Food and Agriculture Organization of the United Nations

A global assessment of water use, impacts on water scarcity, and water footprints in the livestock sector

An application of the LEAP guidelines

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Application of the LEAP guidelines in GLEAM 3 (ca. 2015)

Water use assessment

- Direct water (consumptive service water + drinking water)
- Indirect water (irrigation of major feed crops, trade)

Water footprint

- Blue water FP for milk, meat, eggs (primary products)

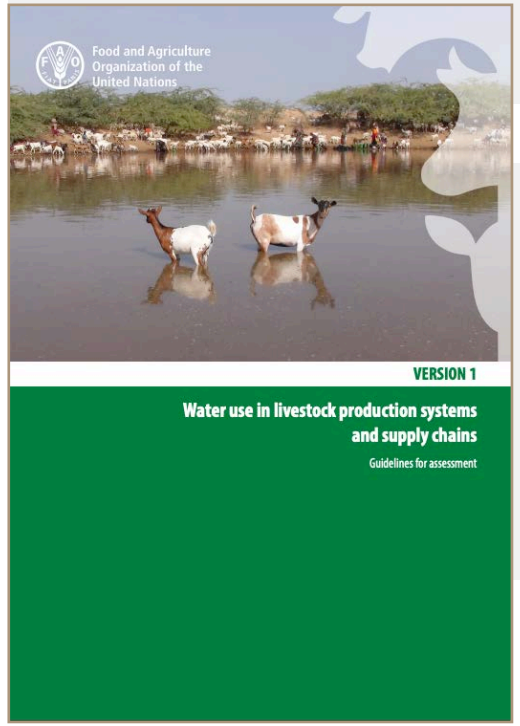
Impacts on water scarcity

- Assessment at river basin level (~1800 basins)

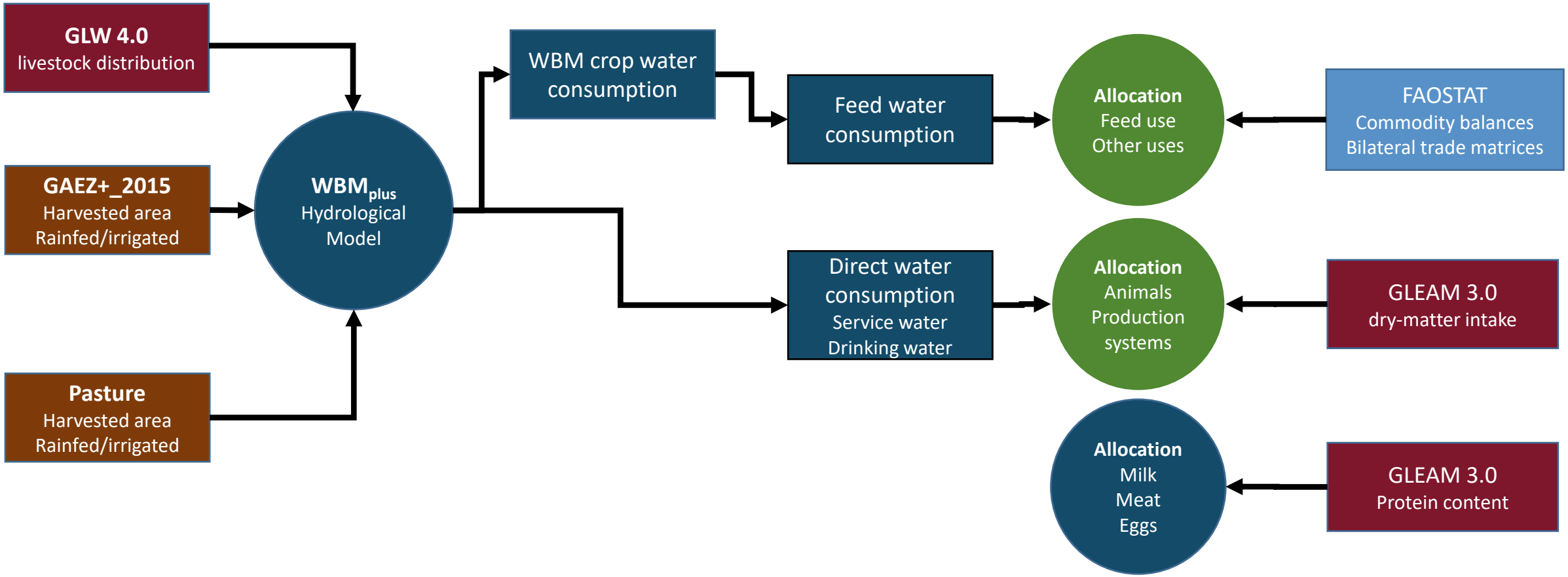
Approach

- Gridded livestock of the world, global hydrological model, FAOSTAT trade data. Allocation to GLEAM feed basket

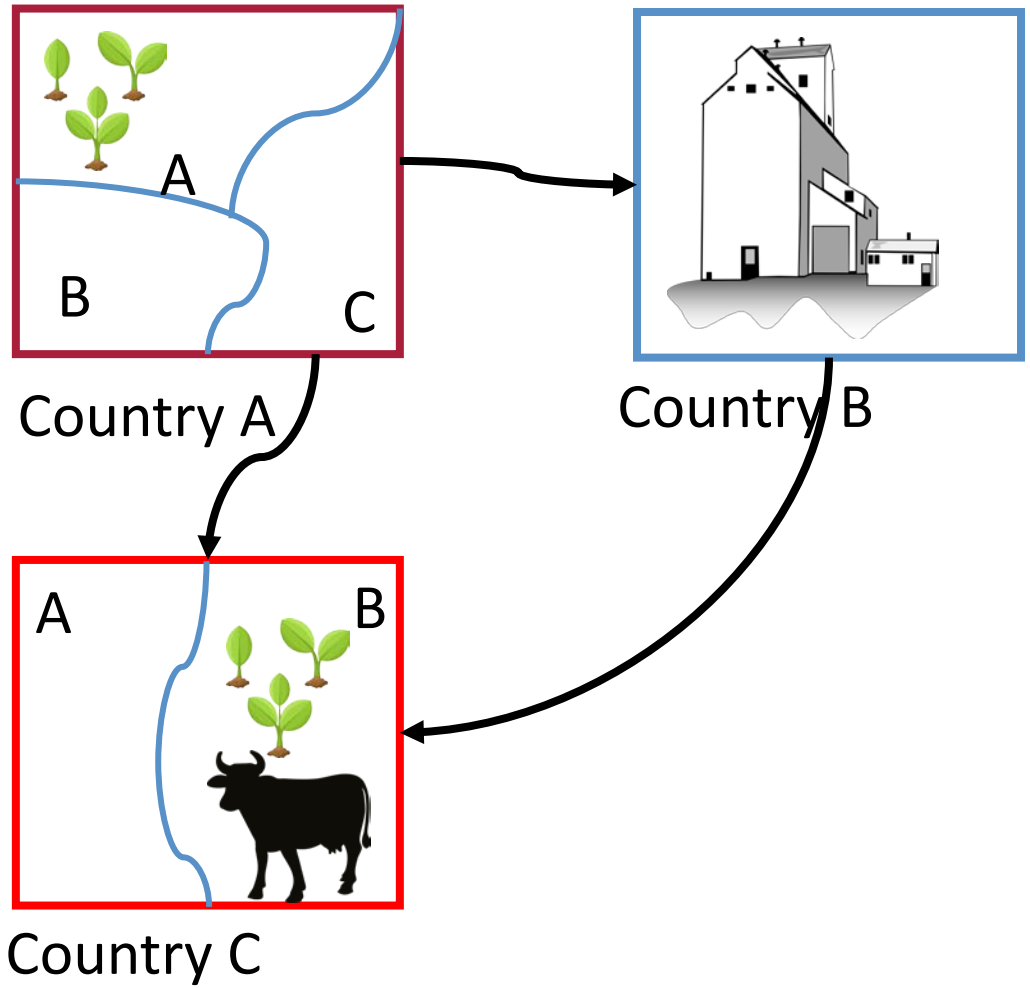
Global Livestock Environmental Assessment Model (GLEAM)

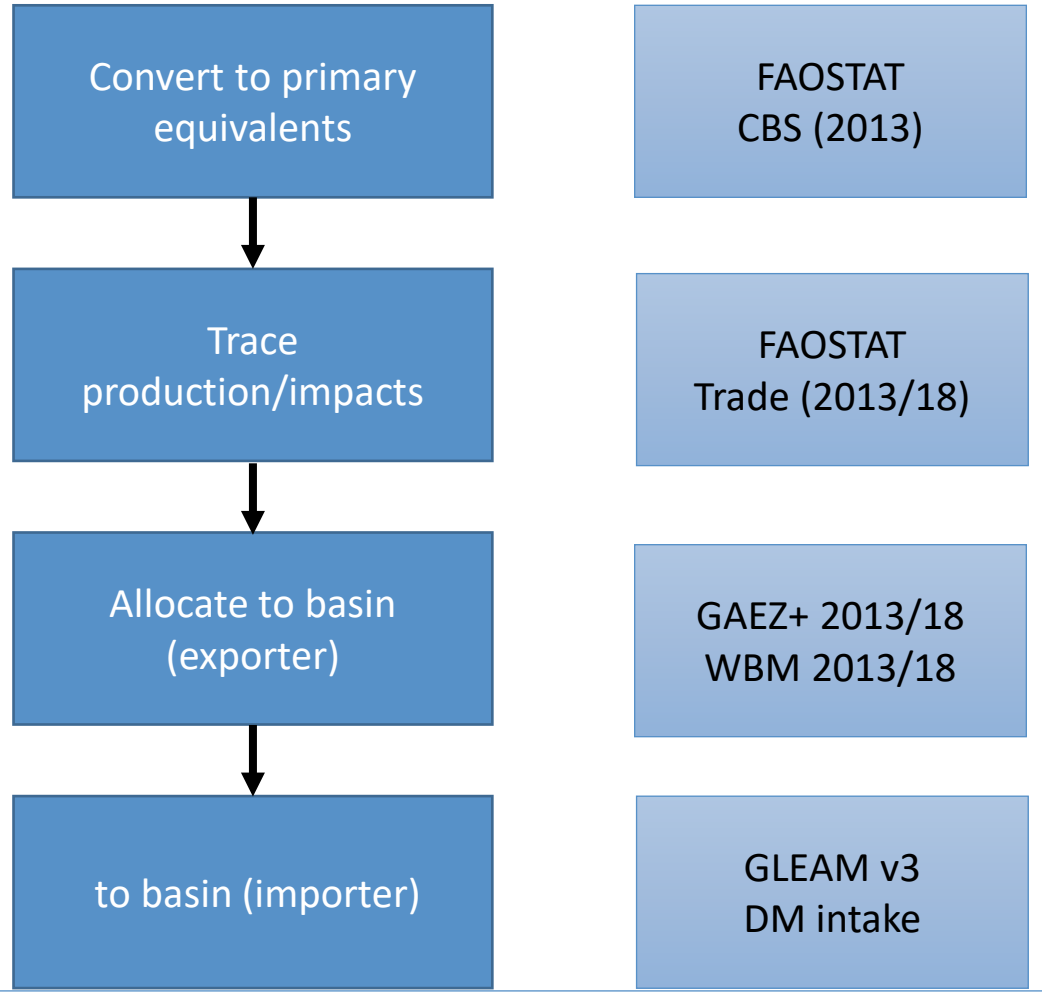


Data and modelling flowchart

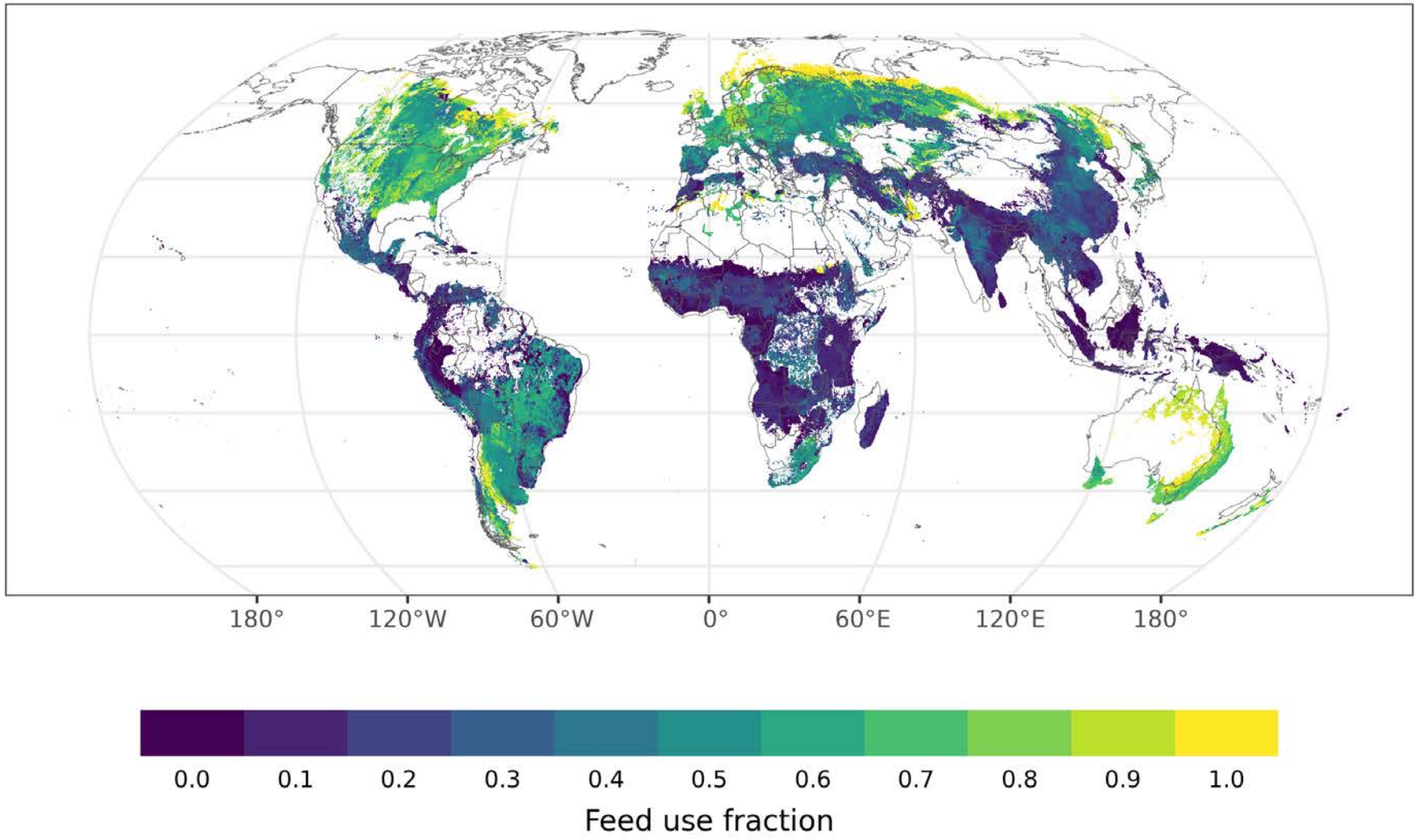


Tracing impacts through international trade





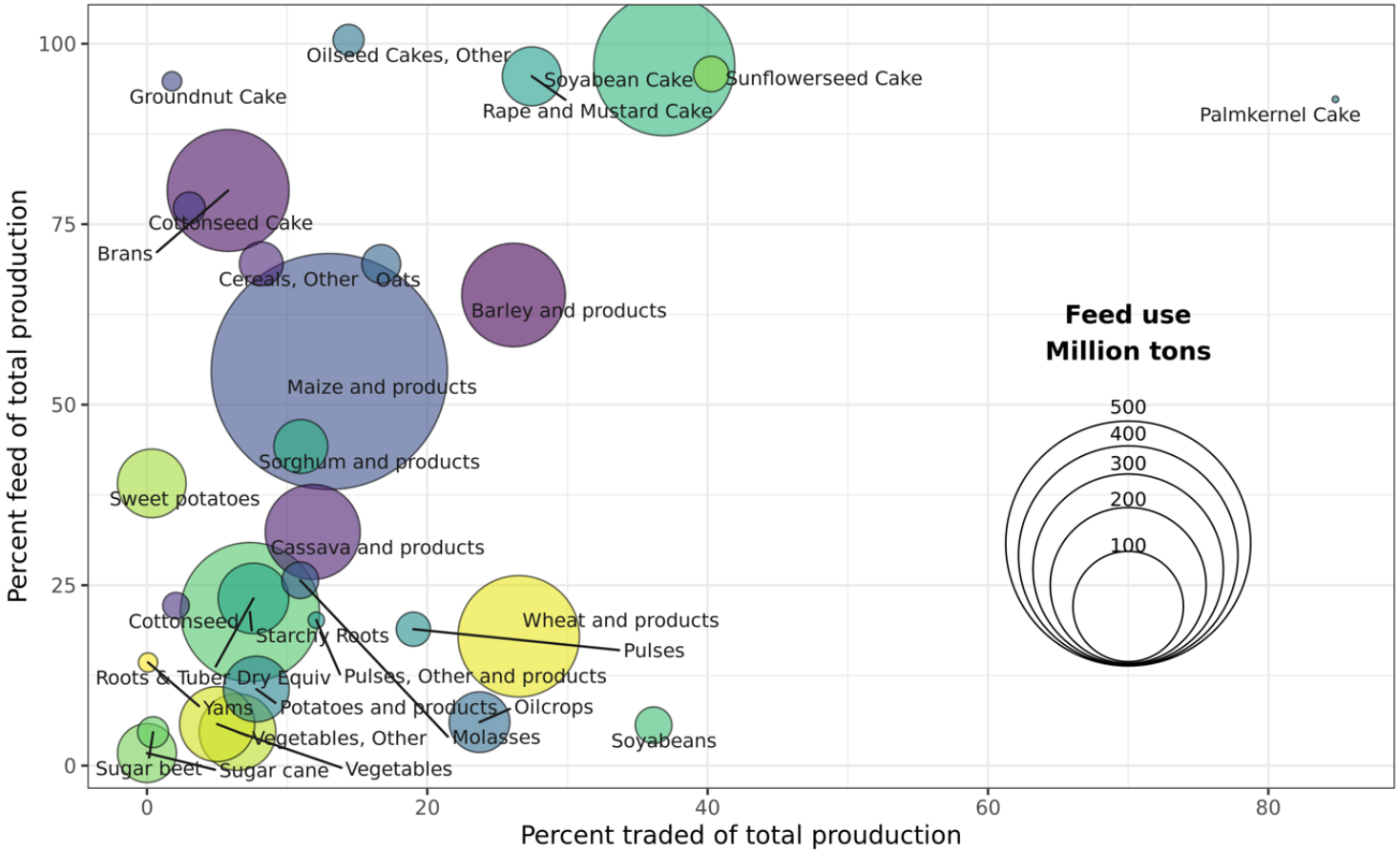
Crop production for animal feed



Global Average (GAEZ c
35% (excl. Pasture)

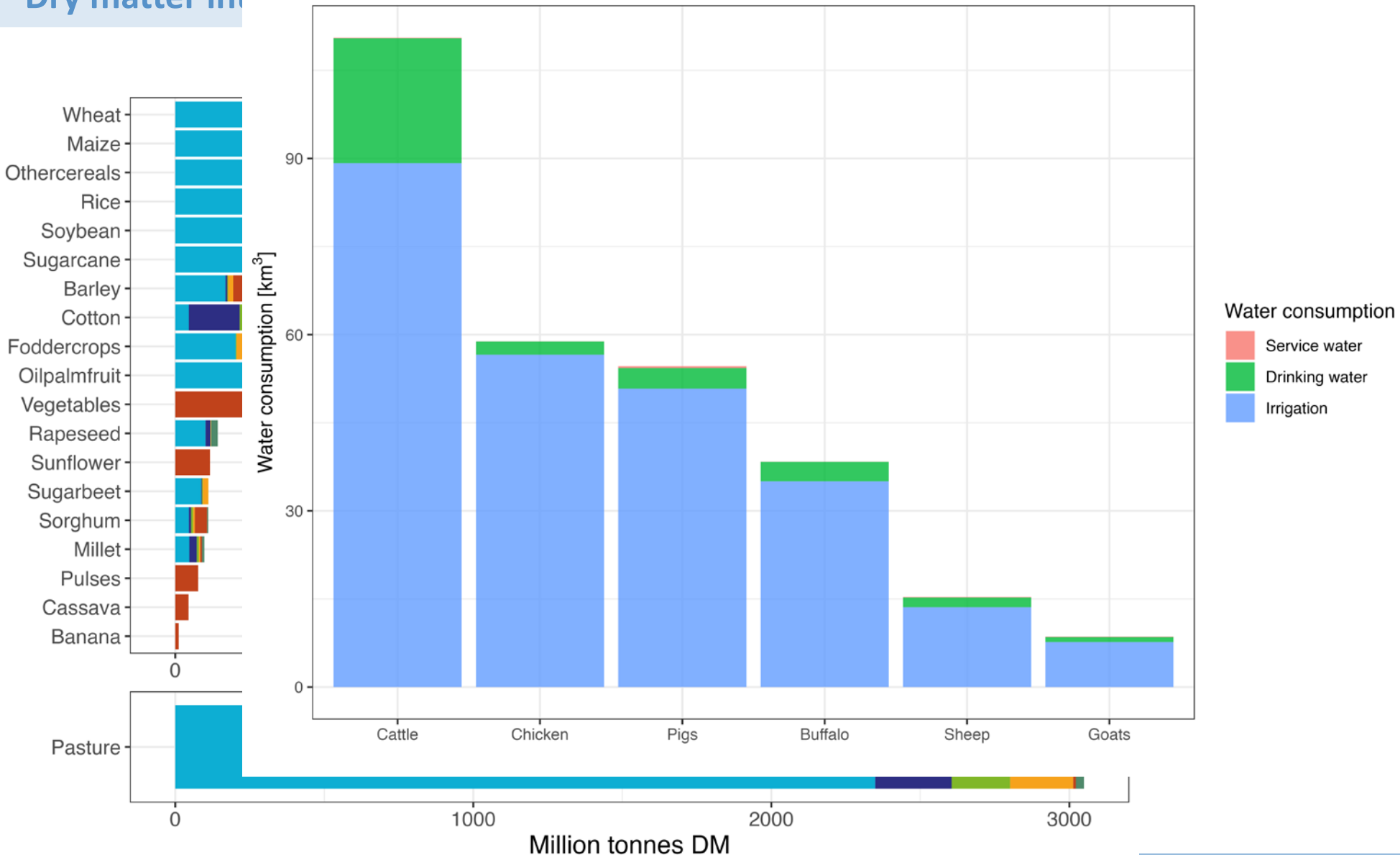
Based on GAEZ+2015
FAOSTAT CBS

Feed production and feed use



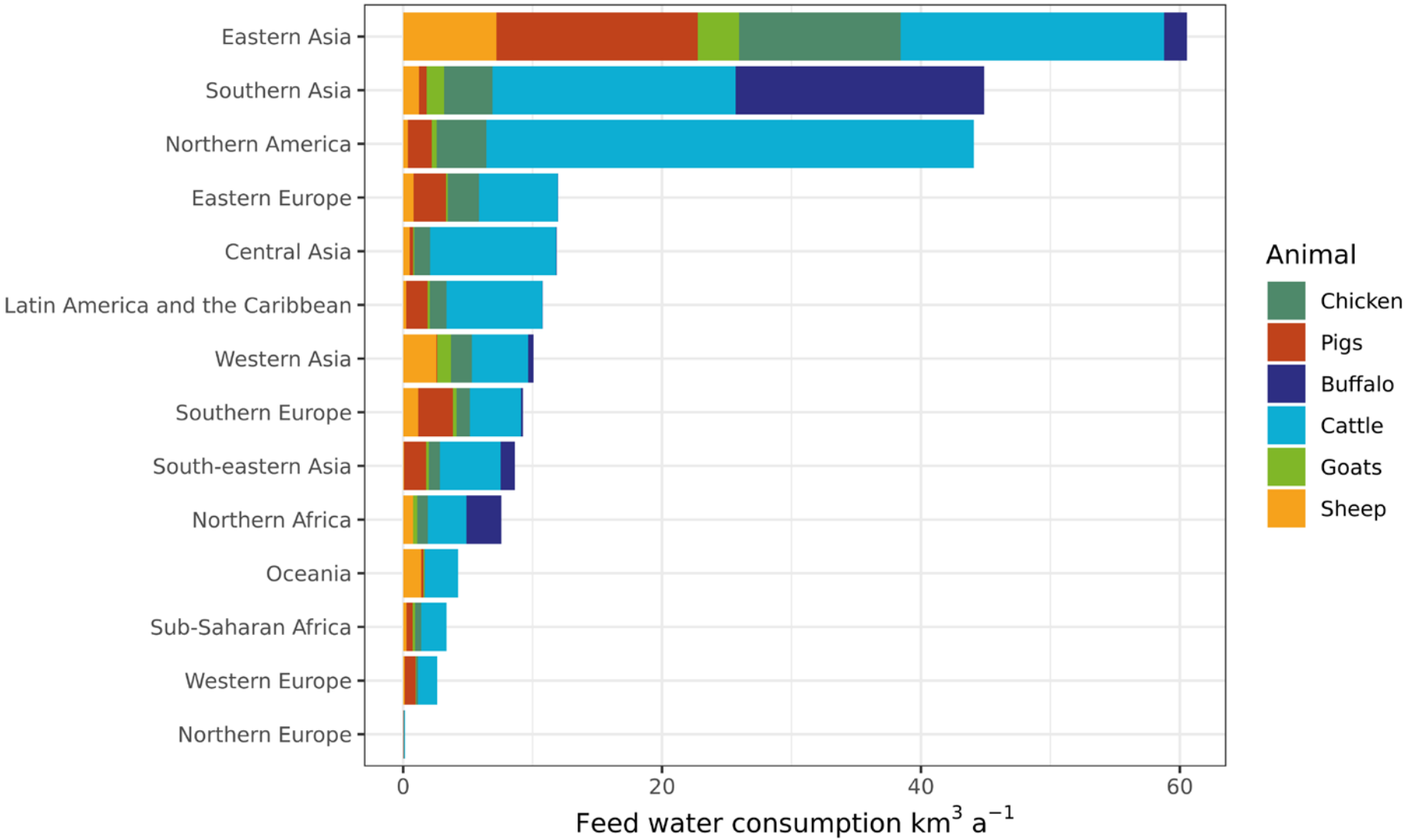
Production of the 30 most important feed commodities globally (excluding pasture, leaves, and fodder crops, and their percentages of feed allocation and to trade, based on FAOSTAT commodity balance sheets

Dry matter intake (global, based on GLEAM v3)

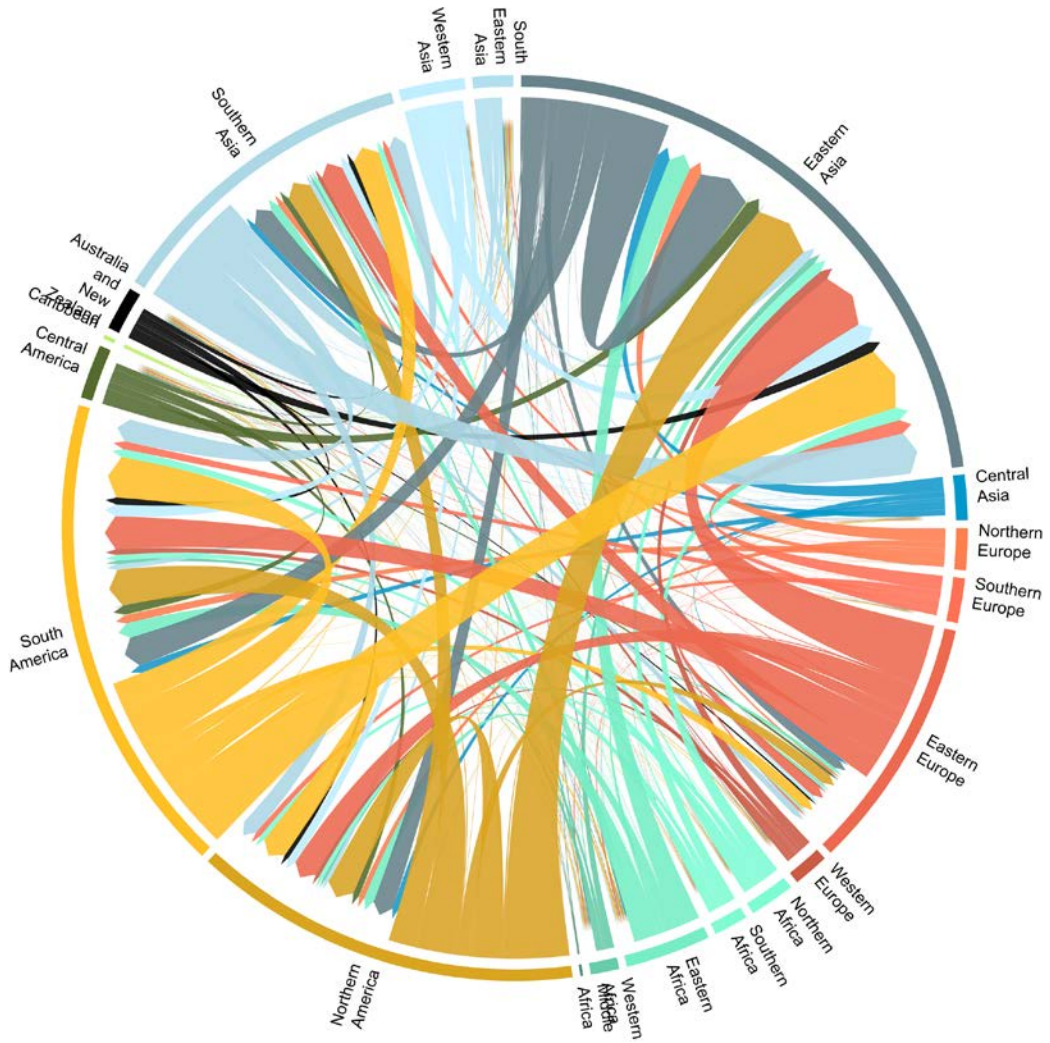


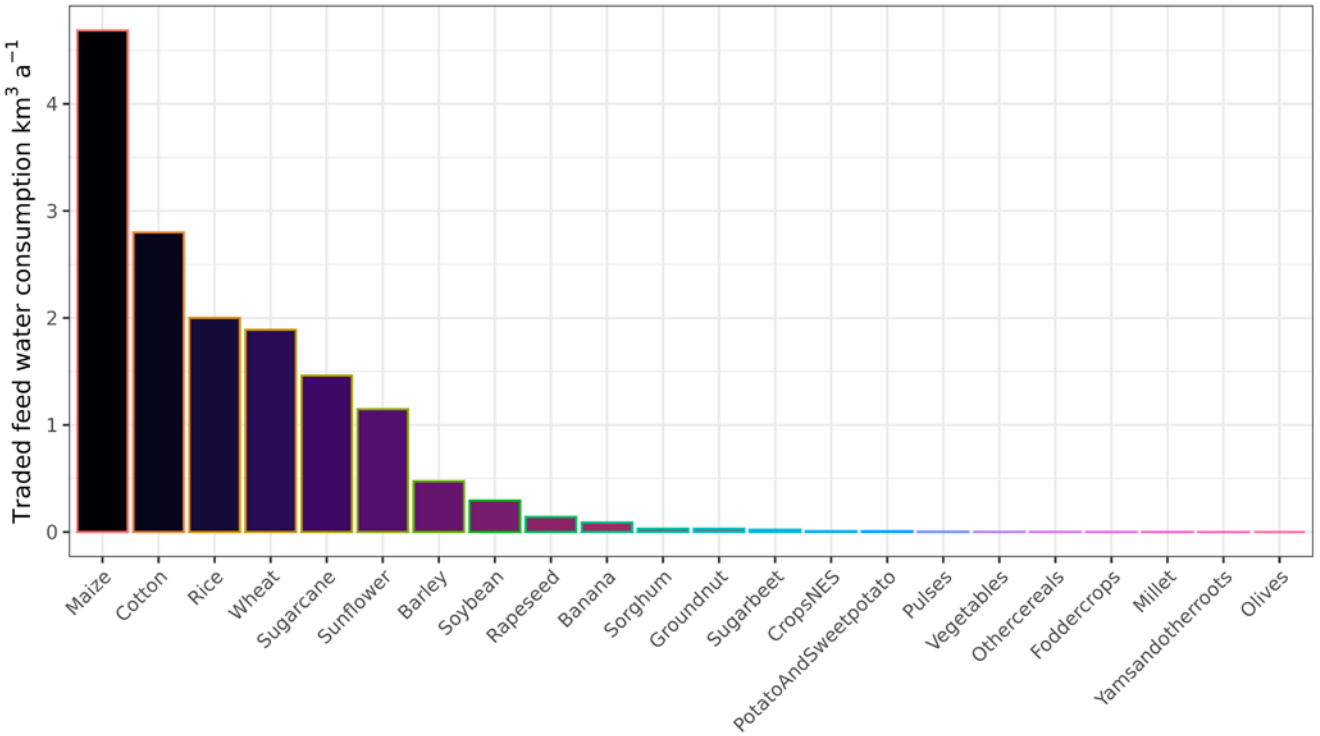
water use assessment of livestock production systems

Feed water consumption by animal



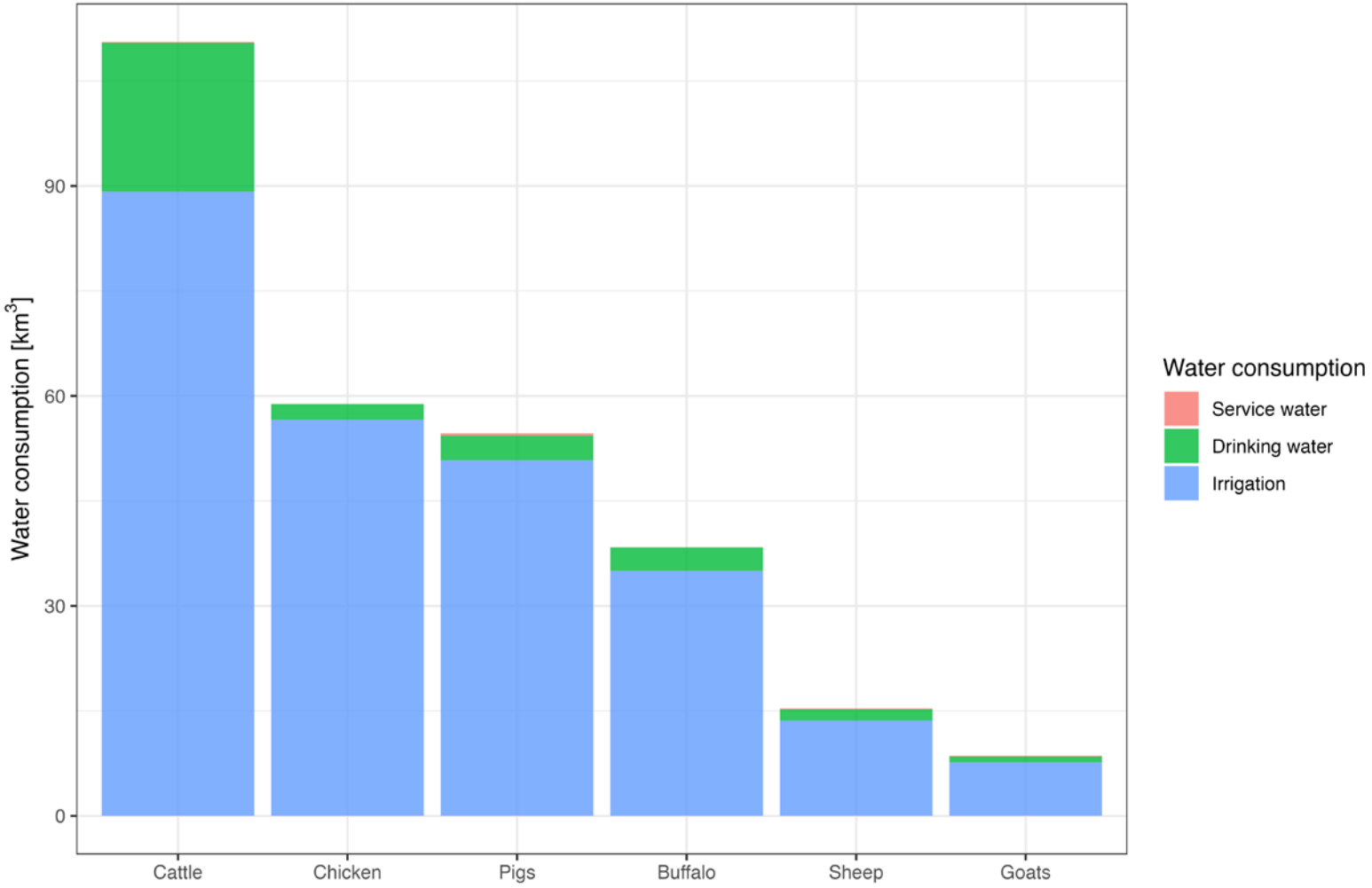
Embedded water in traded feed commodities





16 km3 (6.5%)(of 252 km3)
consumed for irrigation is traded

Global water consumption in livestock systems



Total water consumption: 286 km^3

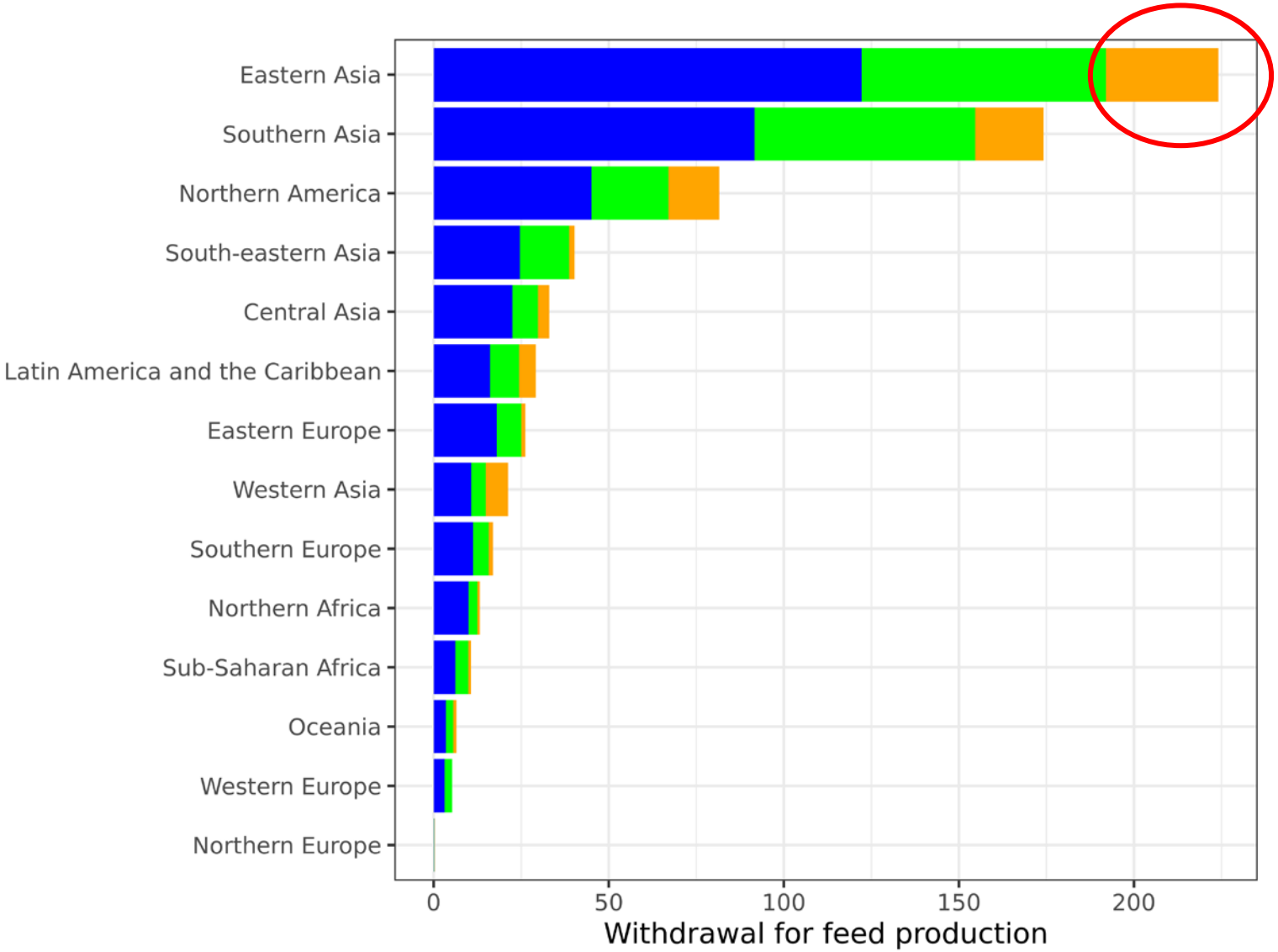
Drinking water: 11 %

Service water : <1 %

Irrigation: 88 %

Withdrawal for livestock : 600 km^3
Service water: 13 km^3
Drinking water: 41 km^3

Water Sources (Feed Production)



Global withdrawal (km^3):

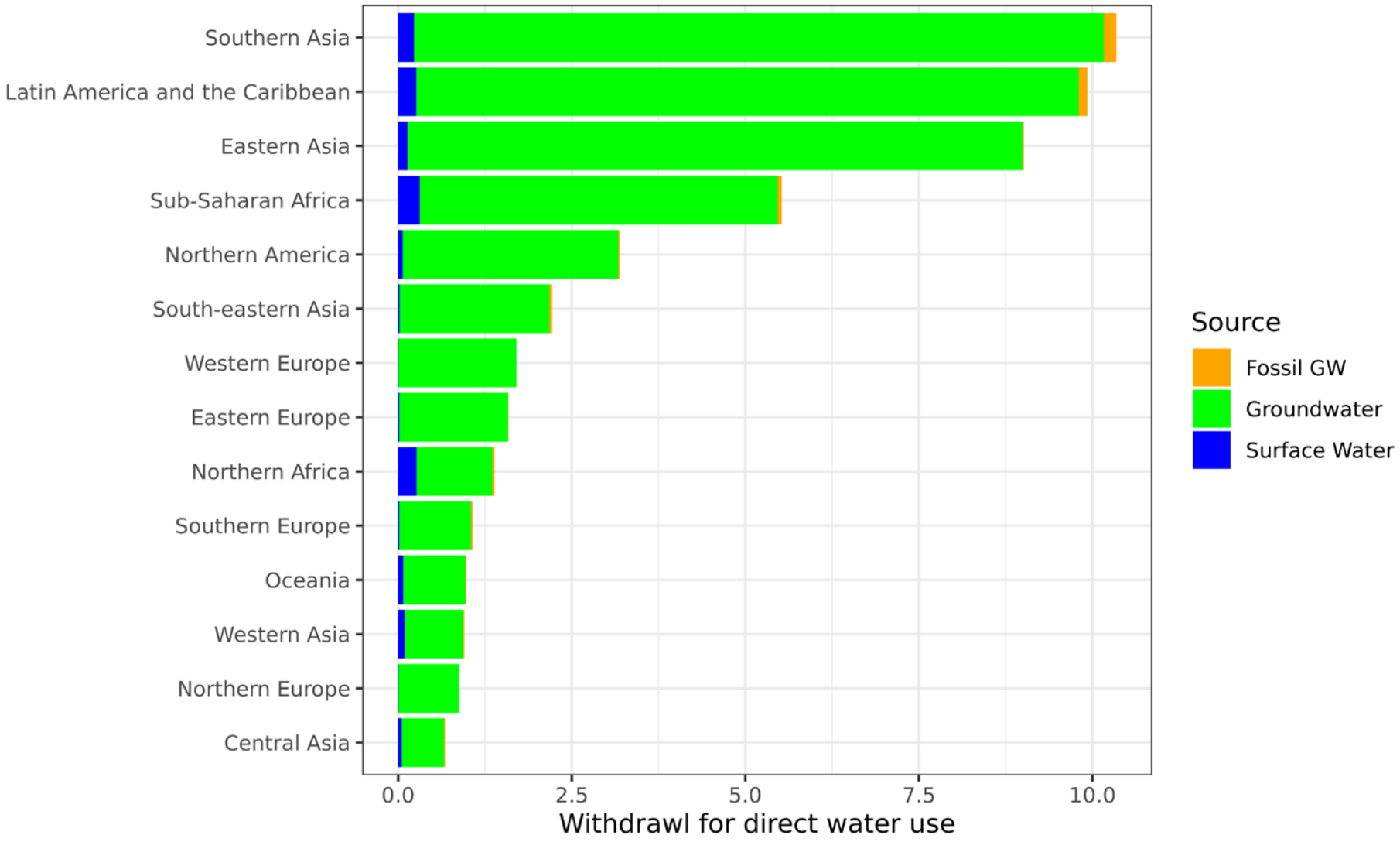
600 total

220 GW

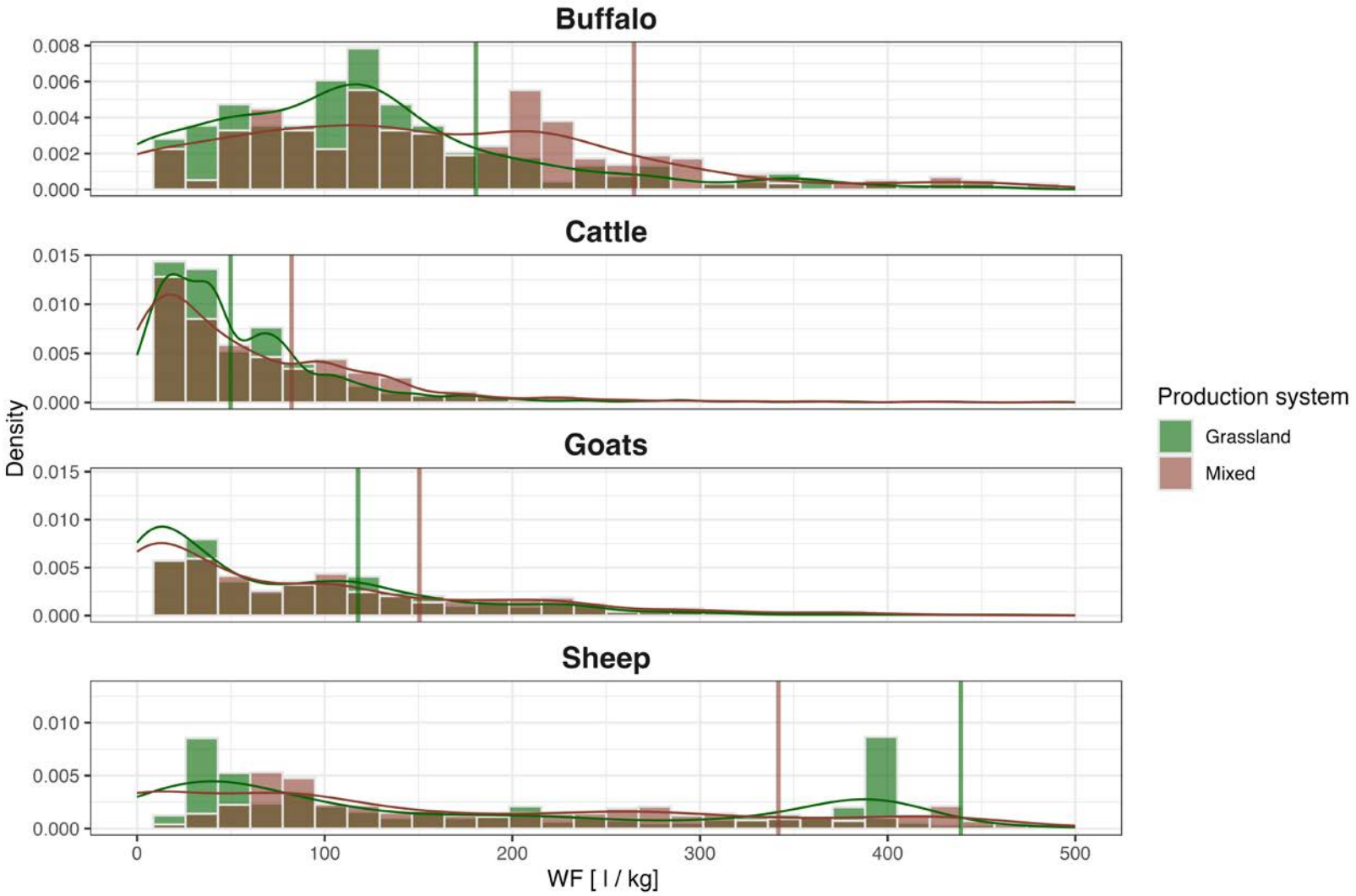
293 SW

87 unsustainable GW

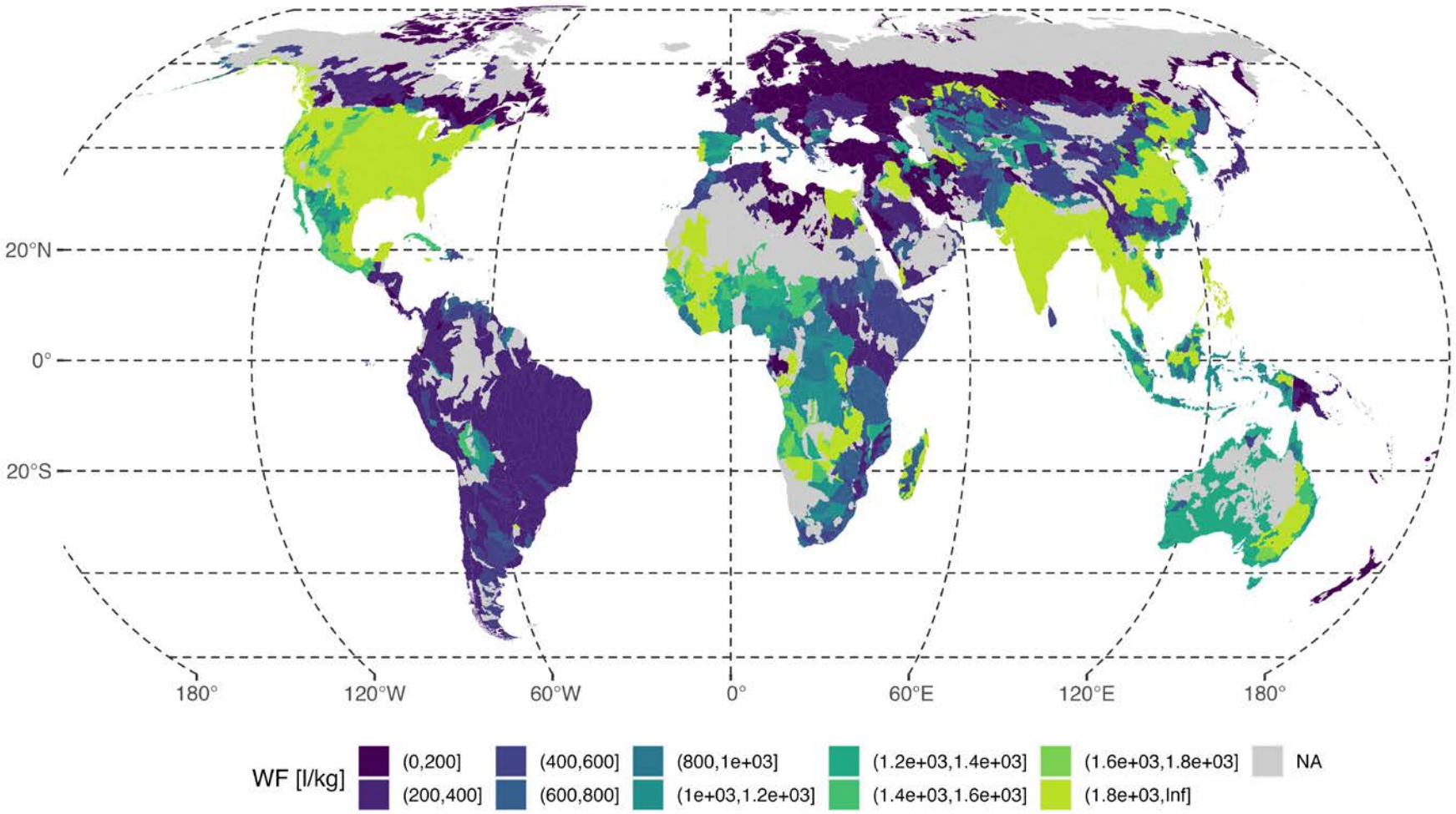
Water Sources (Direct Water)



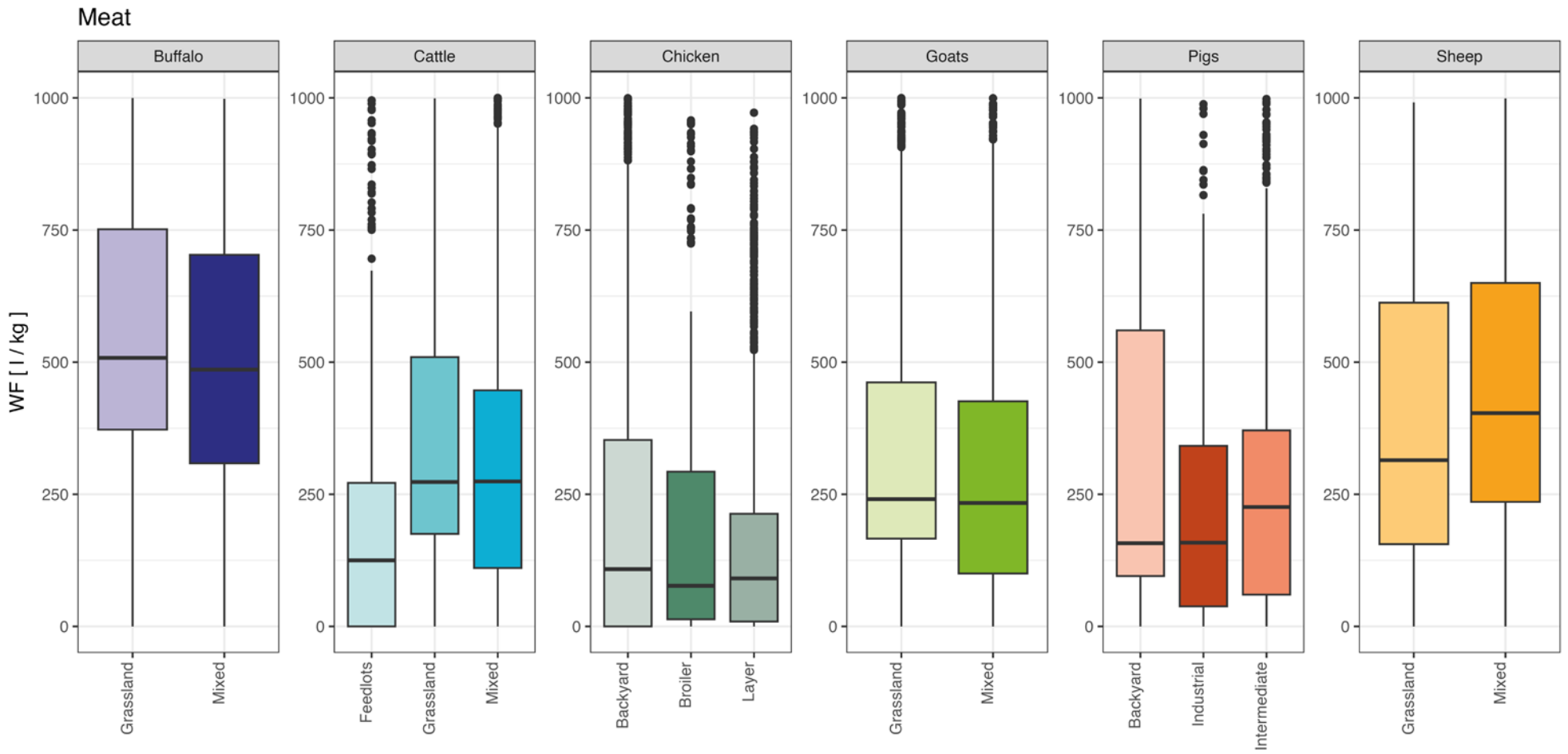
Water footprint for milk



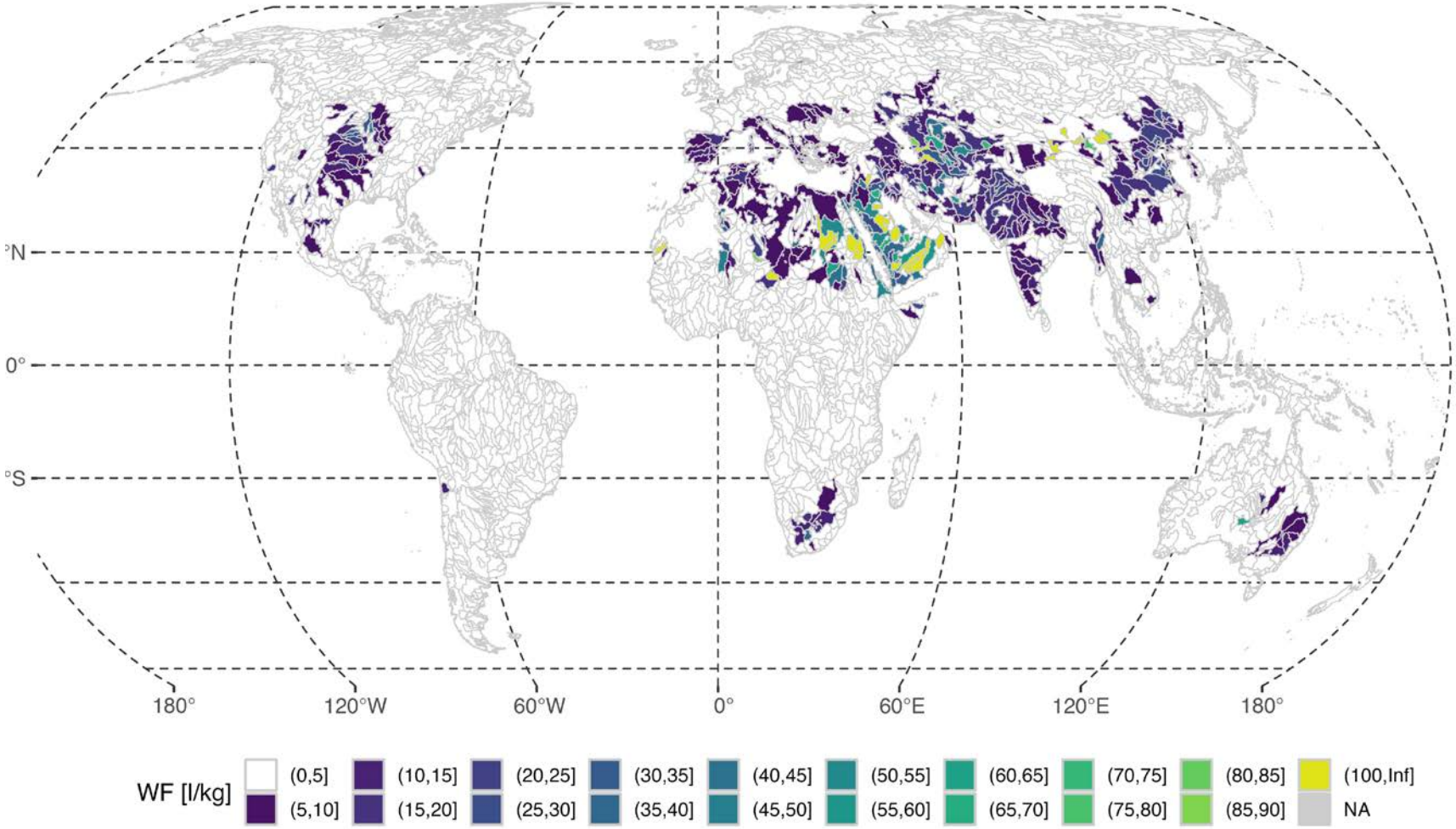
Water footprint for milk



Water footprint for meat



Livestock induced water stress



TRWR = runoff + inflow
Multi year average around 2015
Based on WBMplus
1815 basins globally

$$100 * \frac{Withrawal}{TRWR}$$

Next steps

- Include camels in the analysis
- Refine water scarcity impact
  - (account for ‘traded impacts’)
  - Apply different scarcity indicators
- Report green water (?)
- Add uncertainty assessment (quantitively)

Summary and Conclusions

Blue water only

- Global application of GLEAM guidelines for water use, footprint and scarcity impact
- Water use dominated by feed (252 km^3 ~20 percent of global ET from irrigation)
- Embedded water in feed trade small but not insignificant 6.5 percent)
- Large variation of WF by country, production system and product

  >= *One global WF by product misleading*

- *Water scarcity assessment at basin level*


Thank you!
https://www.fao.org/gleam/en/