

Sustainability

Financial

- Profit
- Cash-flow
- Debt
- Rol

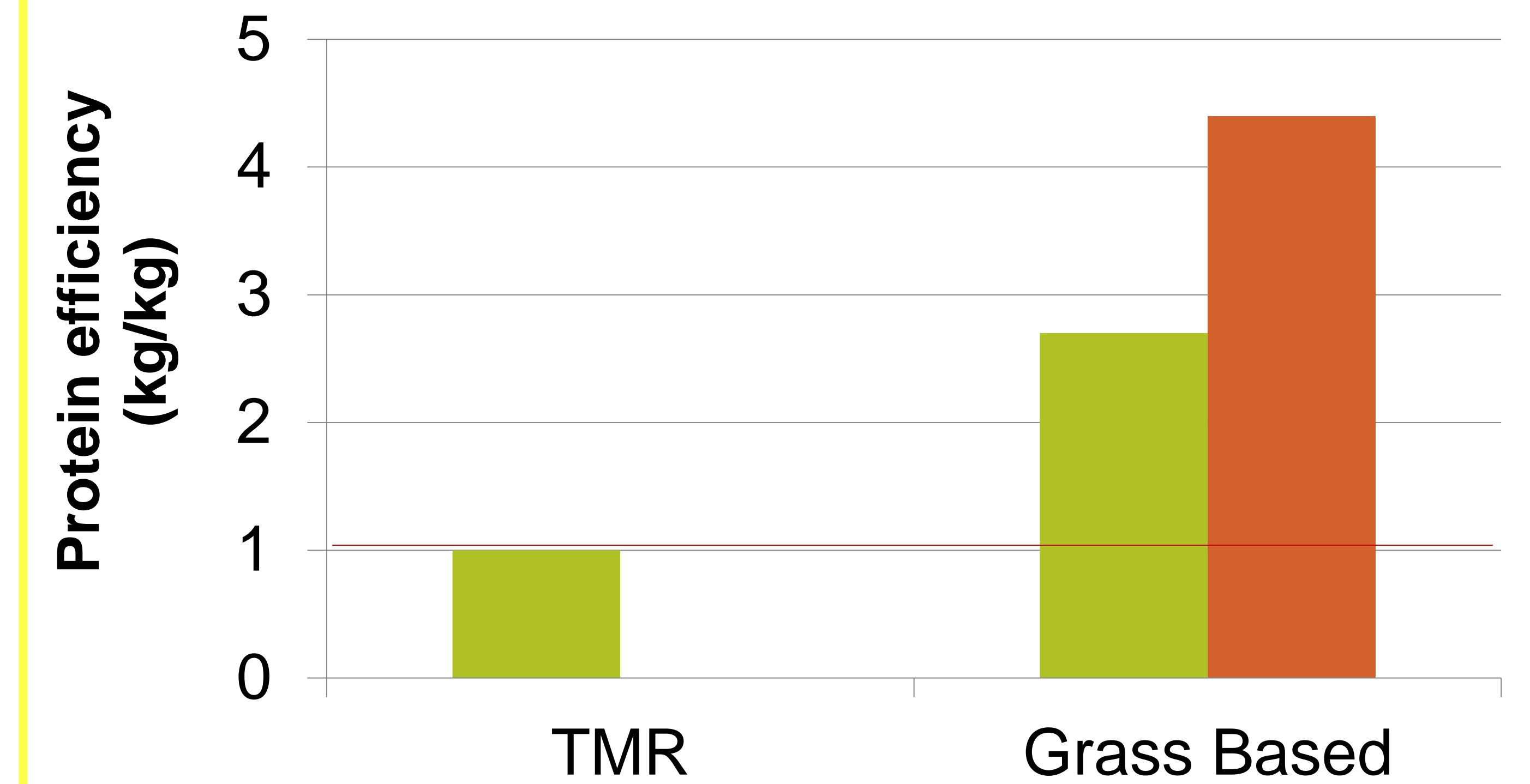
Environmental

- Water quality
- Emissions – GHG, ammonia
- Biodiversity
- Water use

Social

- Workload
- Succession
- Animal welfare
- Land use
- Dairy-beef

Food security



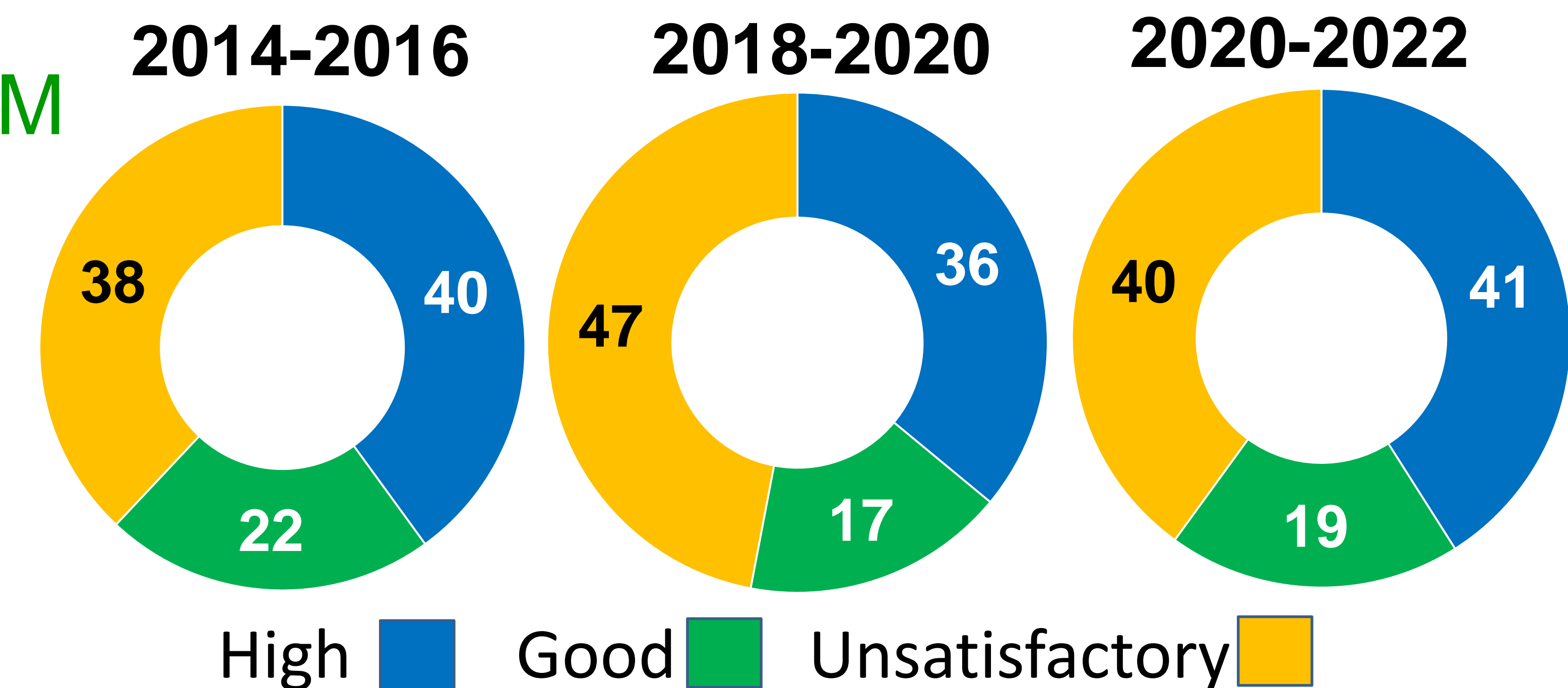
Policy

- GHG emissions - 25% reduction; Climate neutral 2050
- Ammonia – 5% reduction 2030
- Nitrates Directive
- Biodiversity – targets for Nature Restoration Law under review
- Implications

Current status

- GHG emissions
 - ❖ C footprint 0.88 kg CO₂e/kg FPCM
 - ❖ Total Ag emissions
- Ammonia
- Water quality – EPA 2017, 2021, 2023

River Nitrate Quality



challenges

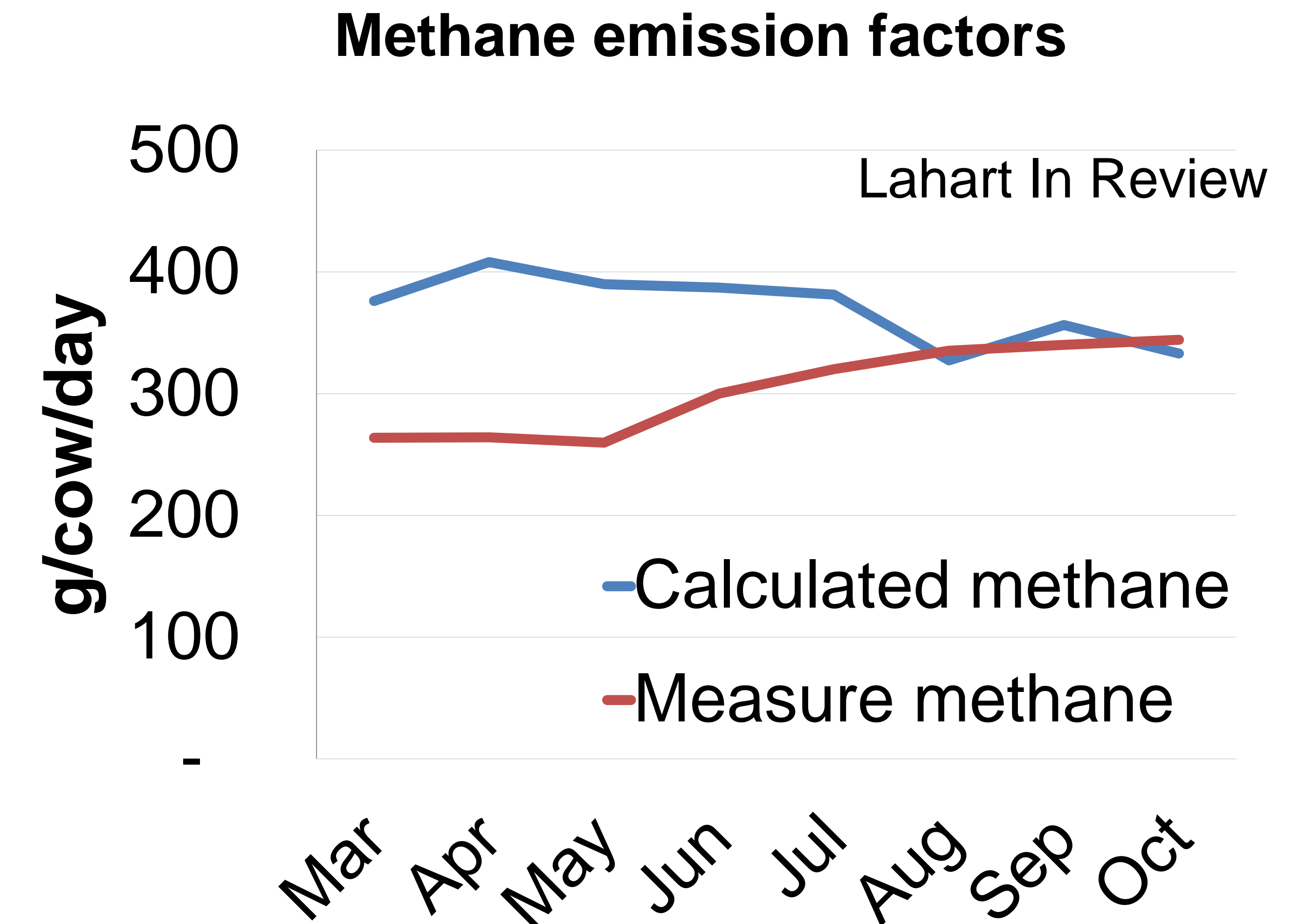
Practices for today

- Reduce chemical N fertiliser
 - Soil fertility – 20% ➔ 100%
 - Strategic N fertiliser use
 - Manure management
 - Clover
- Protected urea – 14% ➔ 100%
- Animal breeding (EBI/sexed semen)
- Reduce conc. crude protein %
- Riparian margins
- Hedgerow management
- Age at slaughter
- Drain mineral soil



Technologies for tomorrow

- Emission factors
 - Methane
 - Pasture
 - Grass silage
 - Soil carbon
 - Fertiliser
- Additives
- Manure
- Genetics & breeding



Other considerations

- Policy change
- Metric change
- Societal requirements
- People

Take home messages

- Policy based on science
- Good metrics
- Implement practices
- New technologies