The Nano Membrane Toilet

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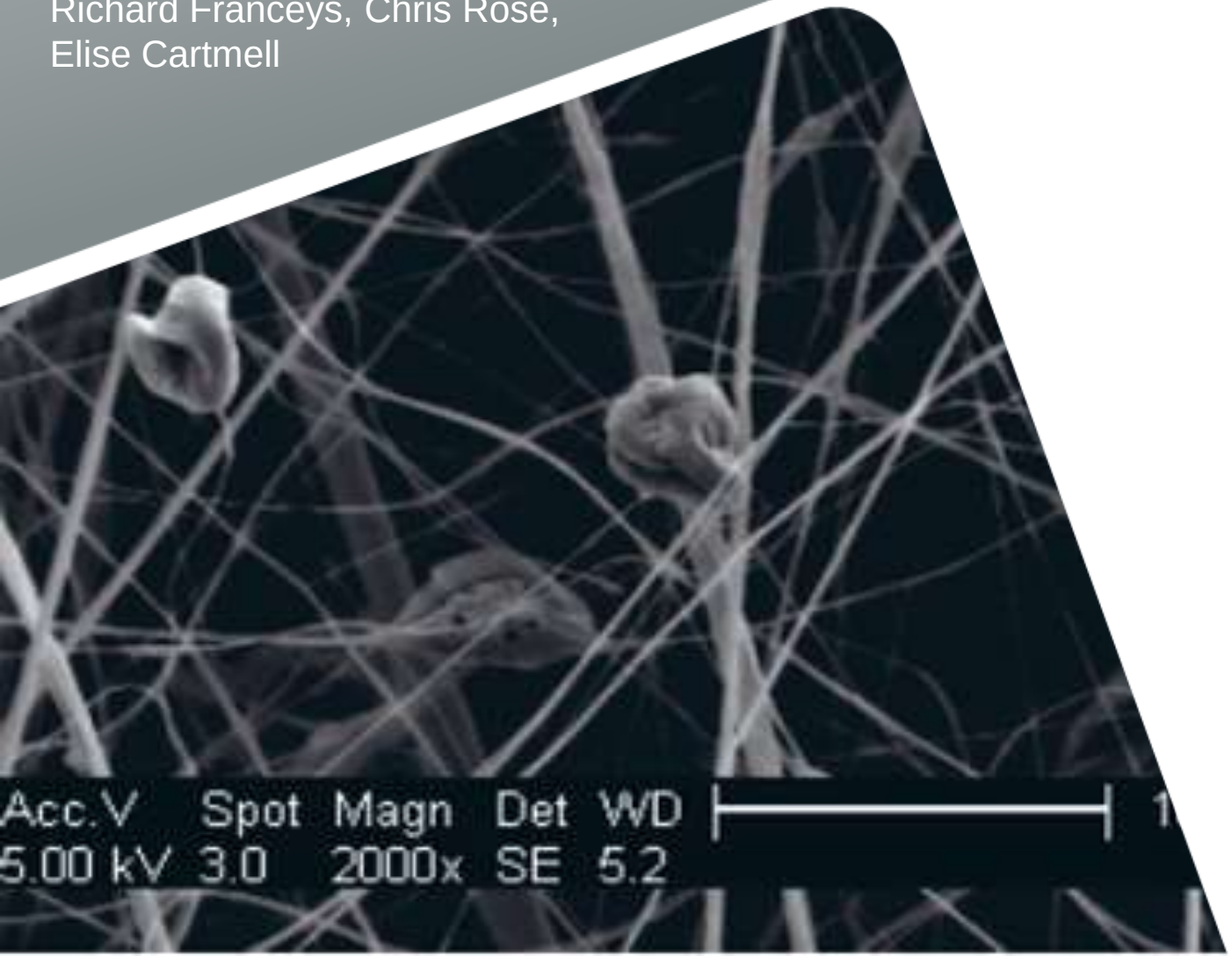

#nanomembrane

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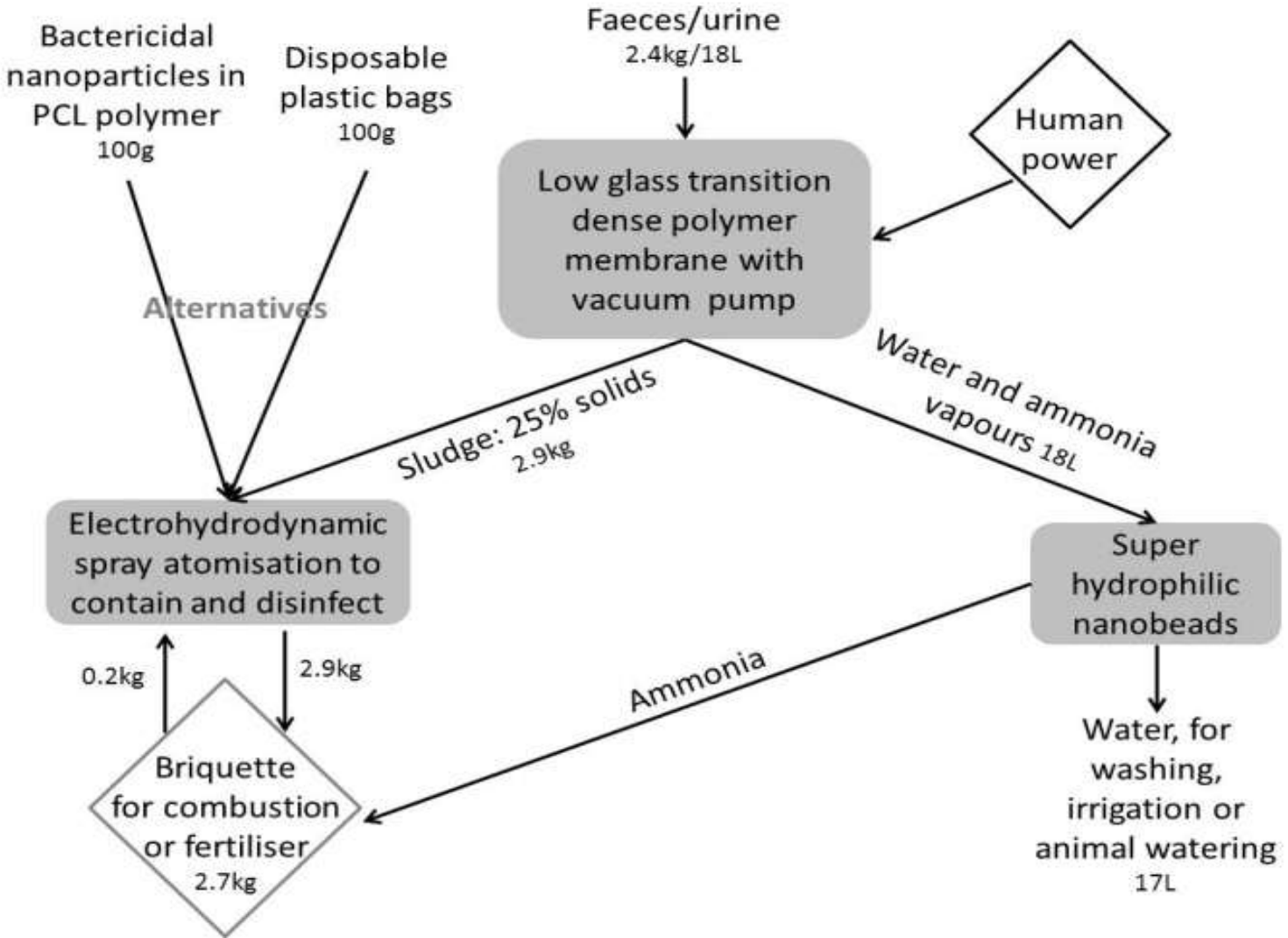
User interface

- Accepts waste as a mixed stream
- For a single household
- Aspirational design to encourage household purchase
- Odour free

Overall concept



Conventional pervaporation

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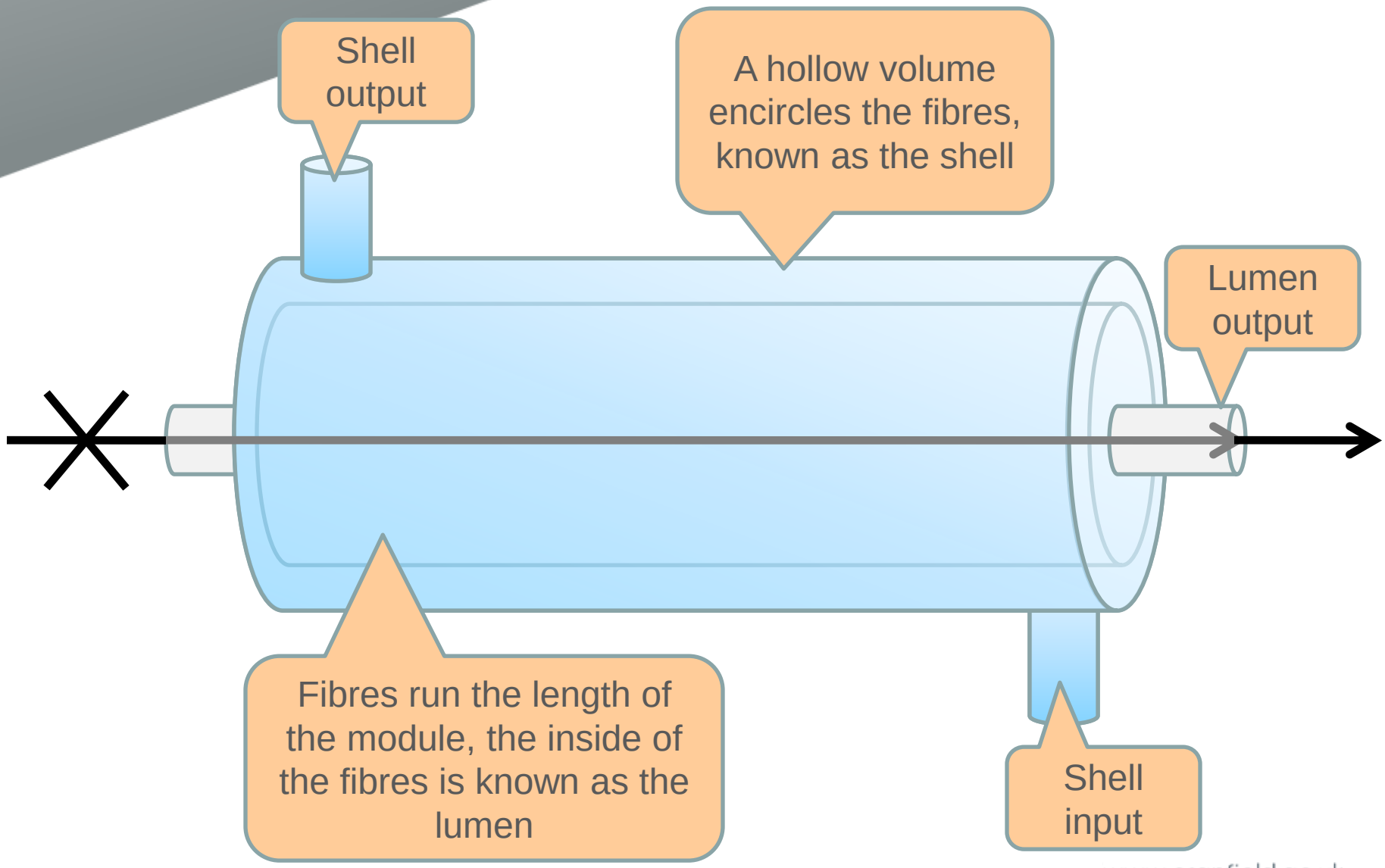
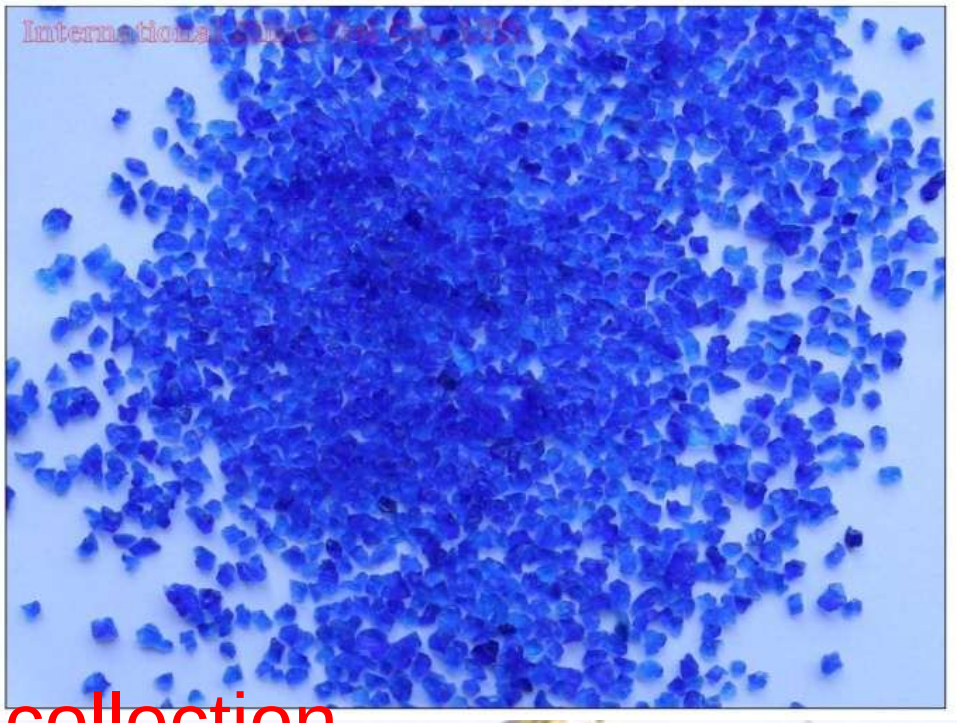
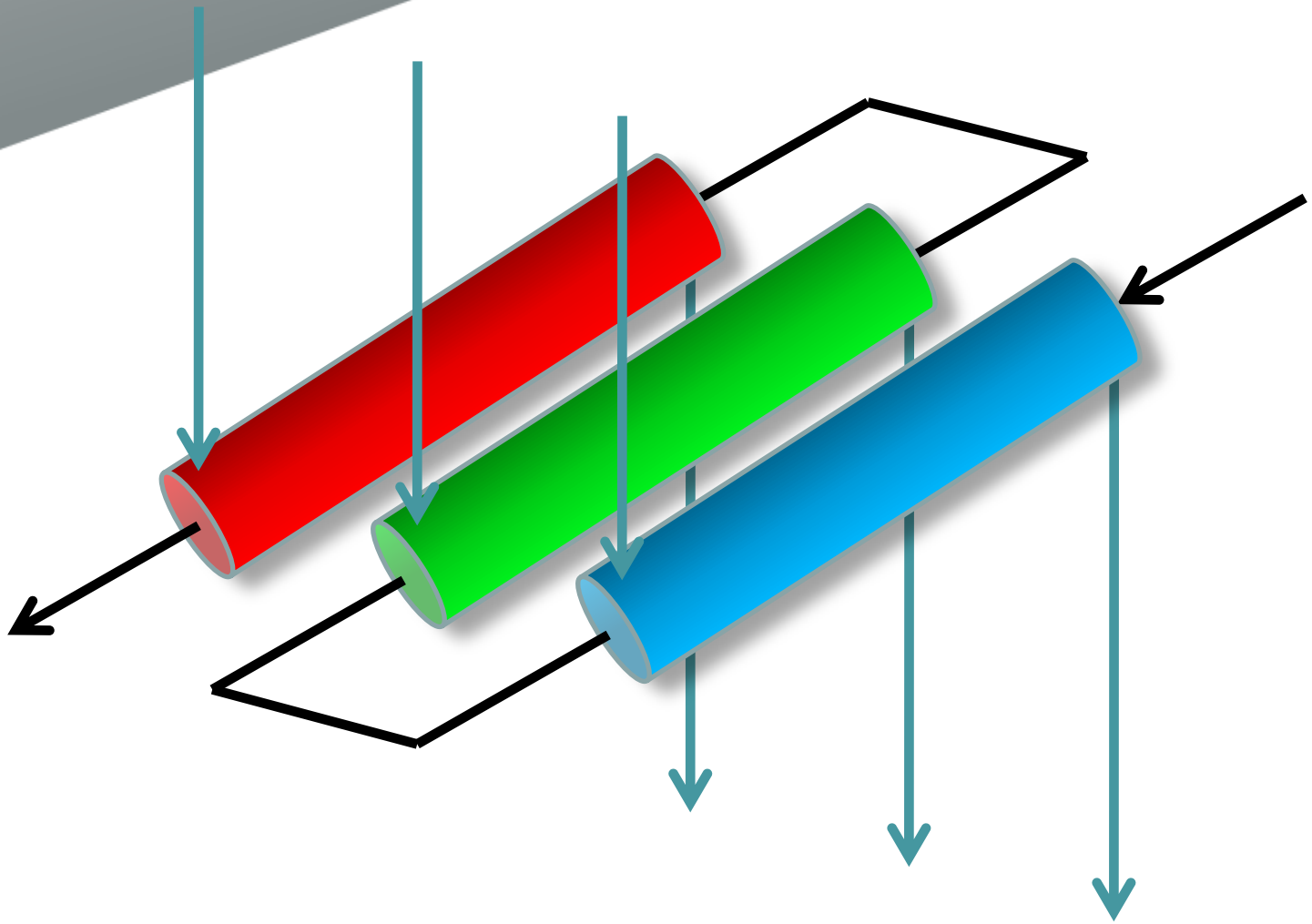




Water vapour collection

Odours

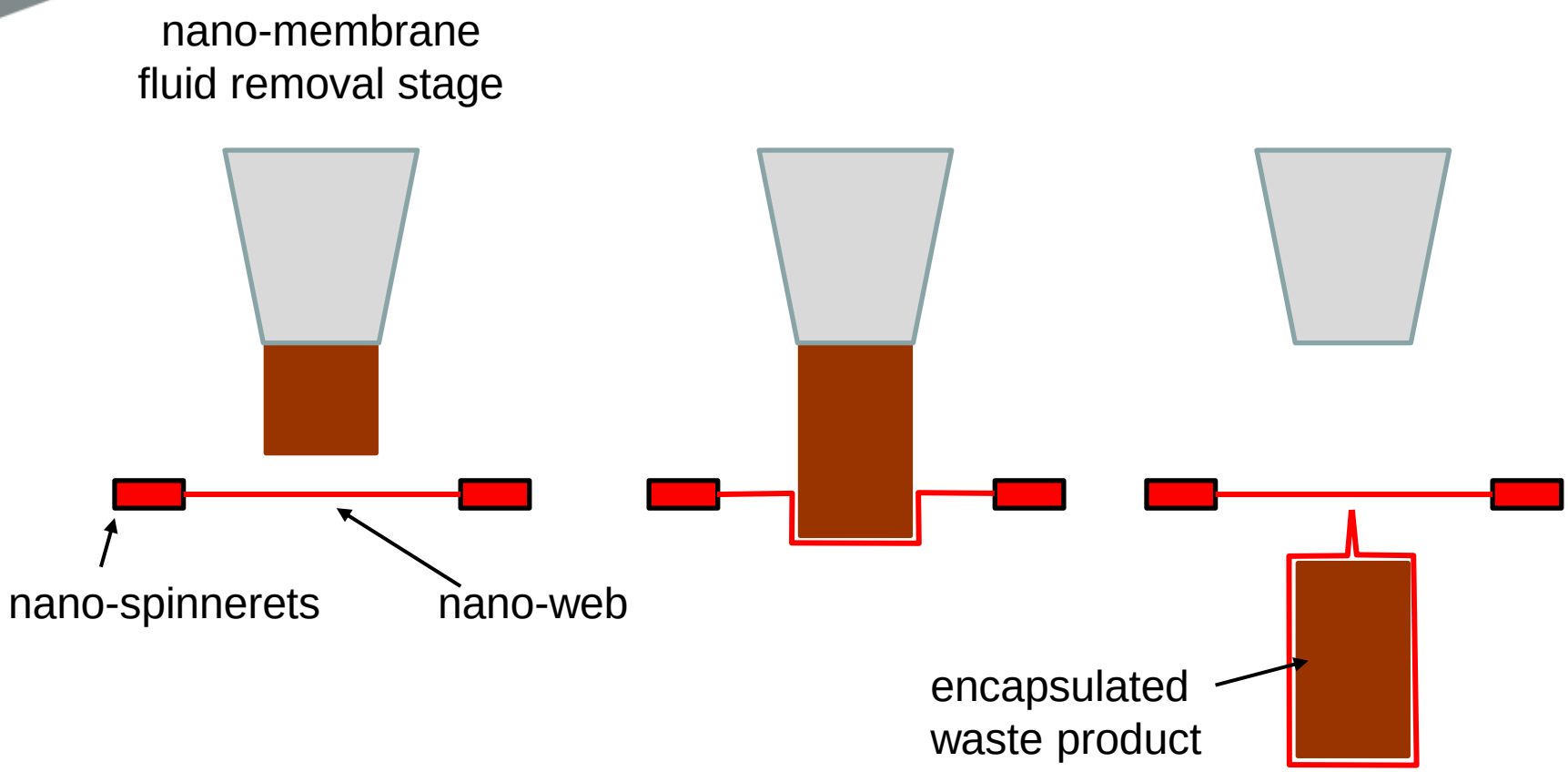
Modular system gives options



One size fits all?

Key challenges

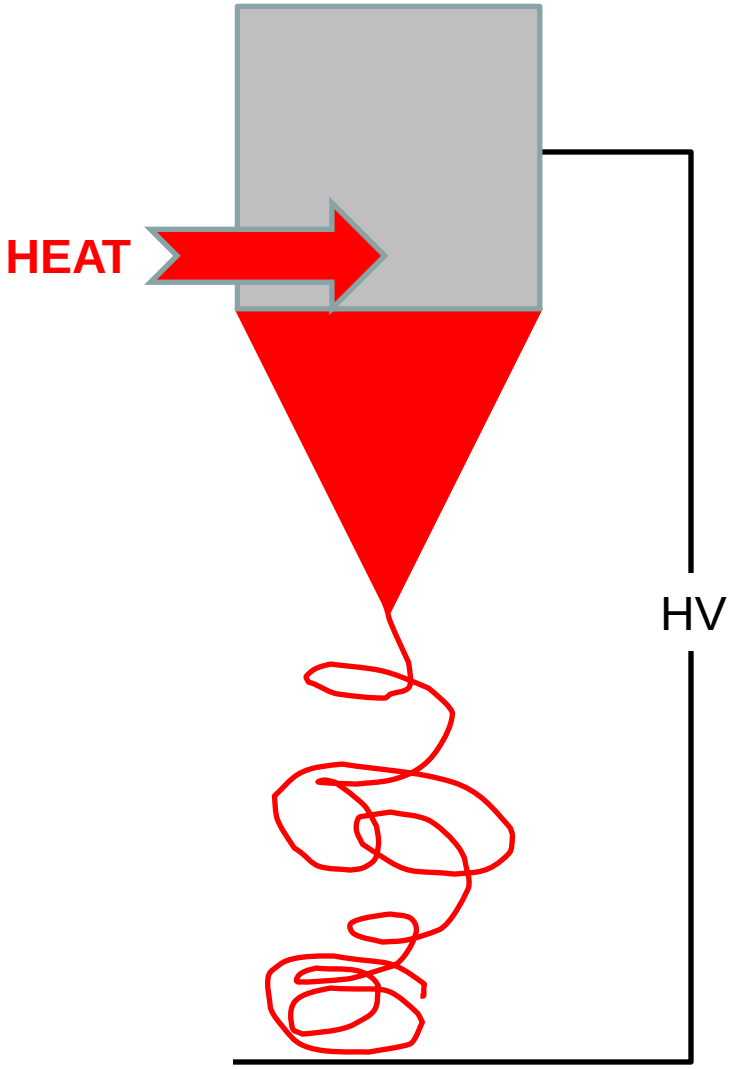
Encapsulation using EHDA



Spray

a) virgin materials
poly ε-caprolactone

b) reclaimed materials
(HDPE plastic bags)

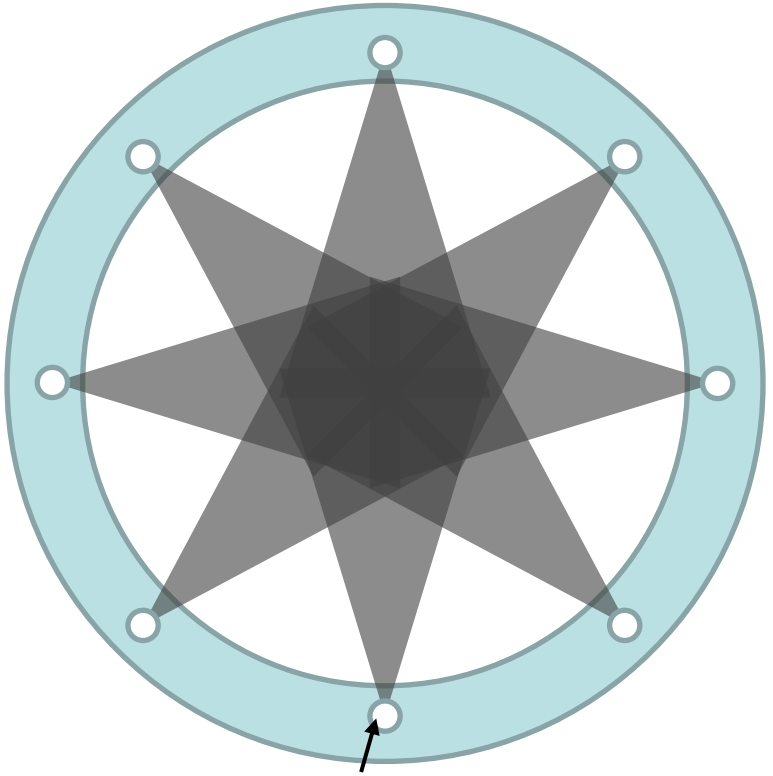


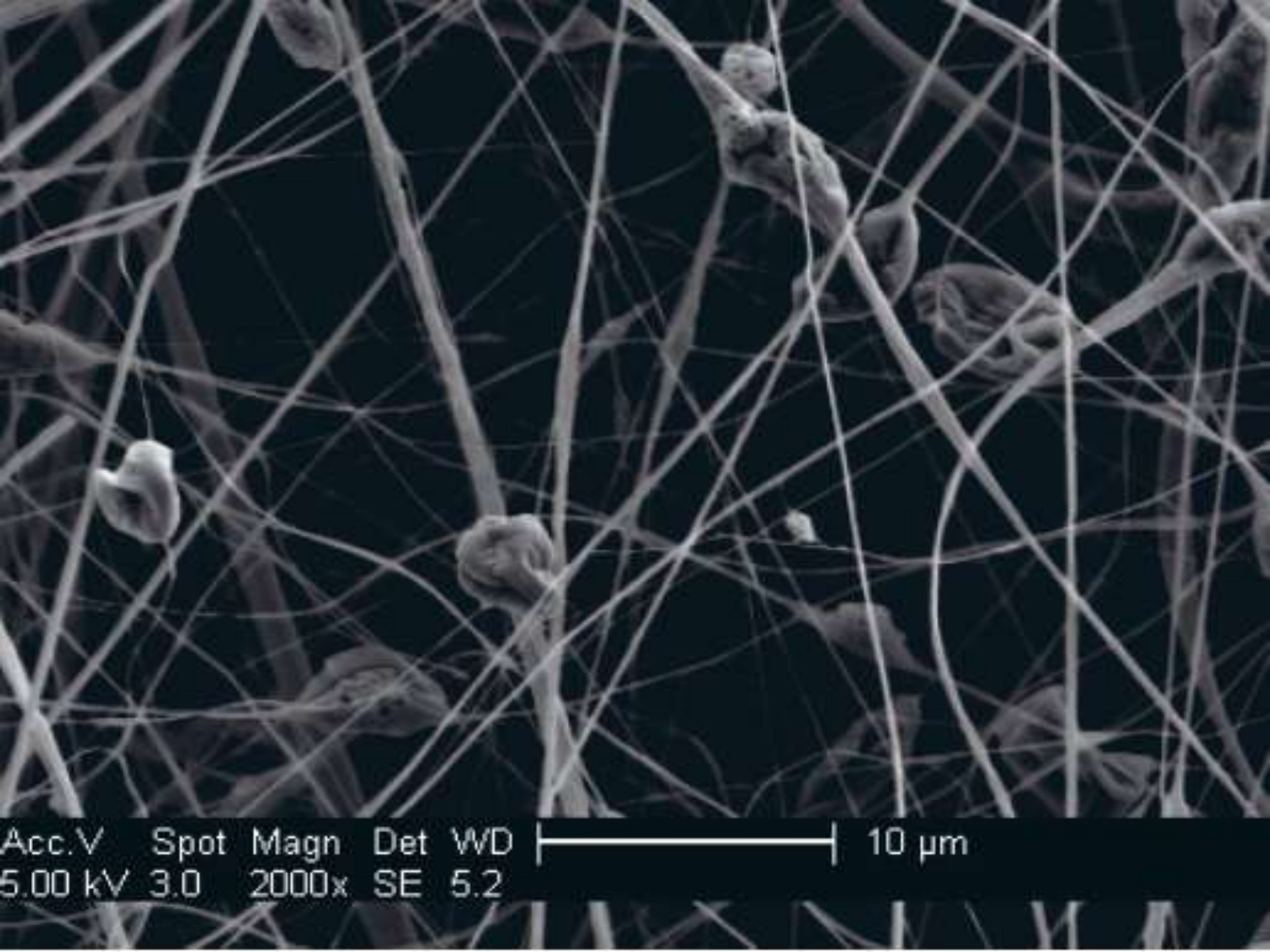
Coalescence

Multiple spray heads

Simultaneous operation

Formation of nano-web




Acc.V Spot Magn Det WD
5.00 kV 3.0 2000x SE 5.2
10 µm

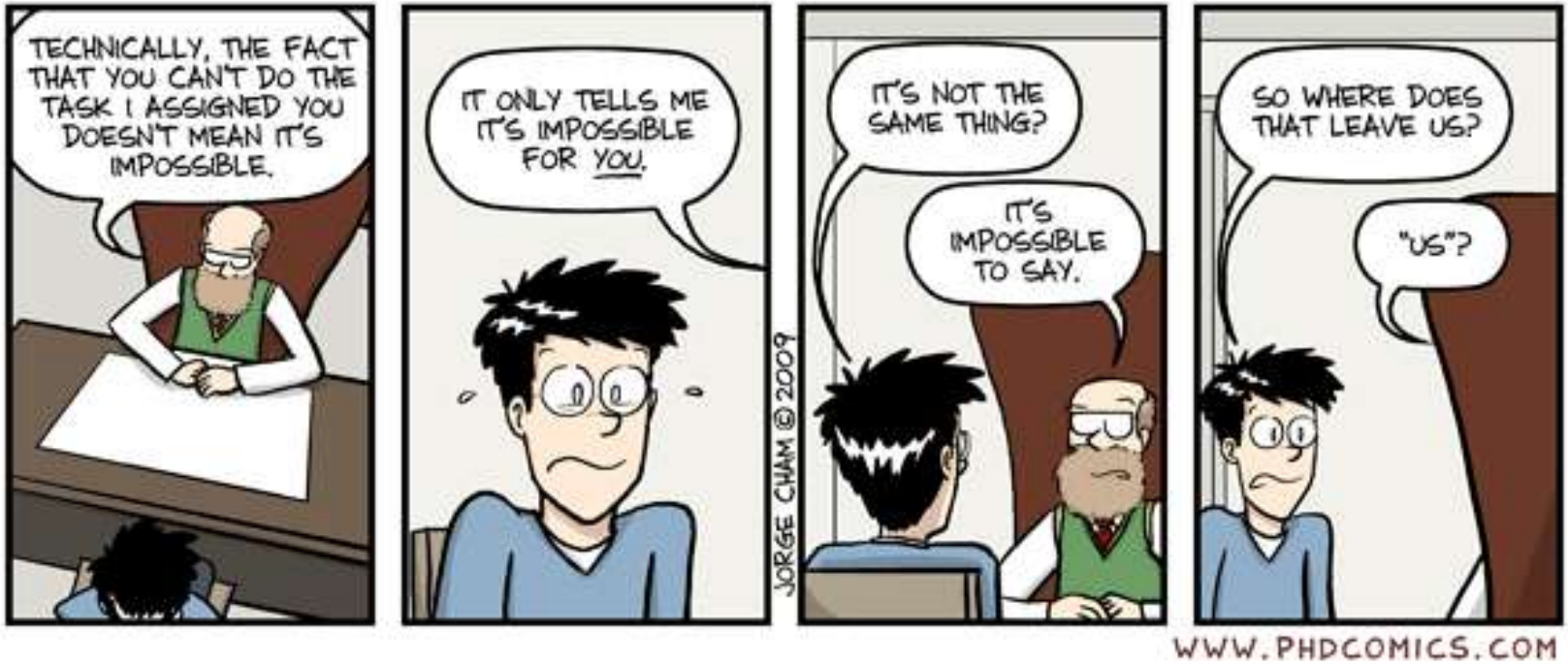
Maintenance

- 6 monthly visit by maintenance company to replace:
  - Membrane cartridge
  - Bead cartridge
  - Polymer

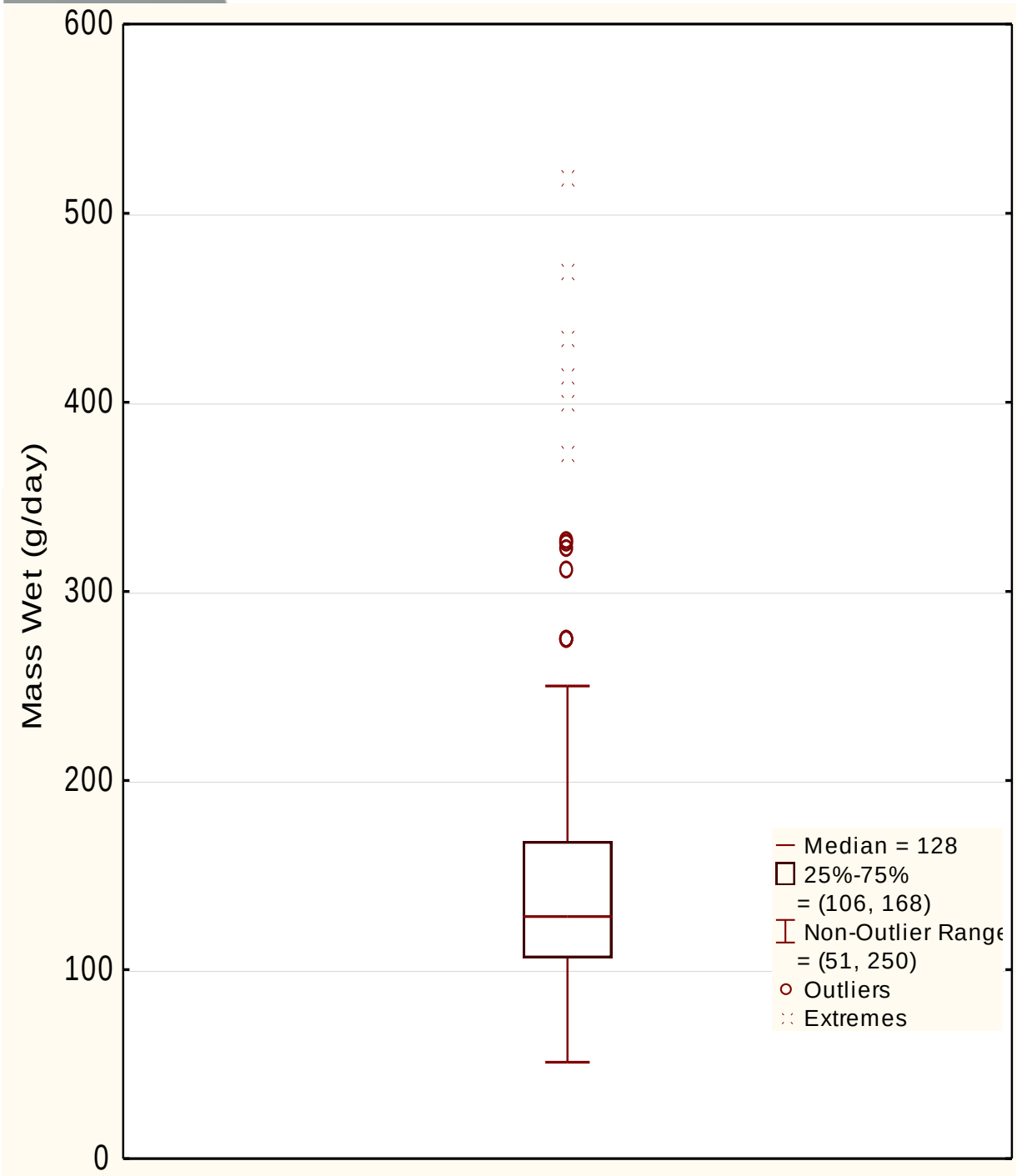
Initial results

What is poo? A review of the medical literature

Chris Rose

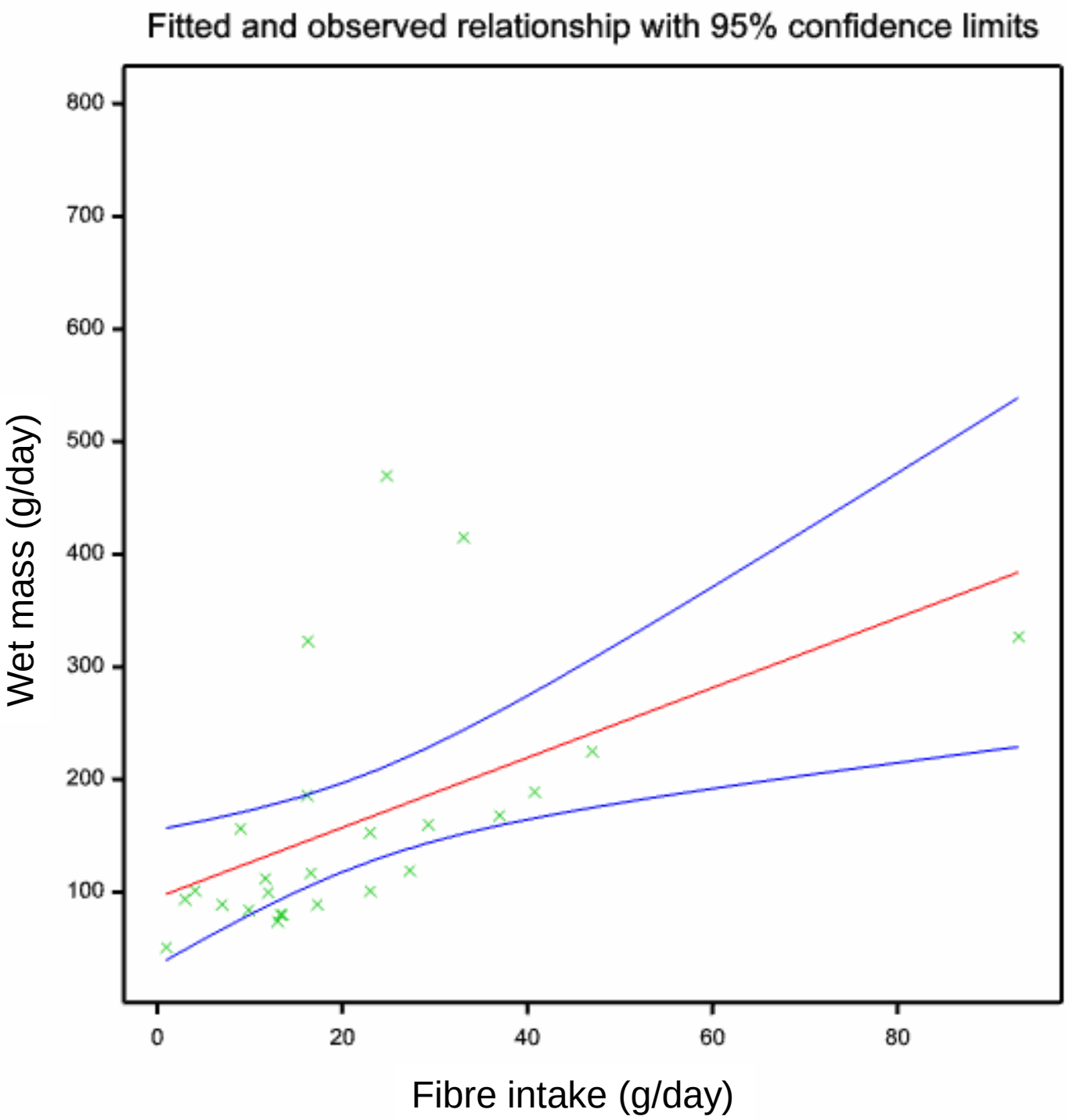


Mean faecal wet mass (g/cap/day)



Values from 116 studies

Faecal mass in response to dietary fibre intake



Values from 25 studies

Liquid generation

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Urine generation rate (n=14)

Variable	Range
Volume l/cap/day	0.5-2.45
Water Content %	91.5-96

Potential liquid inputs

Variable	Quantity
Stool water l/cap/day (mean)	0.1
Urine l/cap/day	0.5-2.45
Anal cleansing l/wash	0.35-3
Pour flush toilet water l/flush	1-3
Estimated total water content l/cap/day	1.95-8.55

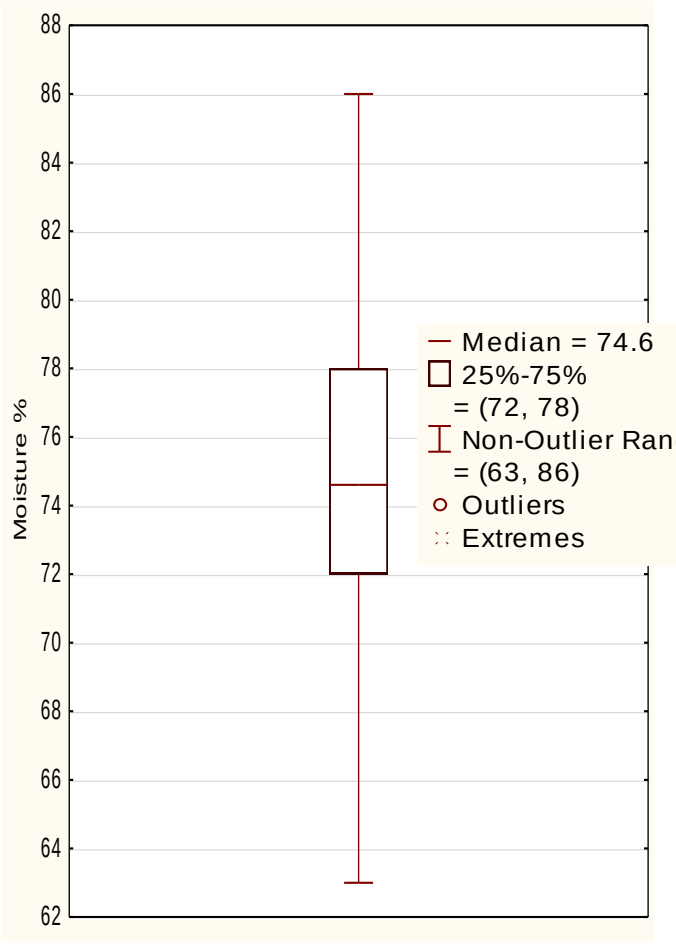
Dry Matter Generation

Potential solid inputs

Component of dry matter	**Quantity**
Stool g/cap/day	4-102
Urine g/cap/day	50-75
Anal wiping g/cap/day	6*
Urinary wiping (women, presuming 6 urinations a day) g/cap/day	36*
Menstrual pads and flow g/cap/day	34*
Estimated total solid content g/cap/day	130-253

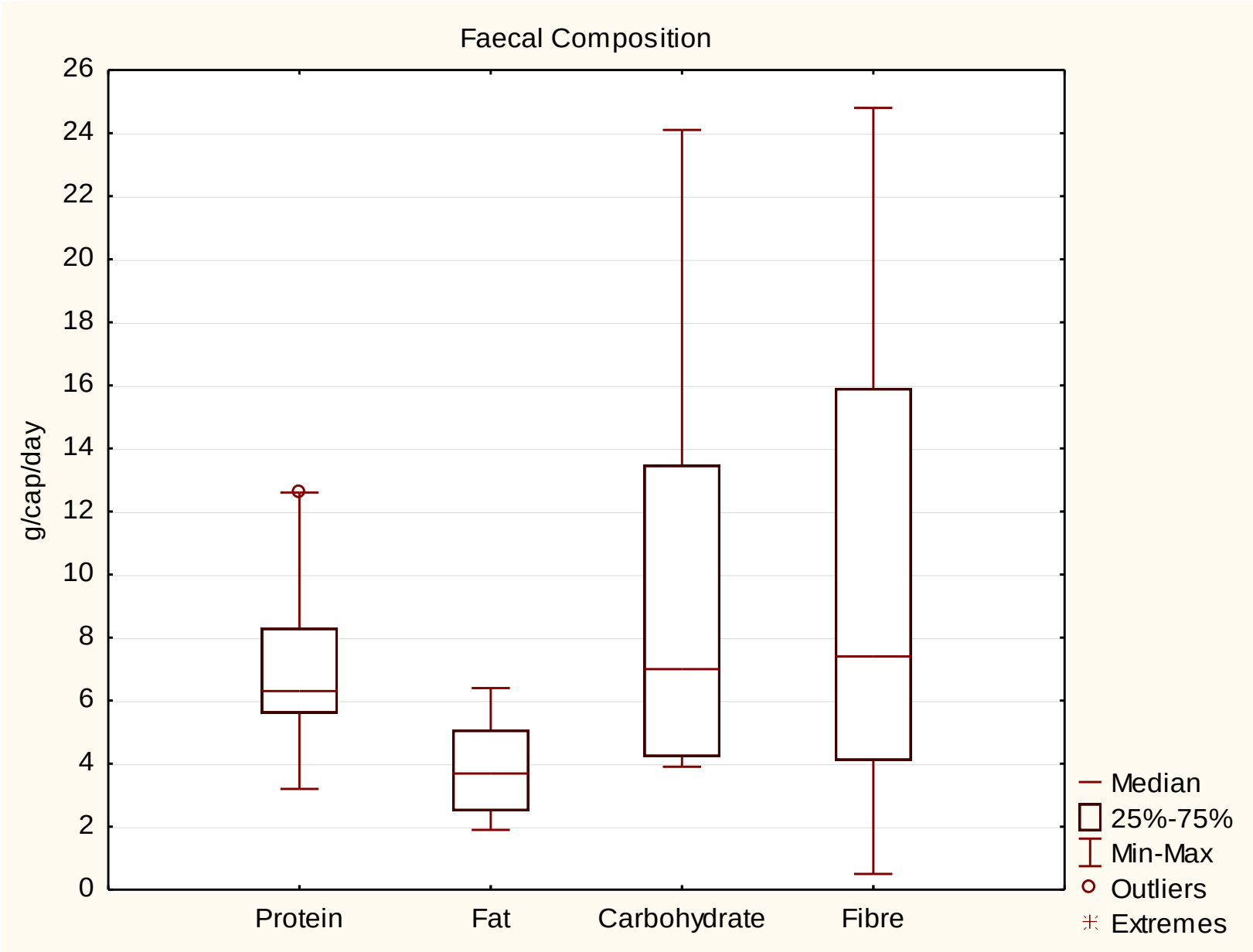
**Data from Parker and Gallagher (1992)*

Mean water content of faeces (%)

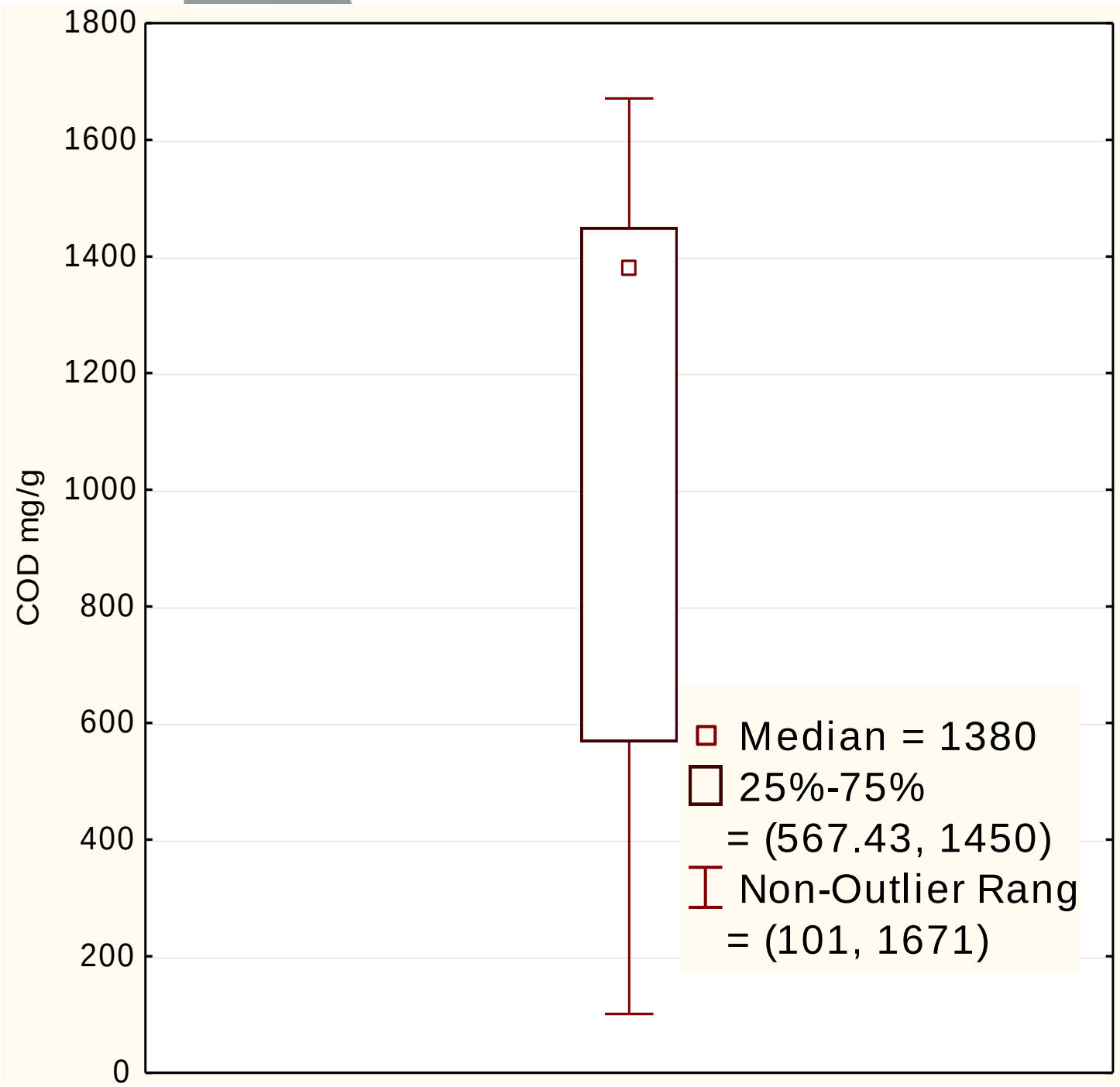


Data from 47 studies

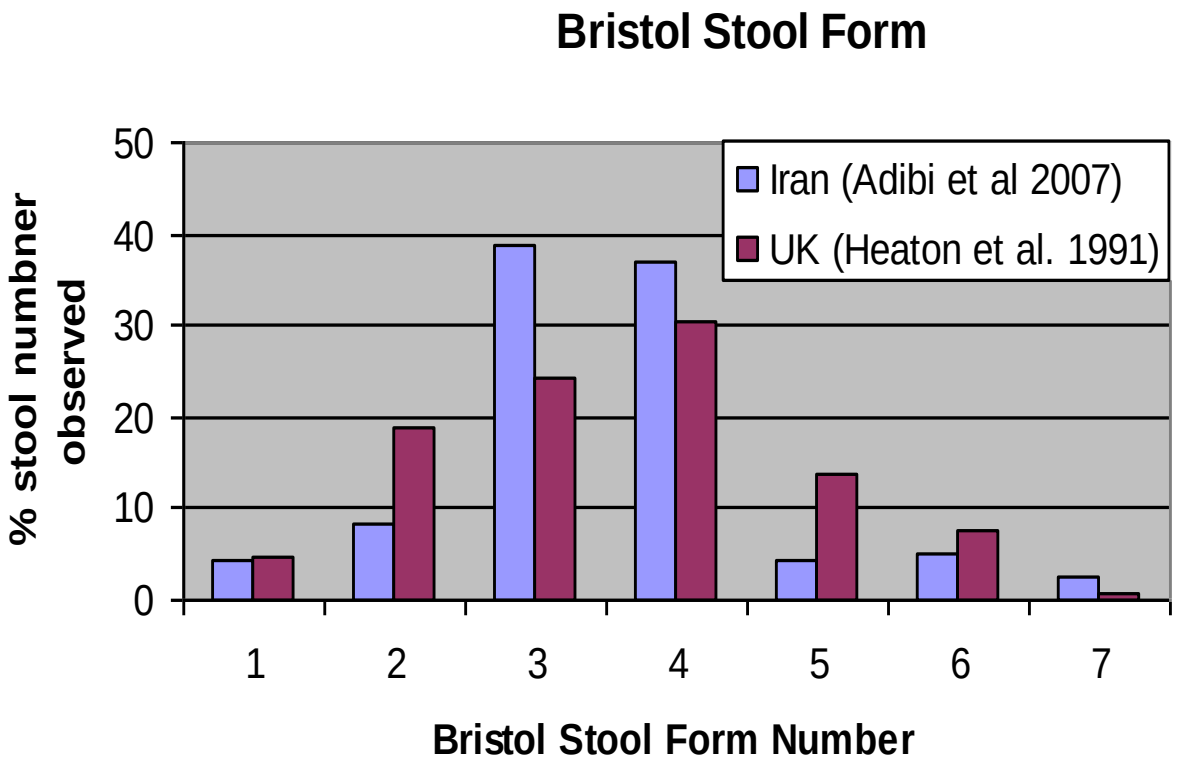
Faecal Composition

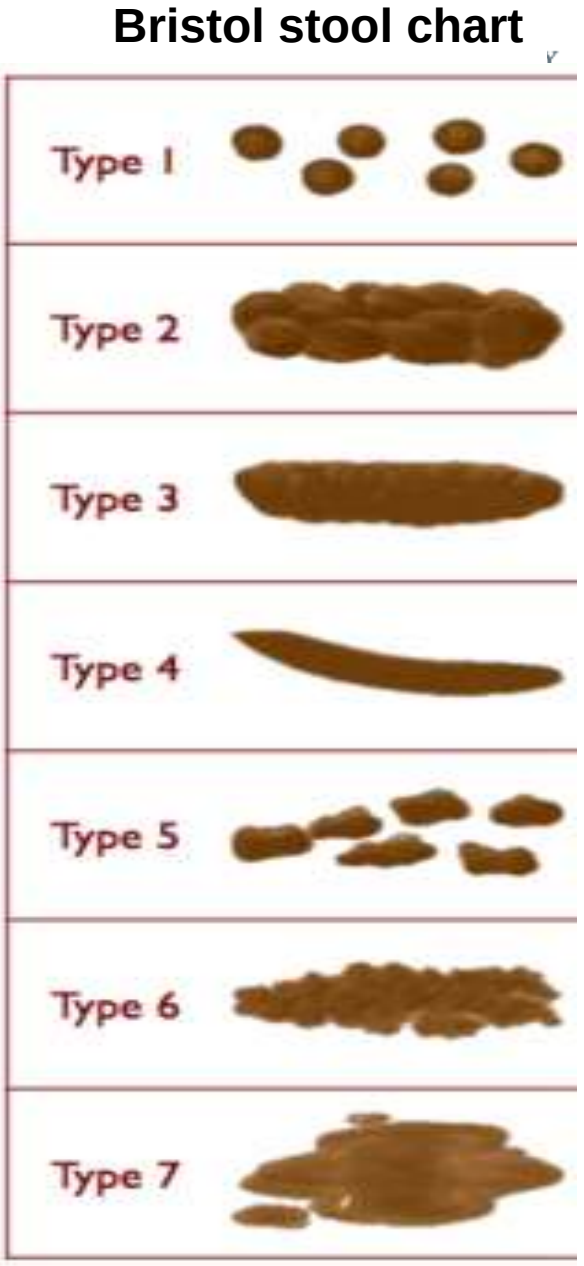


Chemical Nature of Faeces



Physical Nature





Lewis and Heaton (1997)

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