Martin Petrick and Sarah Robinson

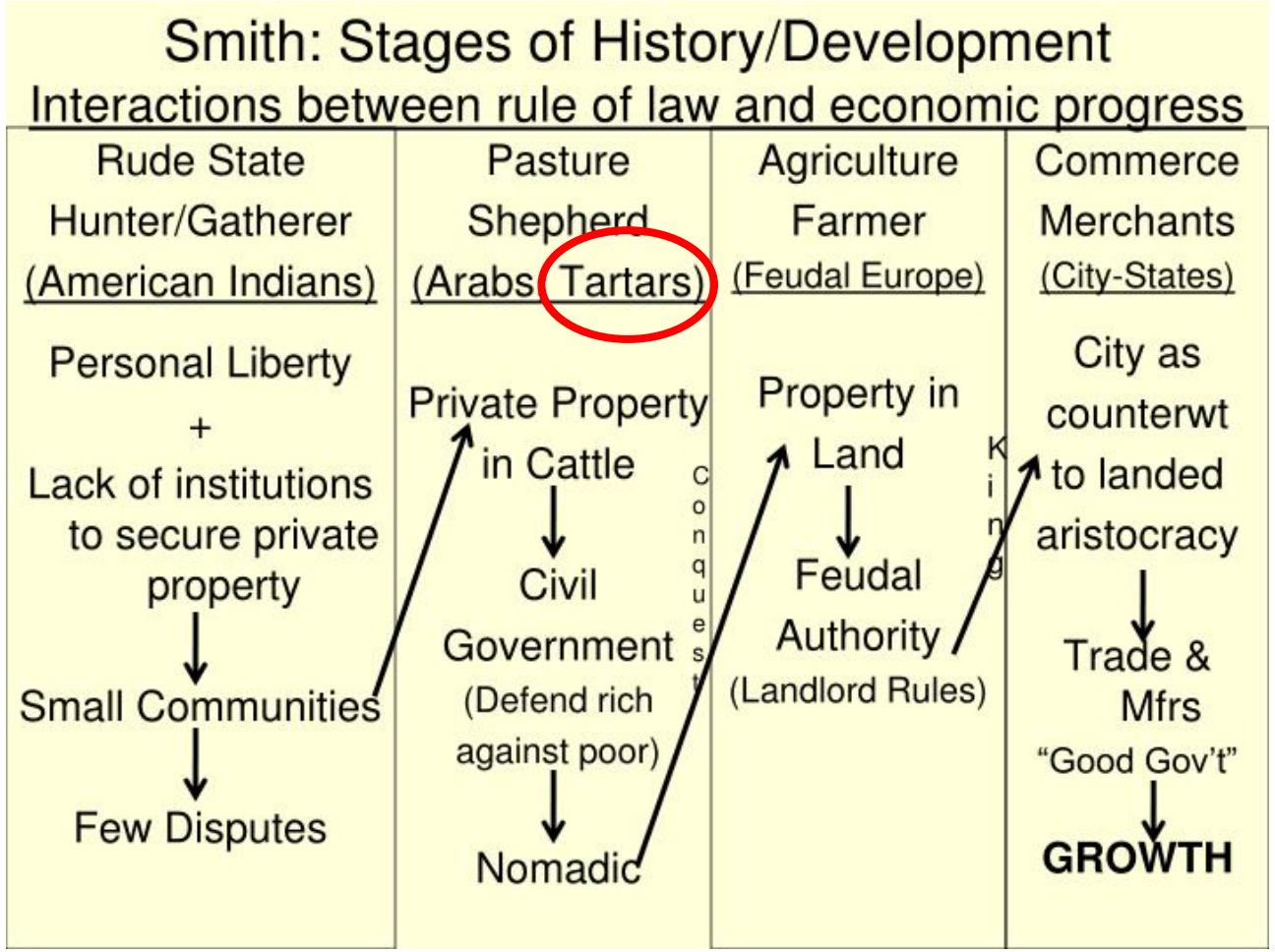
The economics of livestock in Central Asia

Life in Kyrgyzstan Conference 2024

Main points of my talk

- The long-term view of livestock in Central Asia
- Livestock in modern agricultural value chains
- Policy & research implications

Adam Smith on Central Asian livestock



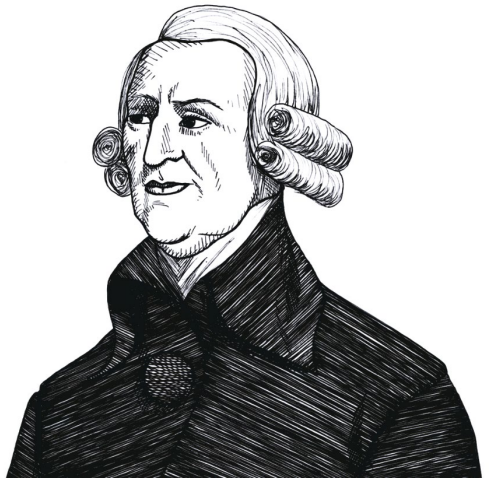


Image: libertyfund.org

Adam Smith 1762/63 Lectures on Jurisprudence,
Source of chart: https://priorprobability.com/2023/12/31/digression-smiths-four-stages-model-of-economic-history/

Adam Smith on Central Asian livestock

"the Tartars have been always a nation of shepherds, which they will always be from the nature of their country, which is dry and high raised above the sea."

Adam Smith 1762/63 Lectures on Jurisprudence, cf. Brewer 2008.

Image: libertyfund.org

Land cover map Central Asia

Land Cover Classes

- Alpine/Subalpine grassland
- Irrigated cropland
- Regularly flooded grassland/woody vegetation
- Sparse grassland/shrubland
- Rainfed cropland
- Water body
- Forested land
- Close to open grassland
- Bare area
- Permanent snow/ice

225 112.5 0 225 Kilometers

1:15,000,000

International boundary

Original dataset: Central Asia Land Cover (CALCOVER - Version 1)
Data source: ADB CALCILM Programme
Satellite data: MODIS NDVI Time Series Dataset (MOD13Q1, 250m)
Acquisition date: January 2008–December 2008
Projection: Transverse Mercator

Nomads, traders & settlers in Central Asian history

2000 BC Agro-pastoralism prevalent in Central Asia

1000 BC **Domestication of the horse** possibly in Central Asia
Nomadic conquerors begin to dominate settlements

200 BC Emergence of the **Silk Road** between China & Europe

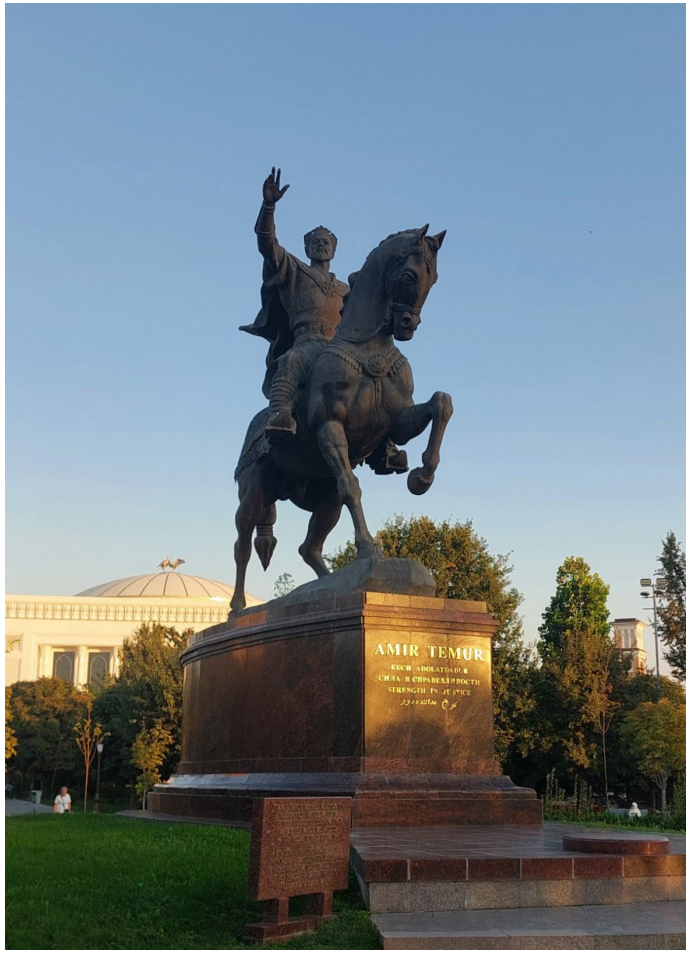
1200 AD Genghis Khan founder of Mongol Empire

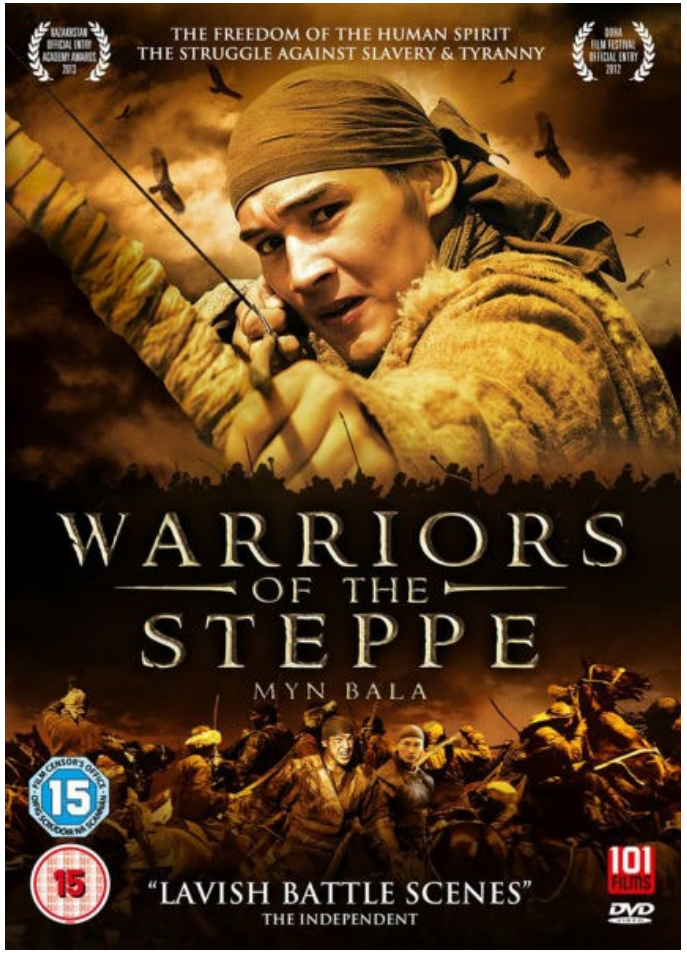
1300 AD Amir Timur, growing nomadism at expense of settlements, Pax Mongolica enables intercontinental trade, Islam in Central Asia

1740s Begin of **Russian colonisation**

Paul 2012

Animals as key resource in warfare





https://www.facebook.com/greatsteppe/; https://gonzohistory.wordpress.com/

Why nomadism?

Economic forces:

- Demographic surplus
- Land scarcity
- Famine

Ecological forces:

- Natural catastrophes
- Climate change

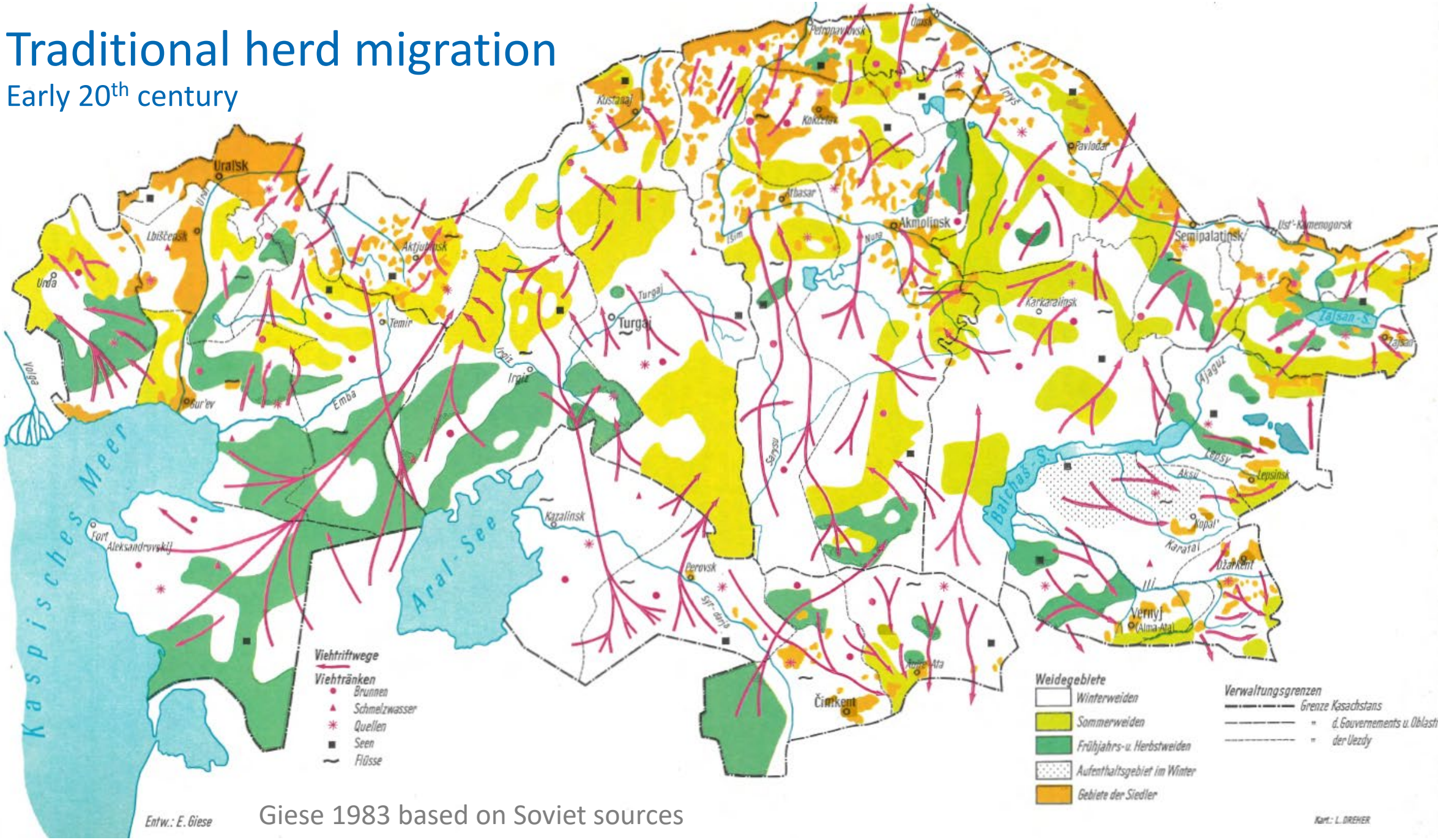
Political forces:

- Armed conflict, conquests
- General uncertainty
- Ideologies of power elites

Scholz & Schlee 2015

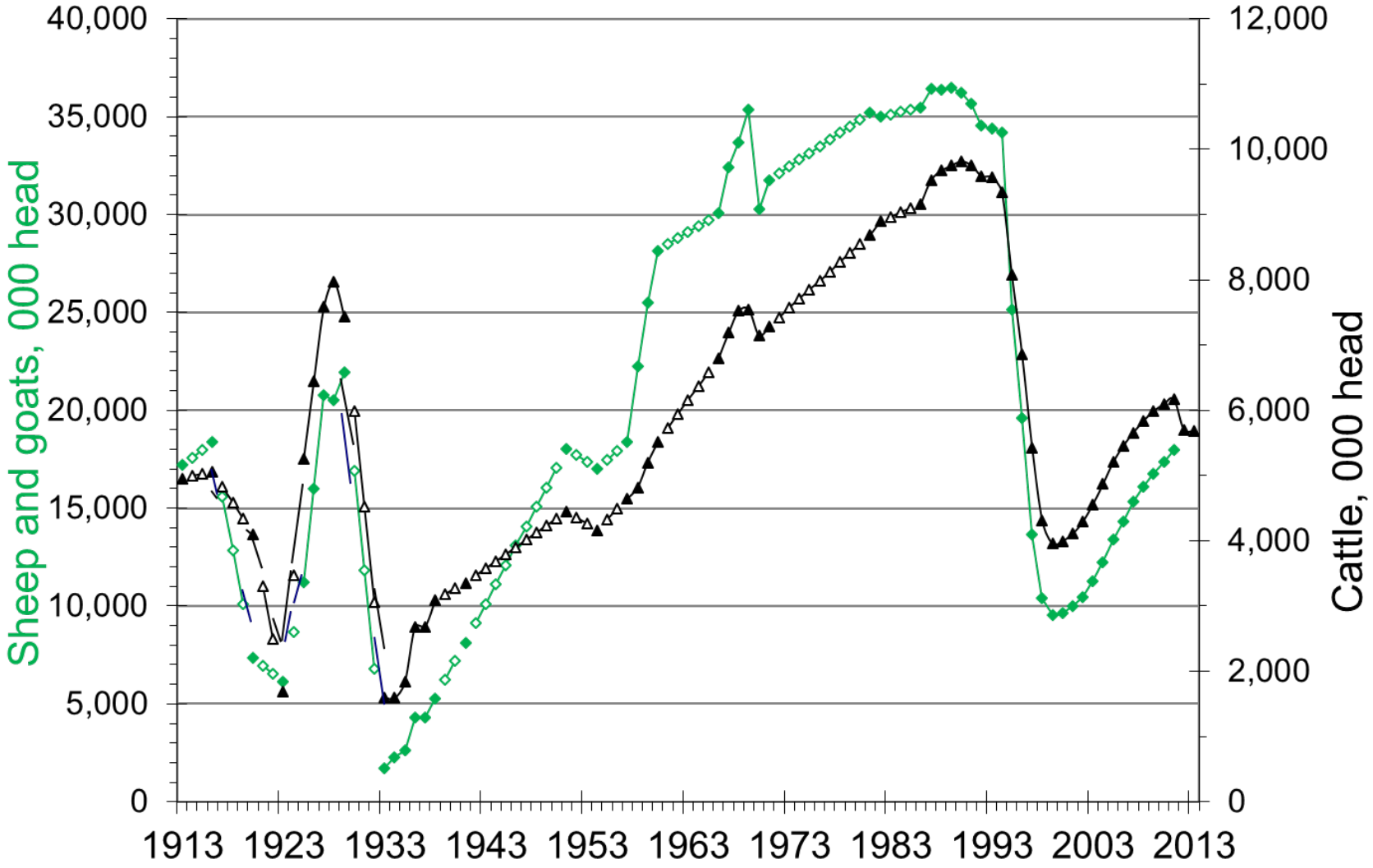
Traditional herd migration

Early 20th century



Giese 1983 based on Soviet sources

Livestock population in Kazakhstan 1913-2013



Hollow markers are linear interpolations.

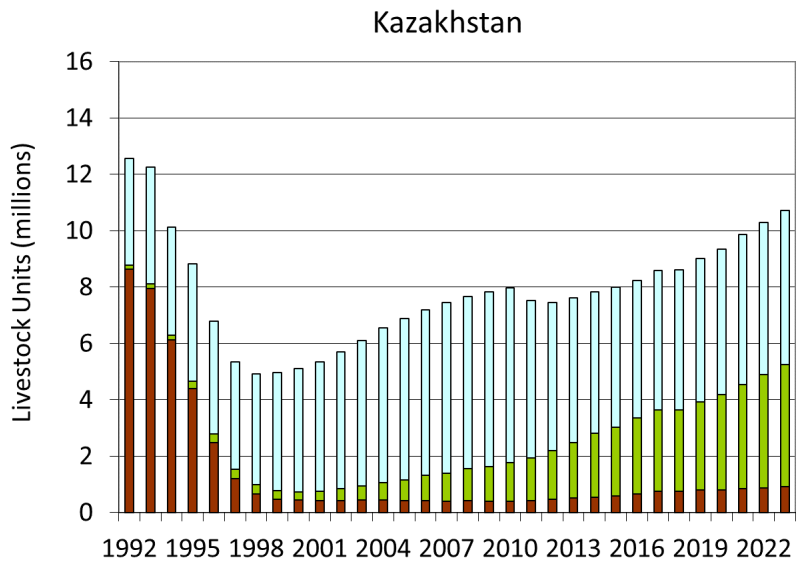
Source: Mimako Kobayashi based on Olcott 1995, National Statistical Office.

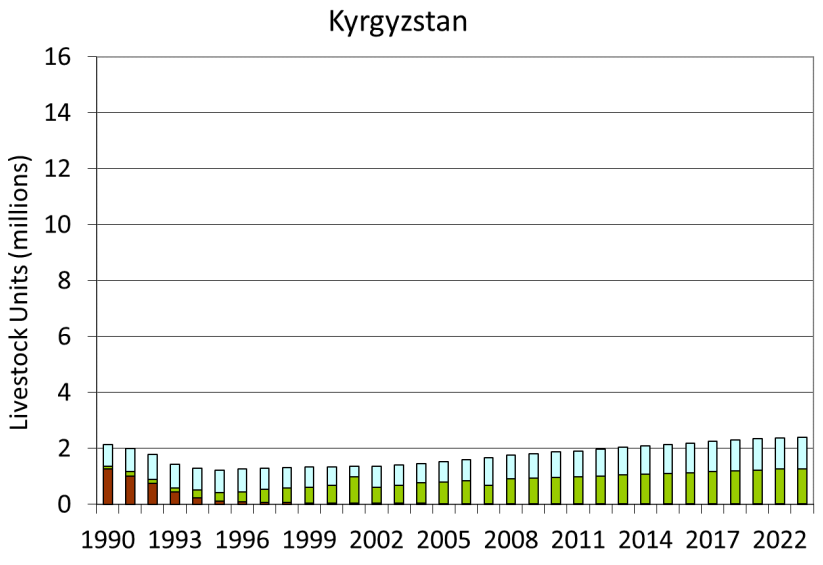
Why do (contemporary) Central Asians keep livestock?

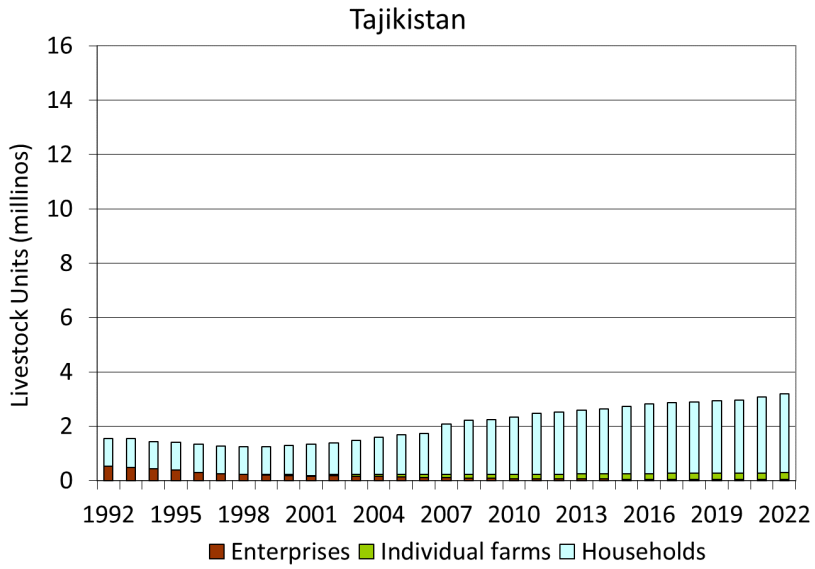
Output	**Input**	**Asset & insurance**	**Social & cultural functions**
Food products	Traction & transport	Tradeable asset	Bride price
Non-food products	Manure	Storage of wealth	Reputation & prestige
Cash income	Utilising pastures	Disaster insurance	Bequest
Diverse & nutritious human diet	Utilising seasonal labour		
	Processing low-value fodder into high-value output		

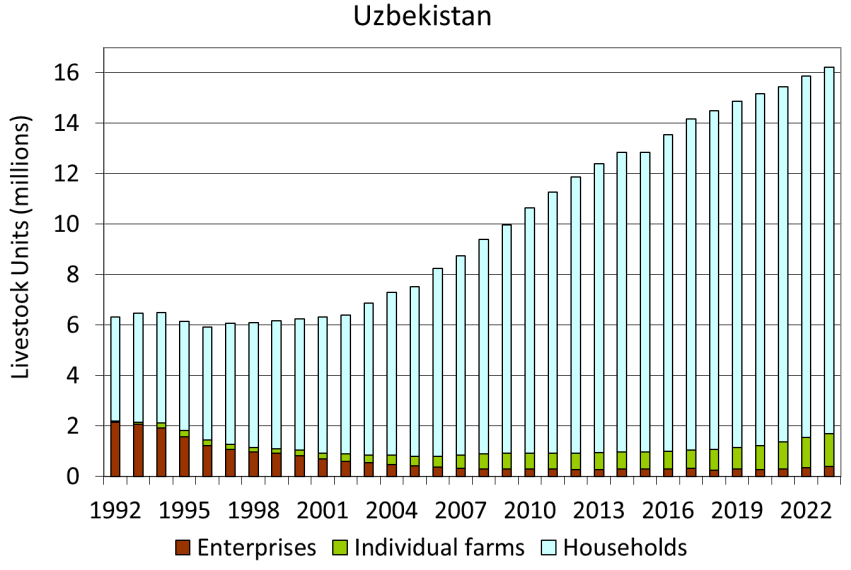
Authors inspired by Jahnke 1982; Herrero et al. 2013.

Livestock numbers by farm type Central Asia









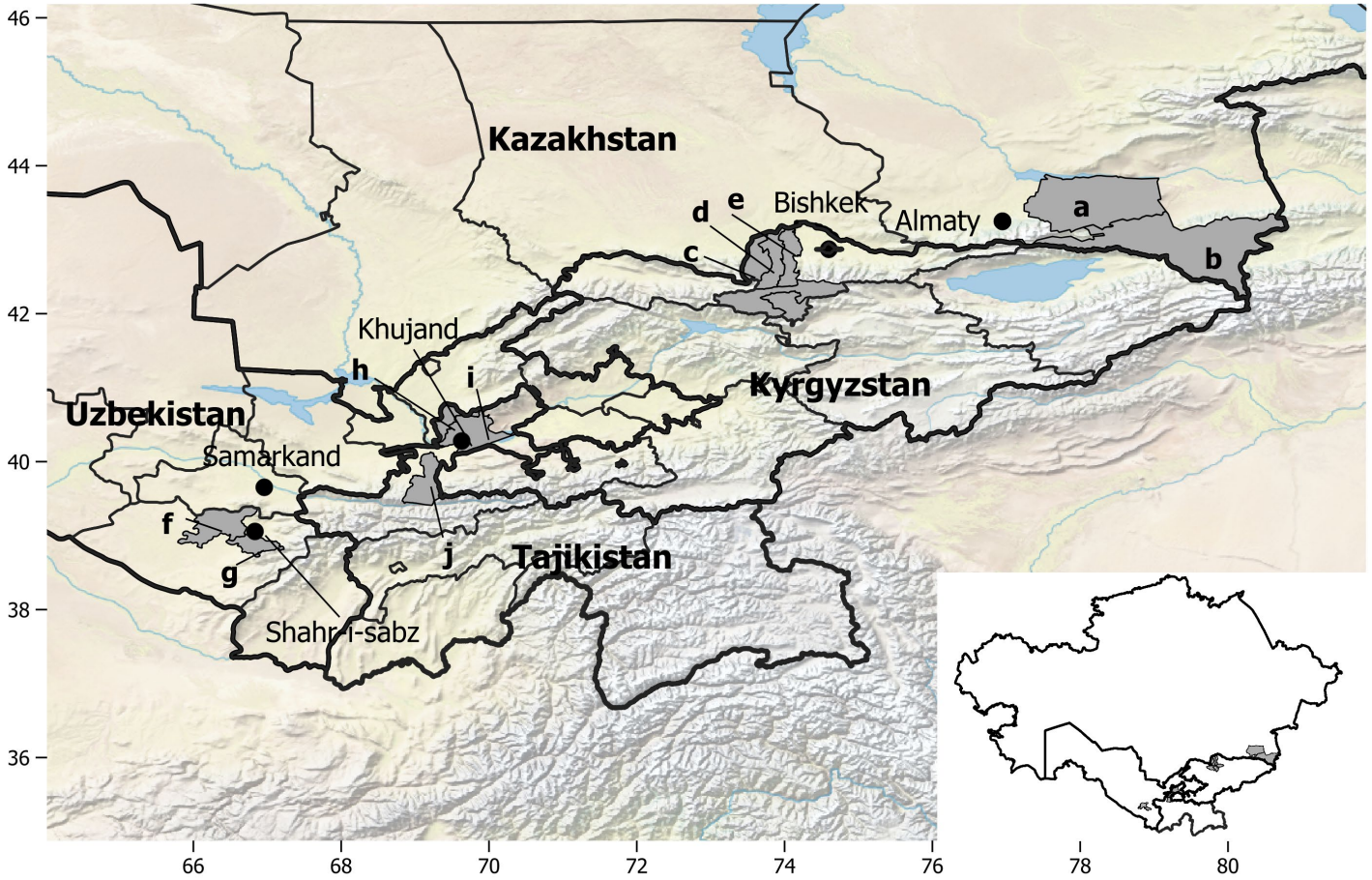
Source:
National Statistics,
Robinson et al. 2024

Livestock & Greenhouse Gas Emissions in CA

- Ruminants greatly contribute to GHG emissions via methane
- Intensification reduces GHG emissions per output
- Little alternative economic use of rangeland
- Carbon credits for pastoralists?

Robinson & Petrick 2021

IAMO-JLU livestock data collection 2018-2020



Peri-urban farming systems in foothill location of four countries
Number of observations

	Farms	Households
Kaz	200	50
Kyr	131	119
Taj	154	148
Uzb	149	152

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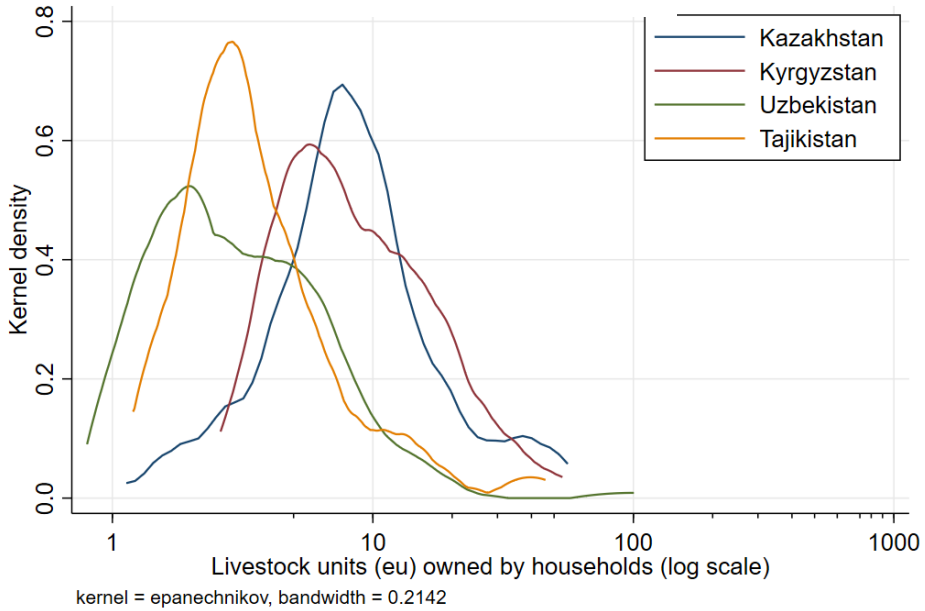
District names: (a) Enbekshikazakh; (b) Raiymbek; (c) Panfilov; (d) Jail; (e) Moskov; (f) Chirokchi; (g) Yakkabogh; (h) Masthchoh; (i) Gaforov and (j) Devashtich. Source: Robinson et al. 2024.

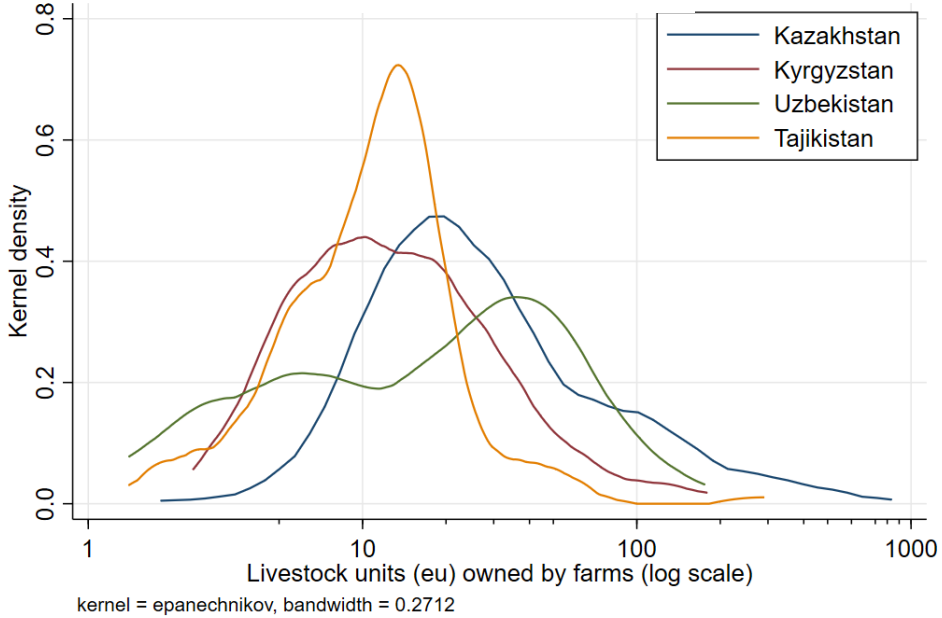
Distribution of herd sizes in survey data

Source: Robinson et al. 2024

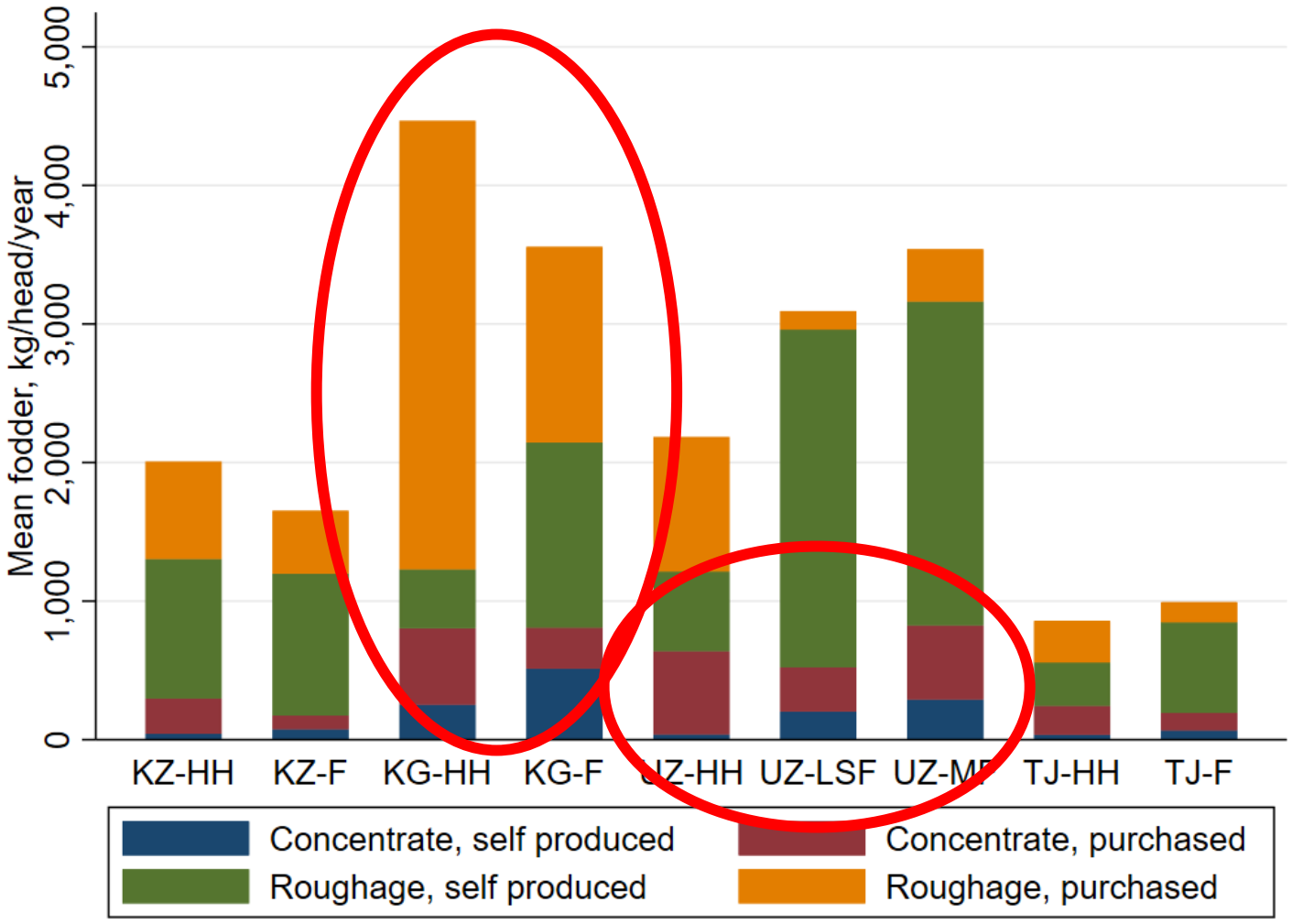
Households



Individual farms



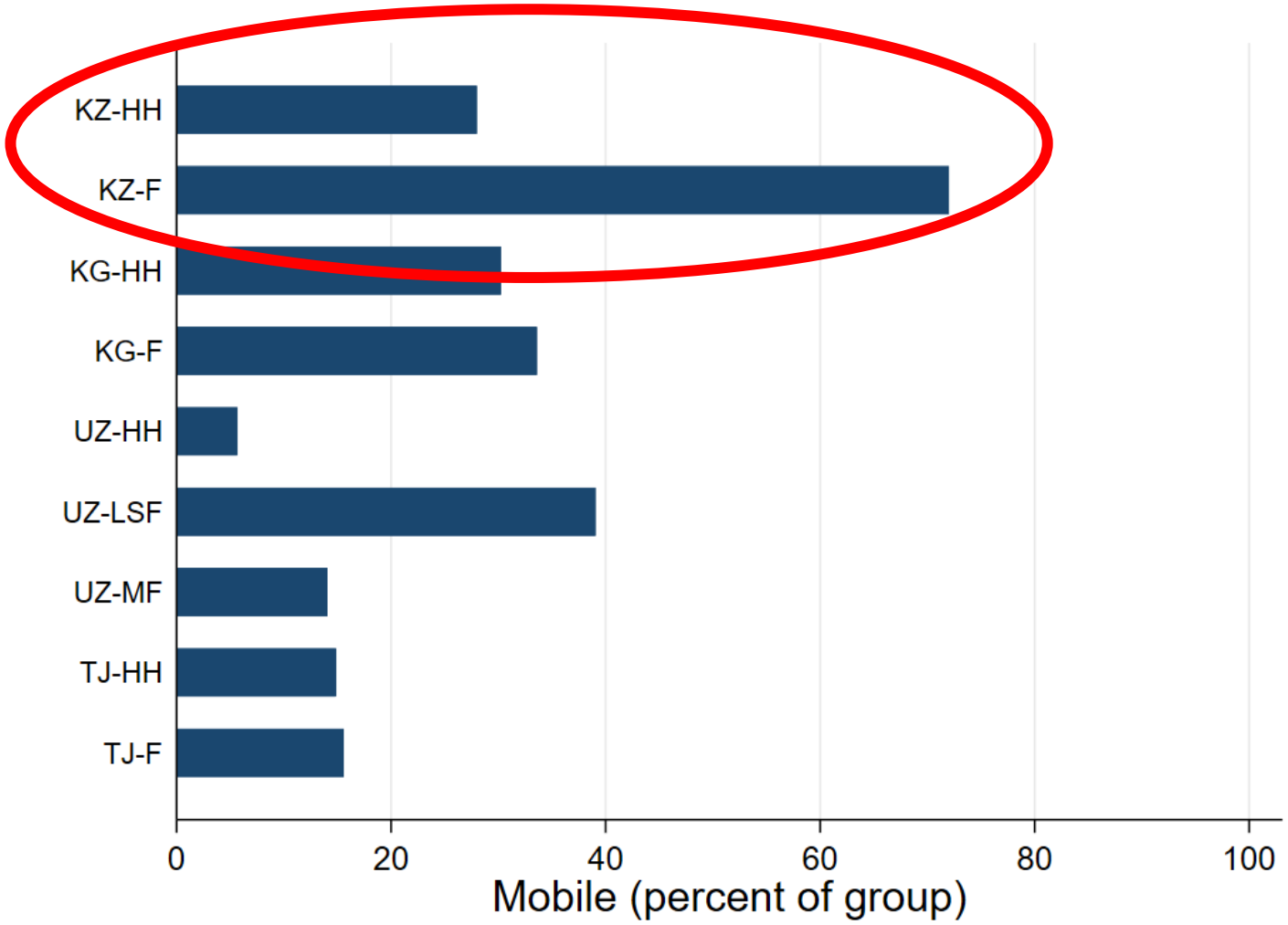
Amount & composition of fodder for cattle in survey



HH: households
F: individual farms
LSF: livestock farms
MF: mixed farms

Source: Robinson et al. 2024

Remote pasture utilisation by cattle holders

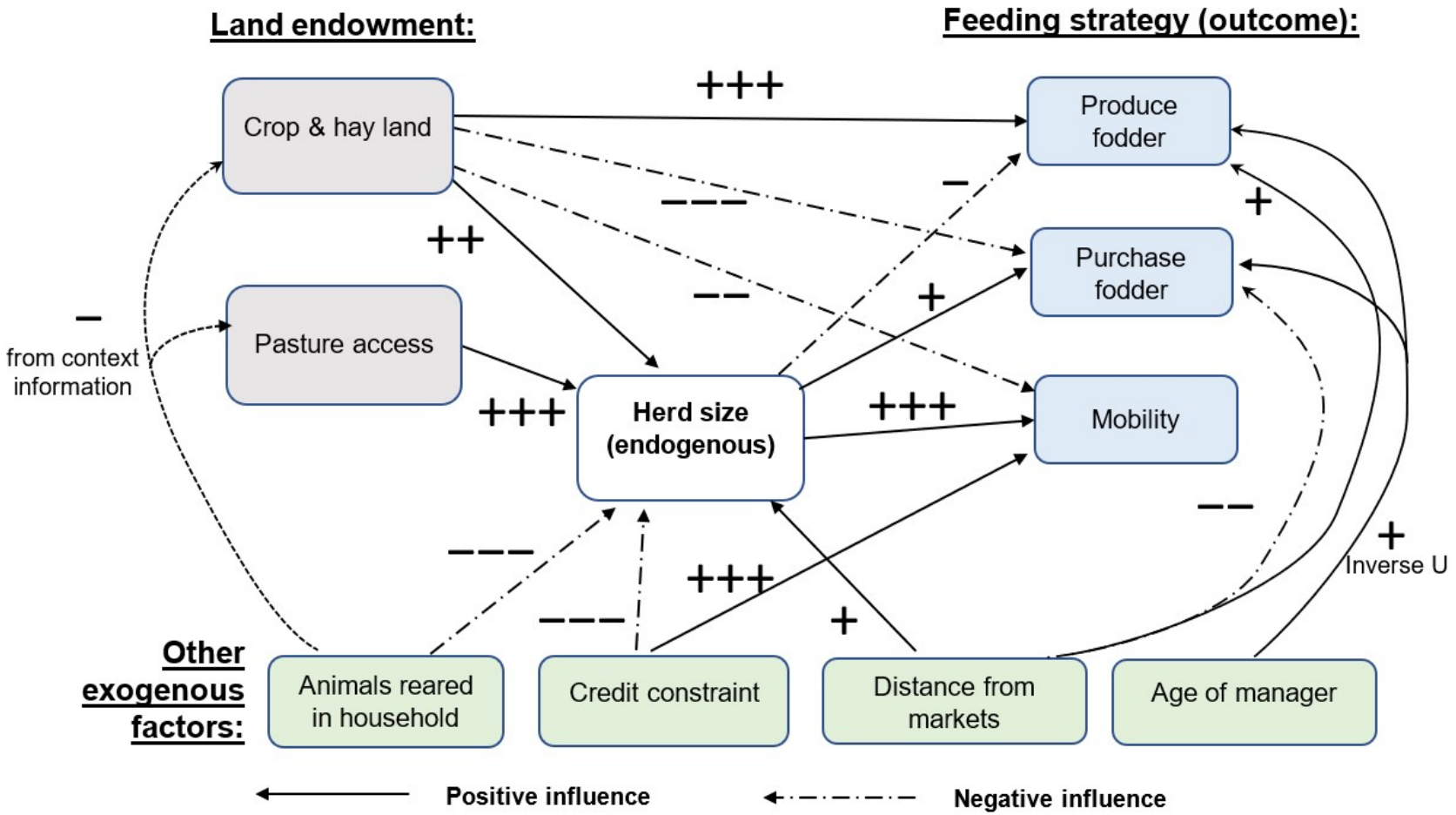


HH: households
F: individual farms
LSF: livestock farms
MF: mixed farms

Source: Robinson et al. 2024

Land access a key determinant of feeding strategies

Results of multi-equation regression model estimated on Kazakh subsample



Number of +, − indicate significance levels (10, 5, 1%)

Robinson & Petrick 2024, Agricultural Systems

Insights on pastoral land use in Central Asia

- Massive growth of animal stocks recently
- **Grazing ruminants remains key strategy** to derive economic benefit from extensive rangelands
- Livestock **mobility increasing** (again)
- Re-colonisation of remote rangelands underway
- Complex **crop-livestock interactions** near settlements

3 stages of agri-food value chain transformation

	Traditional AVC	Transitional AVC	Modern AVC
Main enterprise type in:			
Retail	Home enterprise	SMEs, wet markets	Supermarkets
Food service	None (home cooking)	Street vendors, independent restaurants	Fast-food chains
Processing	None (home-processing)	SMEs such as small mills	Large processors and food manufacturers
Wholesale	Brokers based in rural villages	Wholesaler based in urban markets	Off-market distribution companies
Logistics	Own-logistics by brokers	SMEs in third party logistics services (3PLS)	Large 3PLS companies and freight forwarders
Supply chain length	Short, local	Long, rural–urban	Long, rural–urban, international
Exchange arrangements	No contracts, no standards	No contracts, public standards, some vertical integration	Emerging contracts, private standards, vertical integration
Technology	Labor intensive	Labor intensive	Capital intensive
Foreign direct investment	None	Emerging	Significant

Barrett et al. 2022, Agri-food Value Chain Revolutions in Low- and Middle-Income Countries, J of Econ Lit

A livestock value chain revolution in Central Asia?

- Emergence of Western-style supermarkets
- Capital intensification, technology upgrading
- Emergence of quality standards
- Rise of third party food logistics services
- Spatial elongation & de-seasonalisation of value chains

Reardon 2015; Barrett et al. 2022.

Central Asian dairy producers

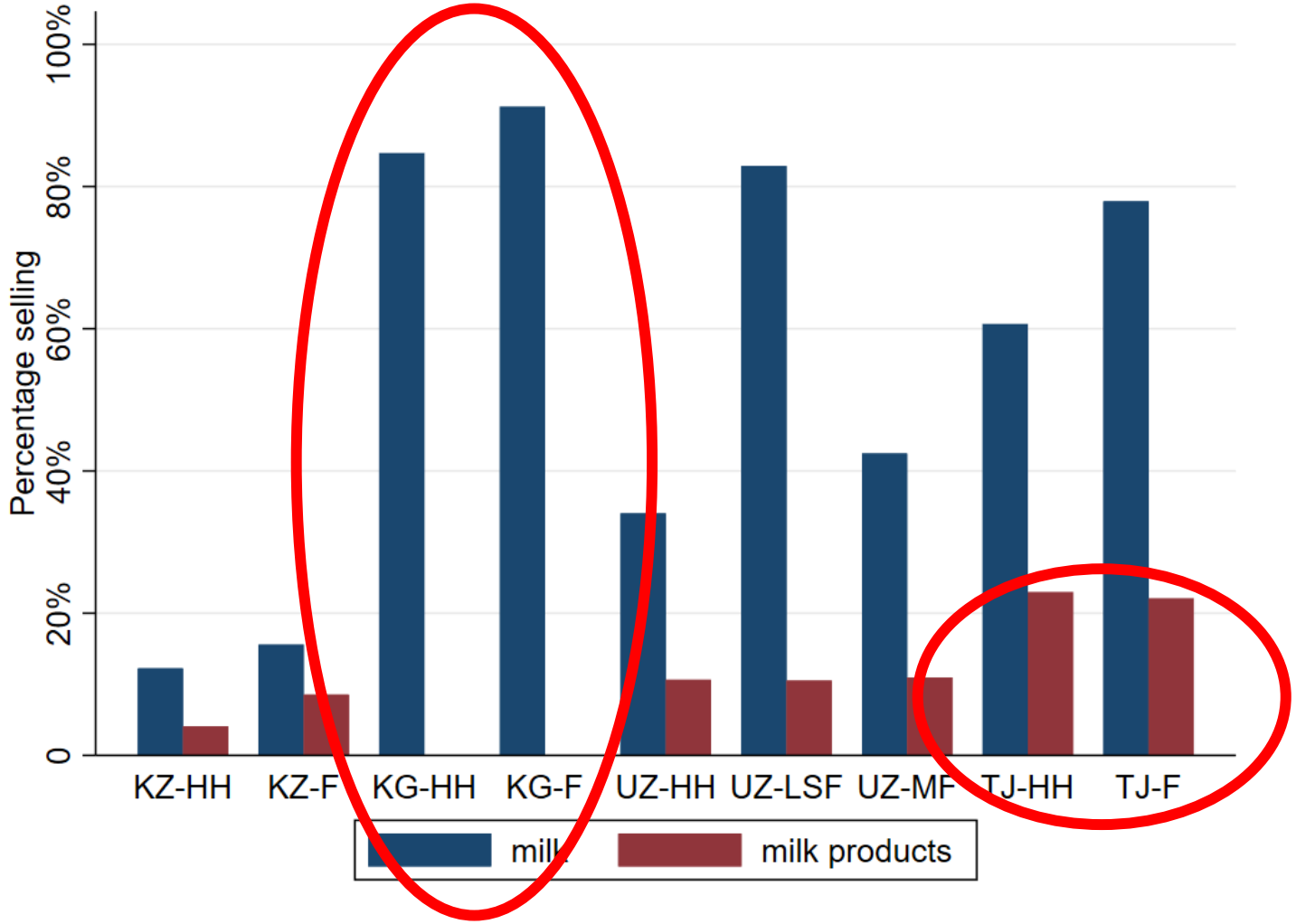
Almaty
2015

Sughd 2022

Chui valley 2022

All photos by Martin Petrick

Share of cow owners selling milk & dairy products



Only respondents keeping cows.

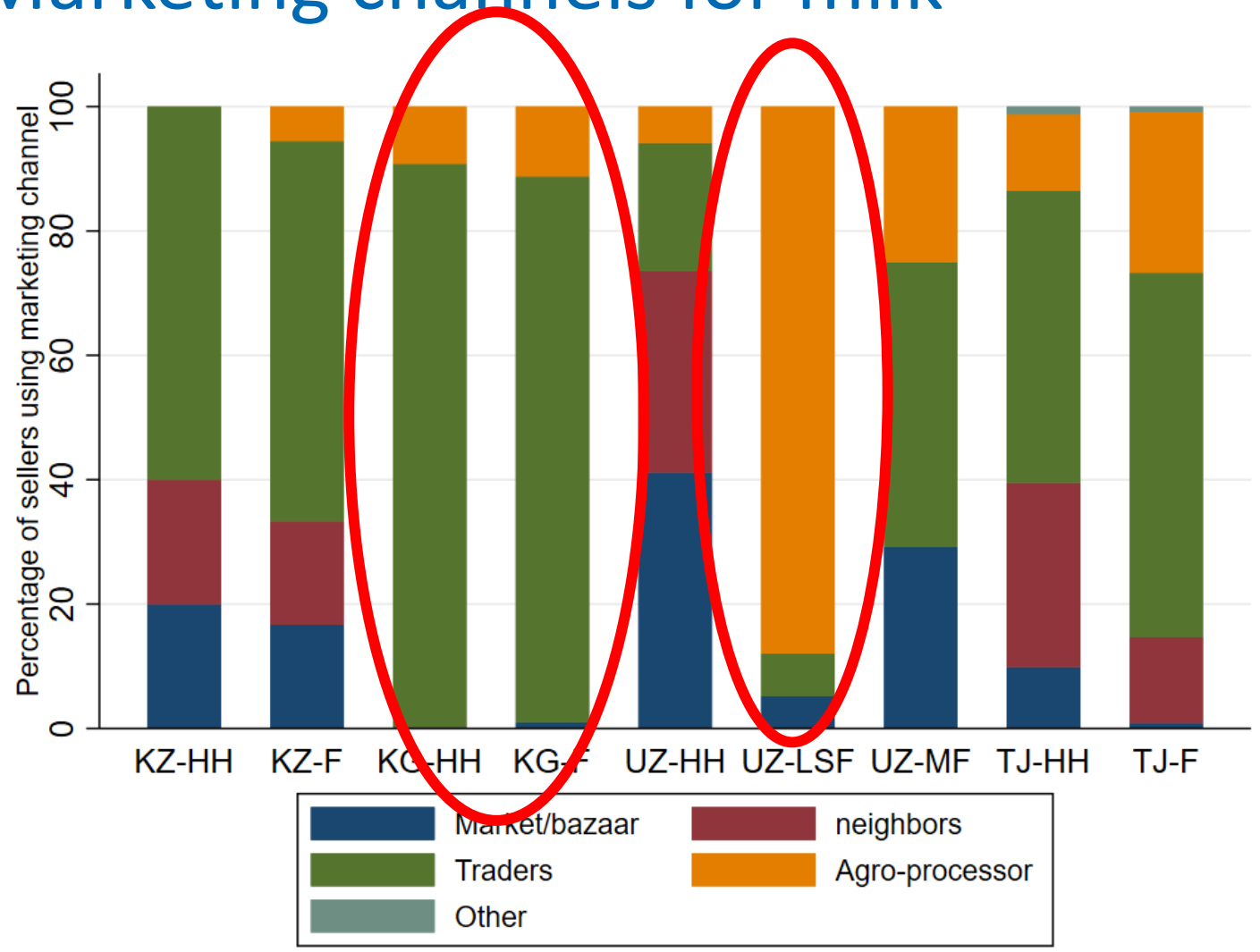
HH: households
F: individual farms
LSF: livestock farms
MF: mixed farms

Source: Robinson et al. 2024

Milk handling in Chui valley, Kyrgyzstan

Chui valley 2018, 2022

Marketing channels for milk



HH: households
F: individual farms
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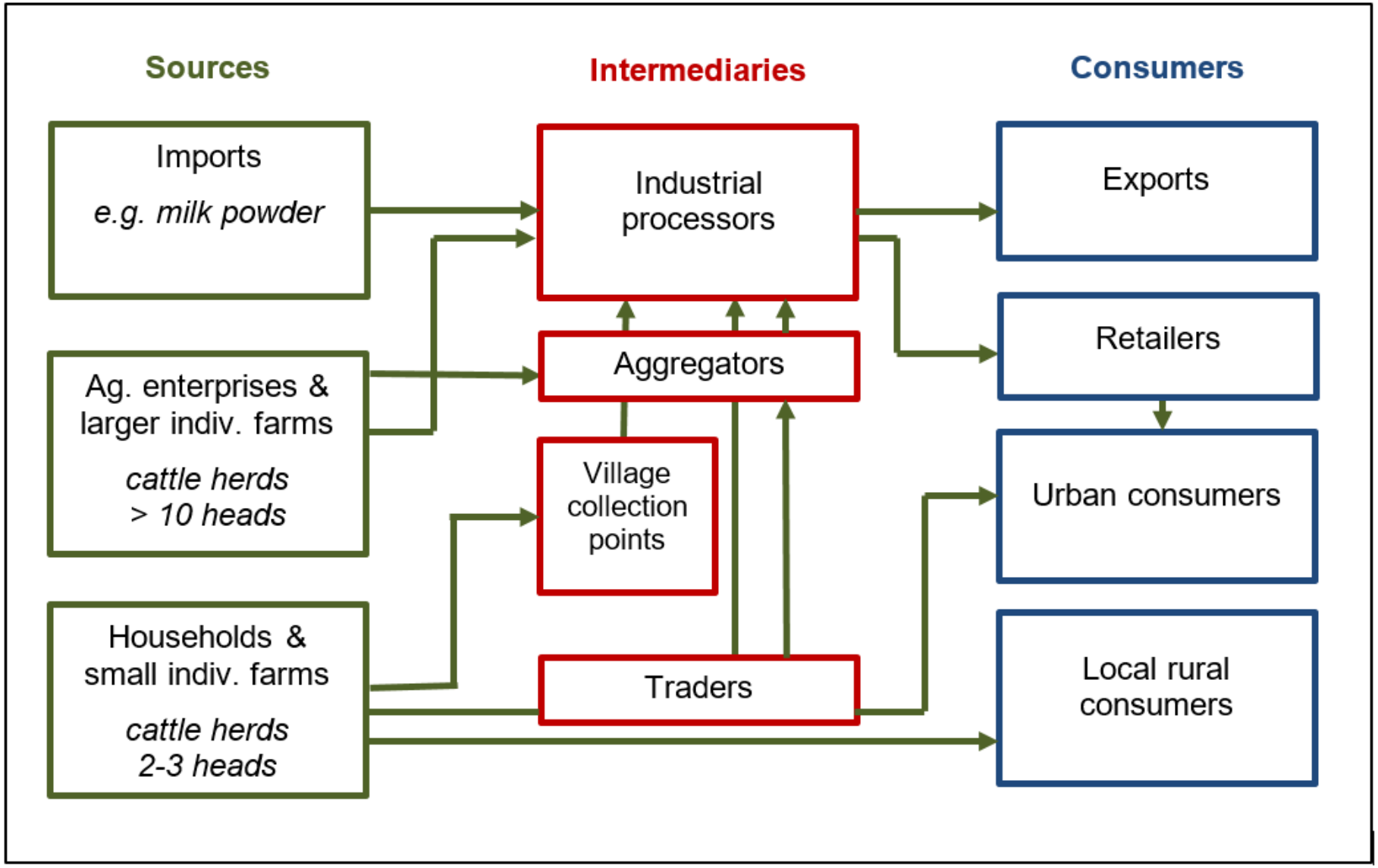
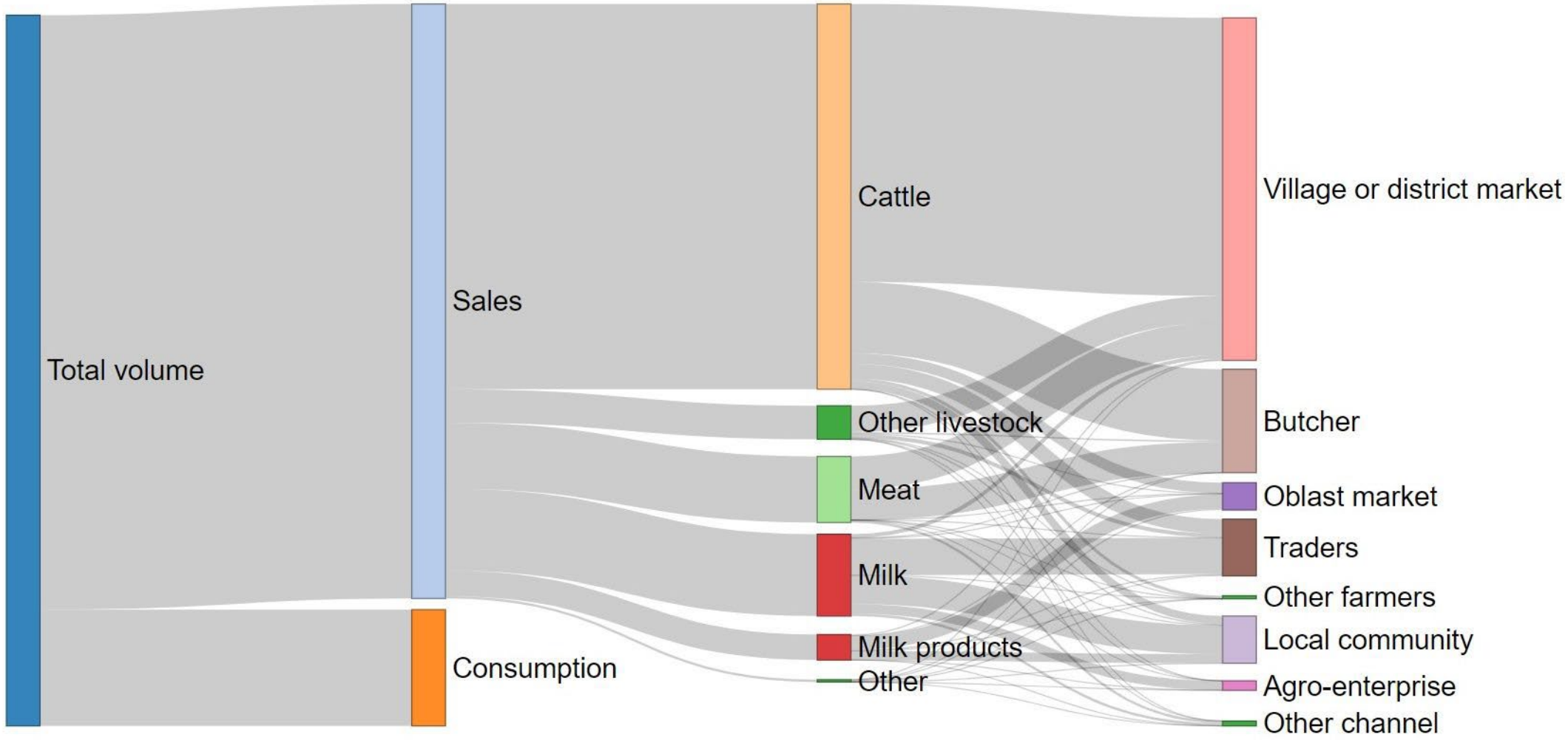
Source: Robinson et al. 2024

Dairy value chains in Central Asia



Highly localized web of sales channels

Monetary value of livestock output by households, Tajikistan site



Aggregation by prices reported by individual respondents.

Source: Robinson et al. 2024, Alisher Kosimov.

Livestock markets in Central Asia

Tokmok, Kyrgyzstan 2022

Key findings on value chain dynamics

- Main livestock expansion occurs in **households** (except Kaz)
- Households **lack access to pastures**, hence purchase fodder
- Many **semi-subsistence**, so far little value chain transformation
- **Low-tech, short value chains** esp. in Taj & Uzb
- Only 30-45% of milk deliveries of satisfactory quality

Robinson et al 2024

Vertical coordination, competition & contracting

- Traders = **informal coordination agents**, often powerful gatekeepers to value chain
- Traders **reduce competition** by spatial market segmentation
- Processors & donors **promote alternatives** (direct aggregation, village cooling)
- **Little formal contracting** (except specialised livestock farms Uzb), no resource providing contracts
- Formal **cooperatives** often dysfunctional

Robinson et al 2024

Quality standards

- Informal quality checks & enforcement
- Government standards if they exist not impartially enforced (Tajikistan)
- Emerging private standards set by processors
- Wide variation in technical quality management (technology, knowledge)
- Price incentives or rejection of substandard milk
- **Hygiene & product quality continue to be major issues** (>50% of milk produced has substandard quality)

Robinson et al 2024

Dairy chain in Kyrgyzstan most advanced

- Most liberalized land market lead to enhanced land access, doubling of fodder area in 20 years
- Most intensive fodder rations across subsamples
- Most active on rural financial markets, little rationing
- Cooling technology & artificial insemination more prominent
- Most diverse & longest value chain

Robinson et al 2024

Ineffective government policies

Rarely reach the type of farmers where the animals are

- Largely **failed attempts to aggregate** producers into larger units (clusters, coops), households overlooked
- **Land policies** lead to slow & conflicting changes (rigidity of land market, dilemmas in pasture tenure)
- **Credit subsidies** end up with few large farmers, as smaller ones don’t apply in first place (lack of profitability, high risks)
- Unintended / undesirable consequences of **industrial policies** for trans-border trade (export bans, stud bulls)

Robinson et al 2024

Conclusions on value chain transformation in CA

- **Short, low-tech value chains prevail**
  from many small producers to dispersed end-consumers
- More a **supply web** than a value chain
- **Modernisation stimuli** emerge from processors & retailers, government, international donors
- **No massive transformation (yet)**



Policy implications

- Better **coordination** of policy measures (e.g. sector promotion vs trade liberalisation)
- More **impartial** policies that serve all producers (households vs enterprises)
- Focus on **local public goods** provision / collective action (e.g. pastures, quality standards, water, breeding,…)
- Strengthening of **rural institutions** (banking, land administration), create capacity to liberalise

Research agenda

- Role of pastoral tenure reform in herd mobility & land use, cross-country comparisons
- How long are the live animal value chains really? Tracking of live animals through Central Asia
- Functionality of local public administration
- Animal mobility vs human mobility, outmigration, labour shortages
- Feasibility of pastoral carbon credits

Session 3.4 tomorrow 11 h in Karkyra

Livestock Production in Central Asia: from Pastures to Markets

Zhyrgalbek Kozhomberdiev, Public Foundation CAMP Alatoo:

The state of pastures in Kyrgyzstan under conditions of continuous growth in livestock numbers and climate change

Viktoriya Krylova, Kazakh-German University:

Pasture resource management in Kazakhstan in the context of climate change

Sarah Robinson and Martin Petrick, Justus Liebig University Giessen:

Land access and feeding strategies in a Kazakhstani rangeland system

Baimat Niiazaliev, UCA, Sarah Robinson and Martin Petrick:

Determinants of milk market participation among small dairy farmers in Kyrgyzstan

Funding acknowledgements

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