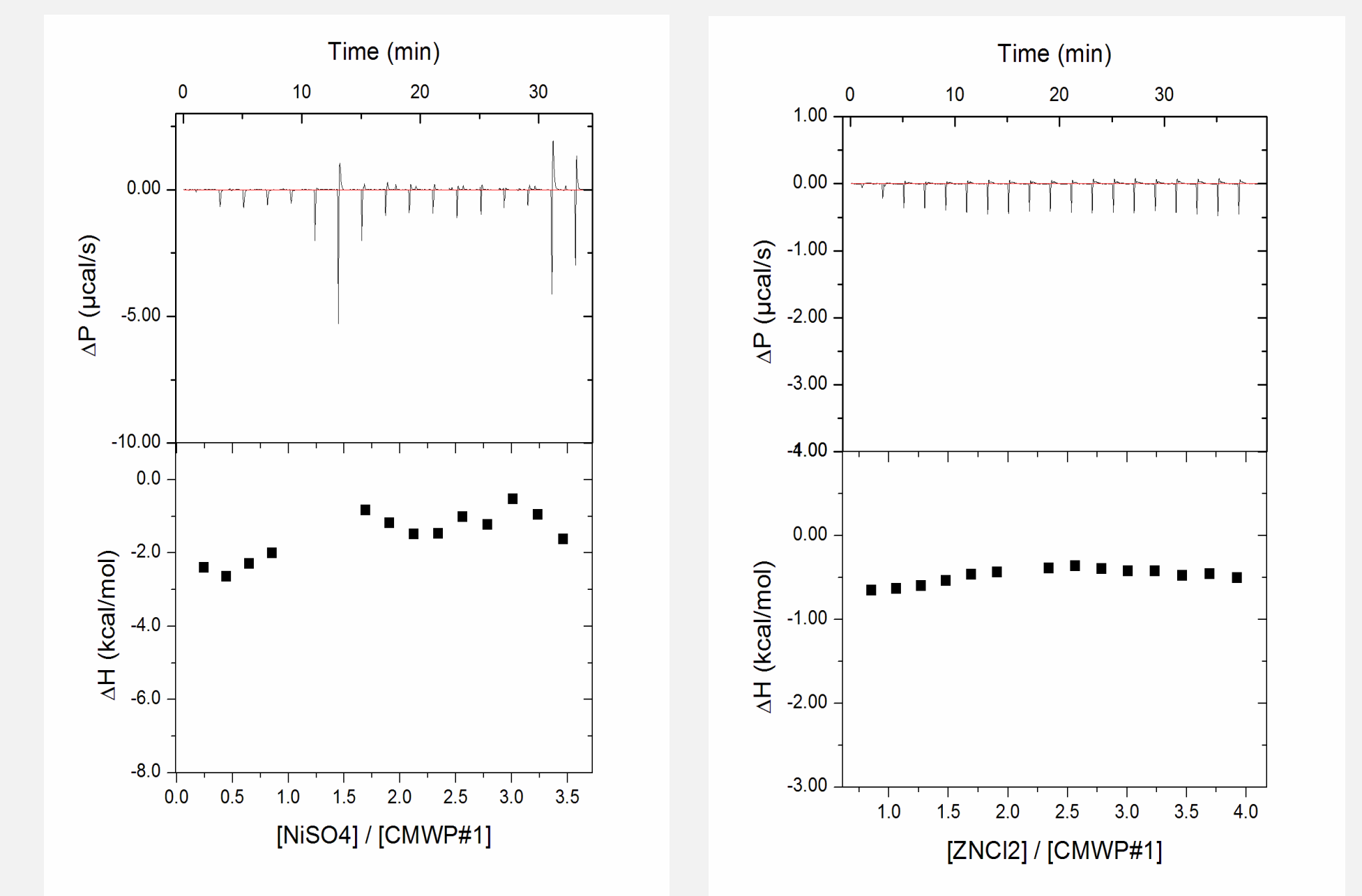
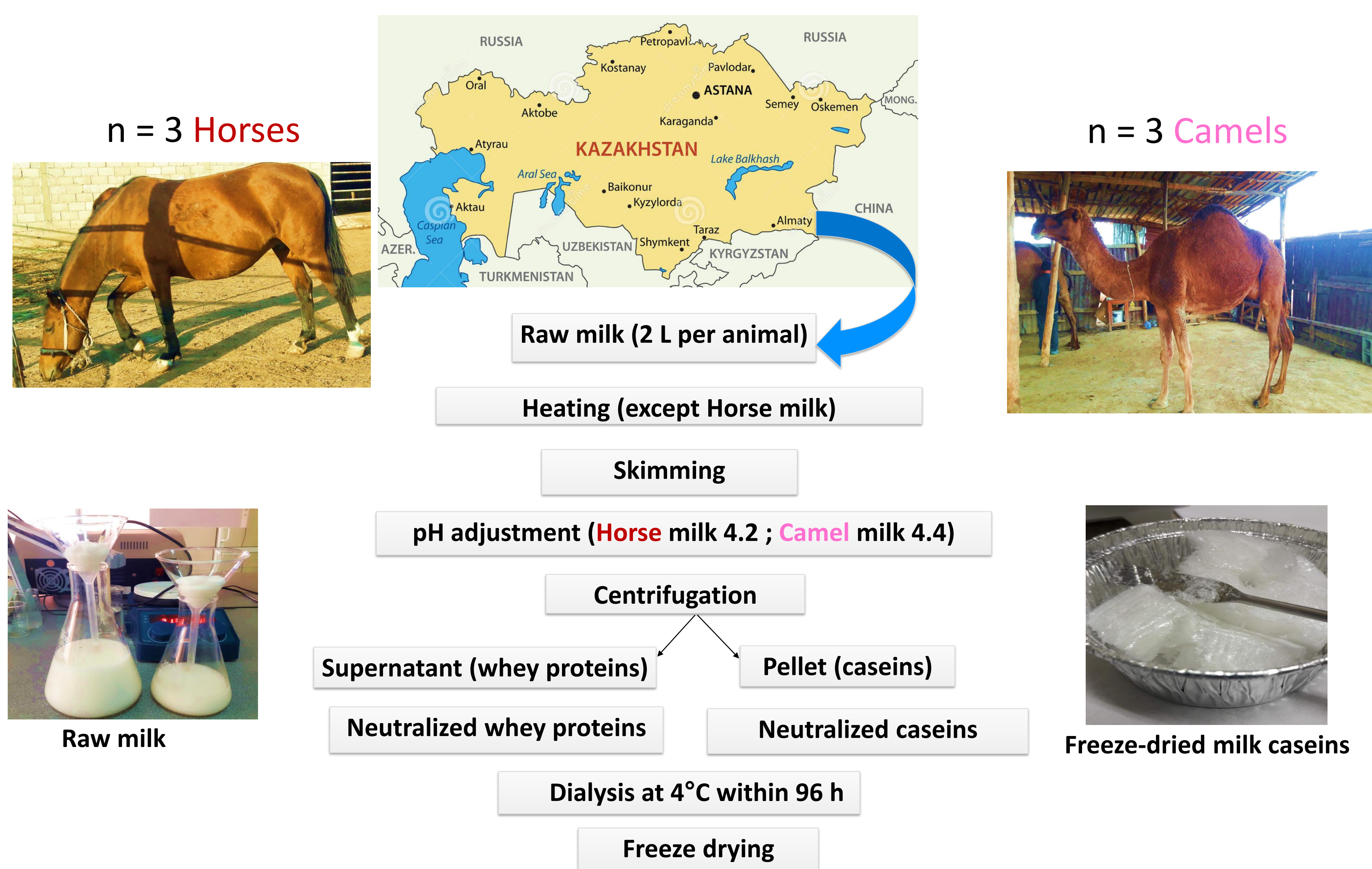
## Objectives

Reducing exposure of consumers to

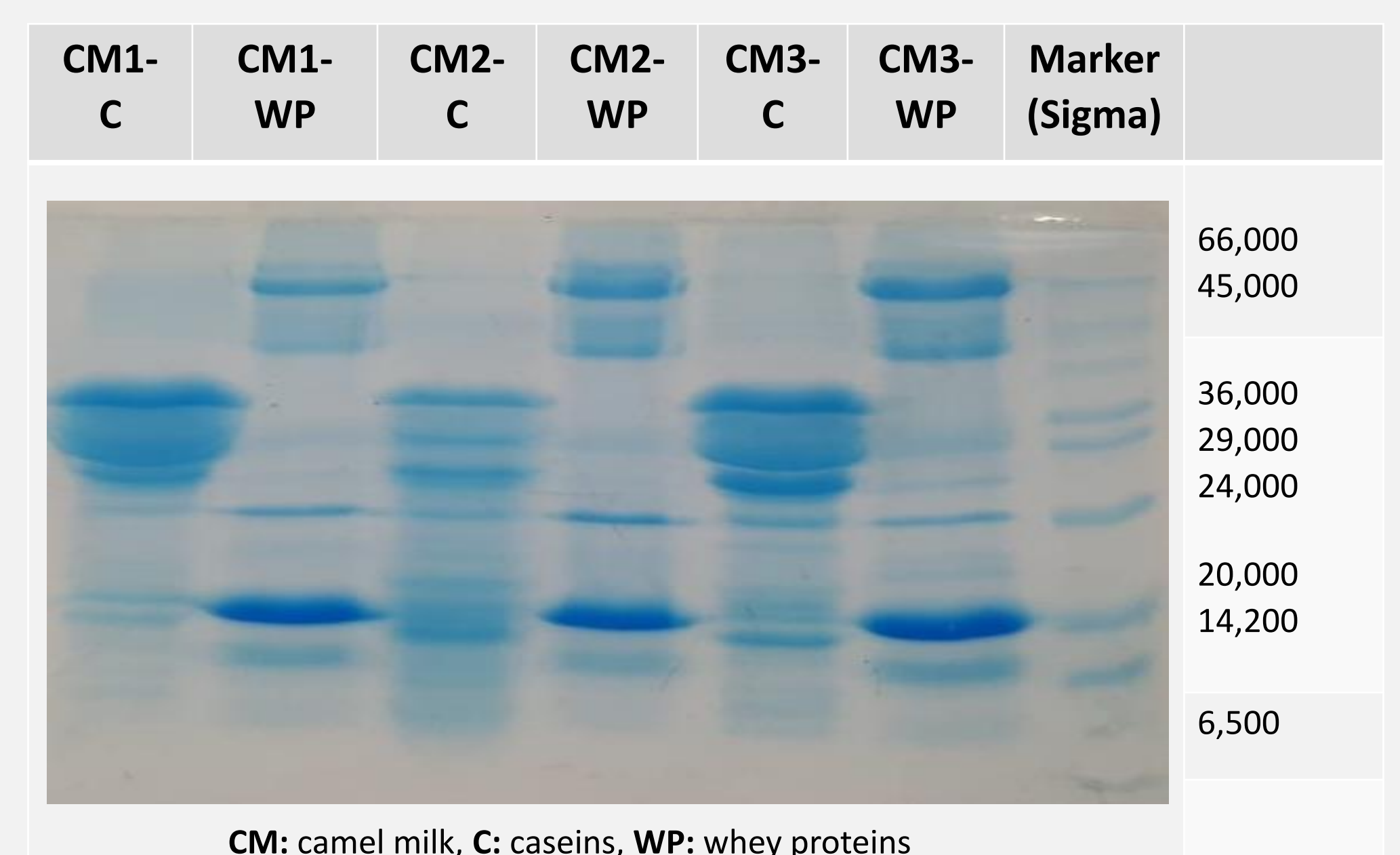
- 1) HMs by reducing their bioavailability *via* chelation with peptides issued from milk of local species (Camel and Mare)
- 2) POPs by skimming fully or partially the contaminated raw milk

## Material and Methods 1: HMs (Spring 2019)

Sampling in Almaty region, Kazakhstan  
Isolating whey proteins and caseins from raw milk:



Interaction between Camel whey-proteins and HMs (Ni, Zn) are checked by ITC (Isothermal Titration Calorimetry)



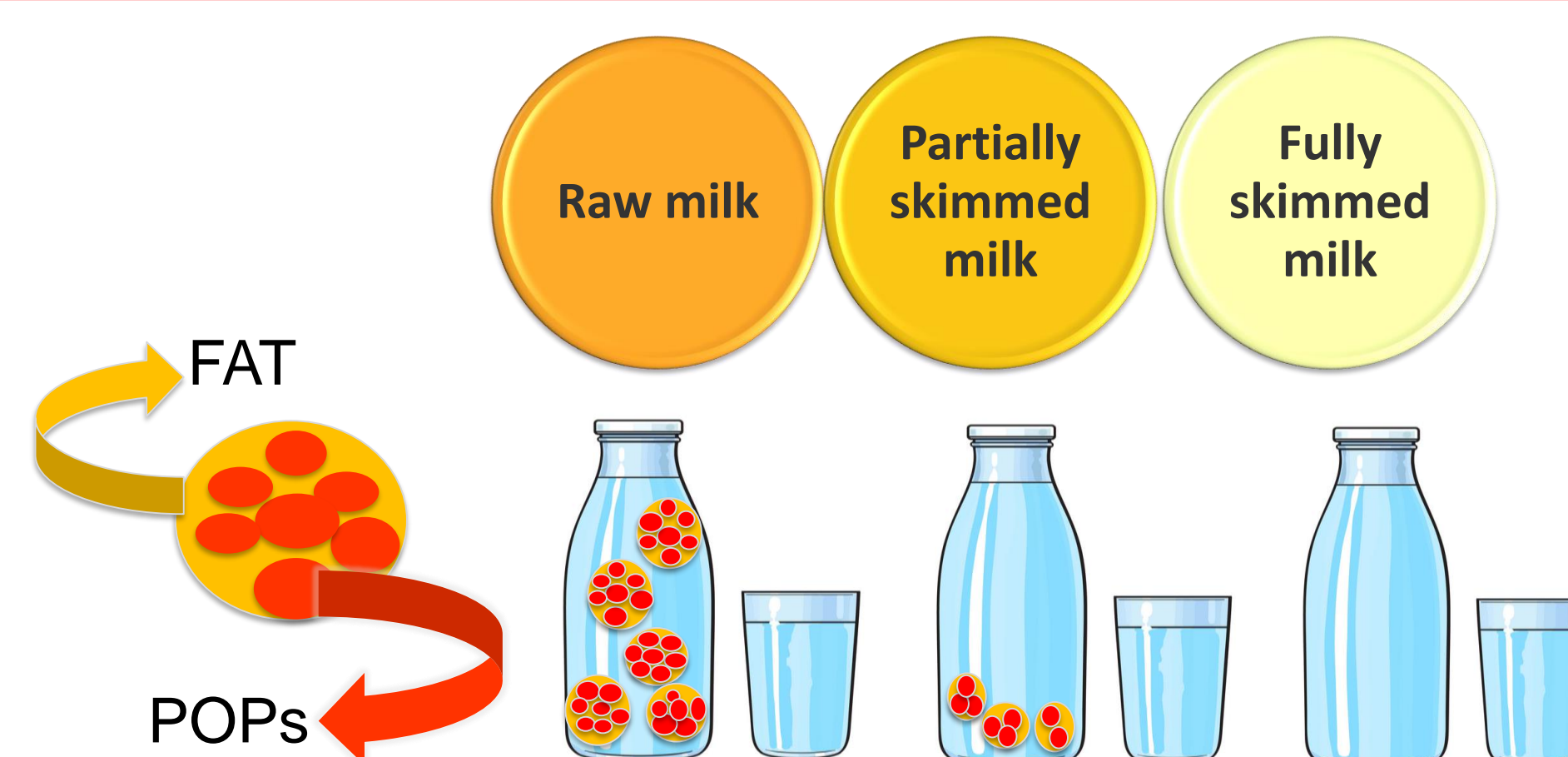
The purity of the isolated protein fractions in both species was verified by SDS PAGE.

Binding strength to peptides will be valued for different HMs: As, Cd, Cu, Hg, Ni, Pb, Zn but also, nutrient minerals: Ca<sup>2+</sup>, Mg<sup>2+</sup>, P.

Binding strength between peptides and HMs will be studied using ITC and switchSENSE Technology.

## Material and Methods 2: POPs (Autumn 2019)

- Separation (partially or fully) of fat fraction of contaminated milks using different speeds and durations of centrifugation
- Choice of relevant POPs in Kazakhstan<sup>1</sup>
  - PCDD/Fs
  - PCBs
  - Pesticides (DDT, HCH)



## Expected results

- Ability of camel and mare milk peptides to chelate efficiently HMs to avoid their absorption by animals if digest contaminated environmental matter without compromising the supply of essential nutrients.
- Establish laws to scale the reduction of POPs concentrations in dairy products from locally produced milk in respect to their fat contents.
- Maintain a local Food production in moderately contaminated areas by finding thresholds for concentrations of environmental contaminants where these methods would allow to ensure Food safety.

## References:

1 Baubekova, A., S. Jurjanz, A. Akindykova. Presence of contaminants in the environment and the food chain over the last 25 years in Kazakhstan. *Experimental Biology* 75.2 (2018): 67-91

Acknowledgments

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