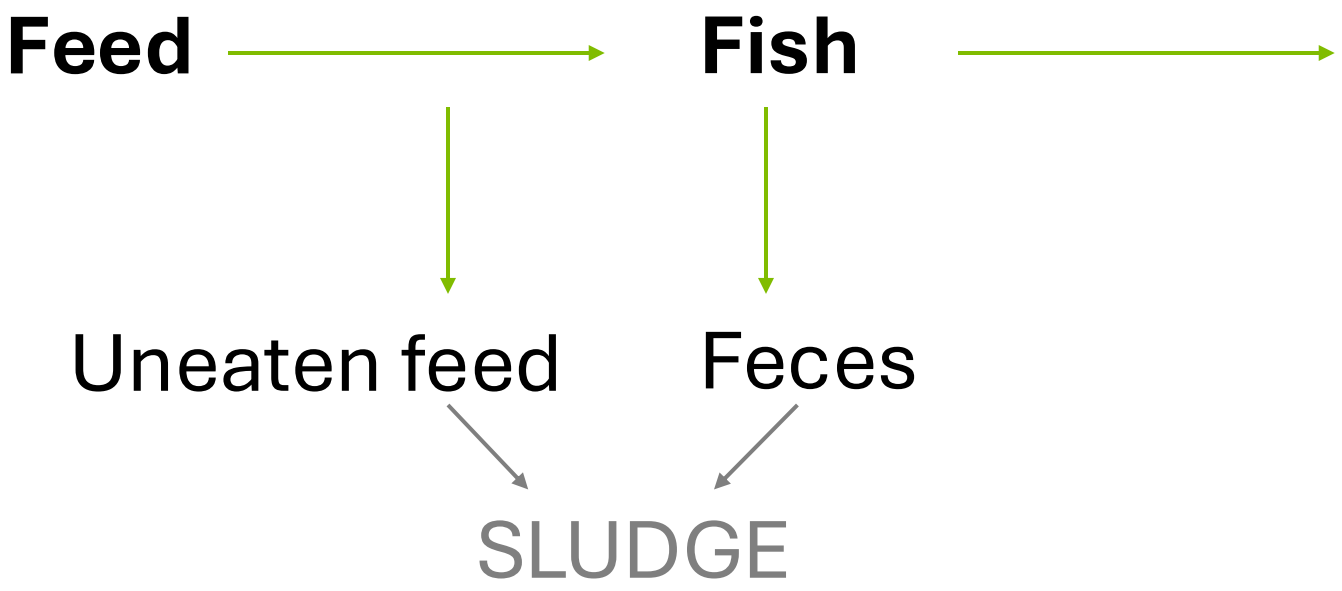
Slam og utslipp fra landanlegg

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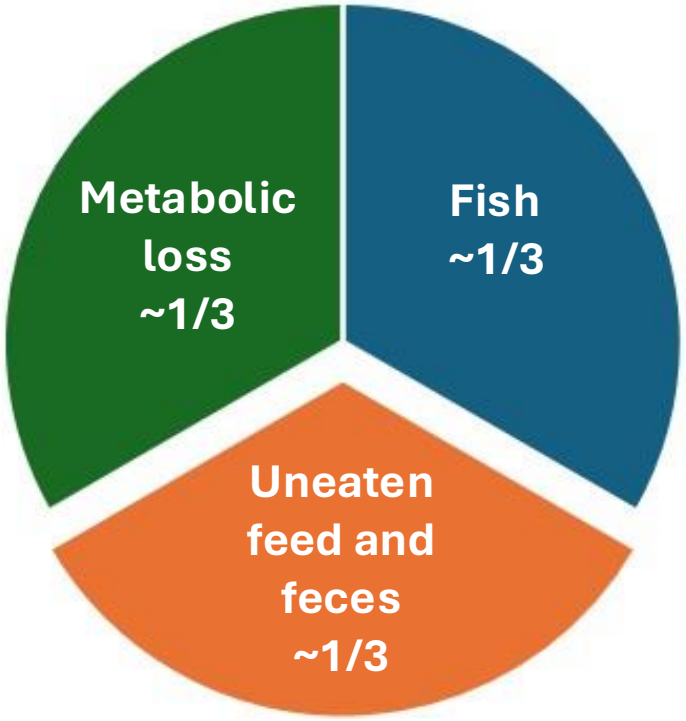


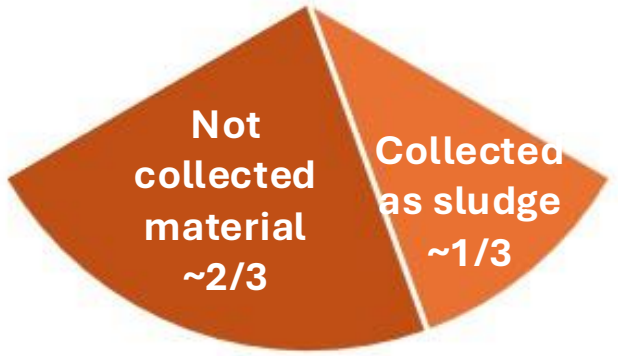
Foto: Frank Gregersen



How much (%) is collected?

Energy and nutrients from feed
Mass balance in a land based smolt farm (RAS)





Aas, T.S., Åsgård, T., 2019. Stoff-flyt av næringsstoff og energi fra fôr i et landbasert settefiskanlegg. Nofima Rapport 5/2019.

How much (%) sludge is collected at a farm?

- Available data:
  - Amount and composition of feed
  - Amount and composition of produced fish
  - Amount and composition of collected sludge

How much uneaten feed and faeces is present?

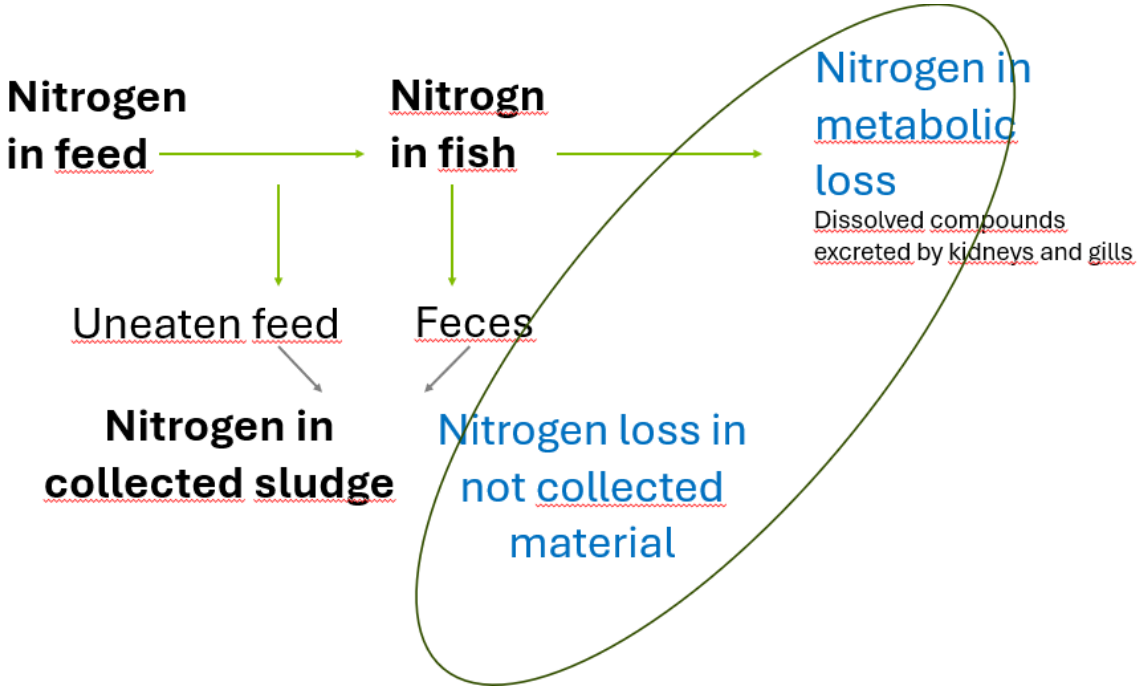
Example: Nitrogen

Nitrogen in feed used (kg)

minus nitrogen in produced fish (kg)

minus nitrogen i collected sludge (kg)

= Total loss of nitrogen (kg)



Total nitrogen loss, calculated with high accuracy

Includes nitrogen excreted from kidneys/gills

To estimate efficiency (%) of sludge collection, nitrogen excreted from kidneys/gills must be separated from nitrogen in uneaten feed and feces

- Some assumptions must be made

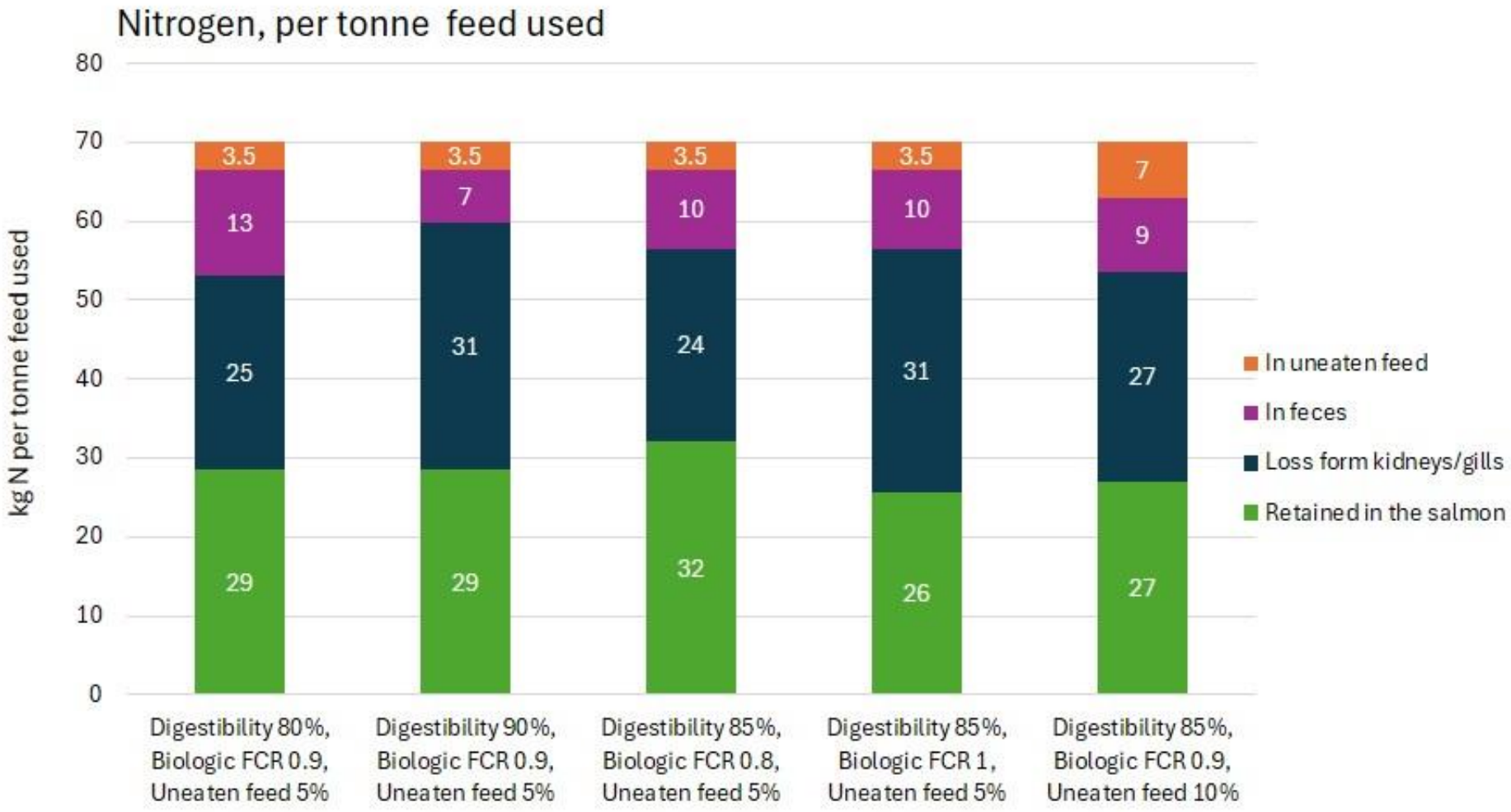
  Nitrogen digestibility: 80 – 90 % ?

  Biologic FCR* : 0.8 – 0.9 ?

  Uneaten feed: 5 – 10 % ?

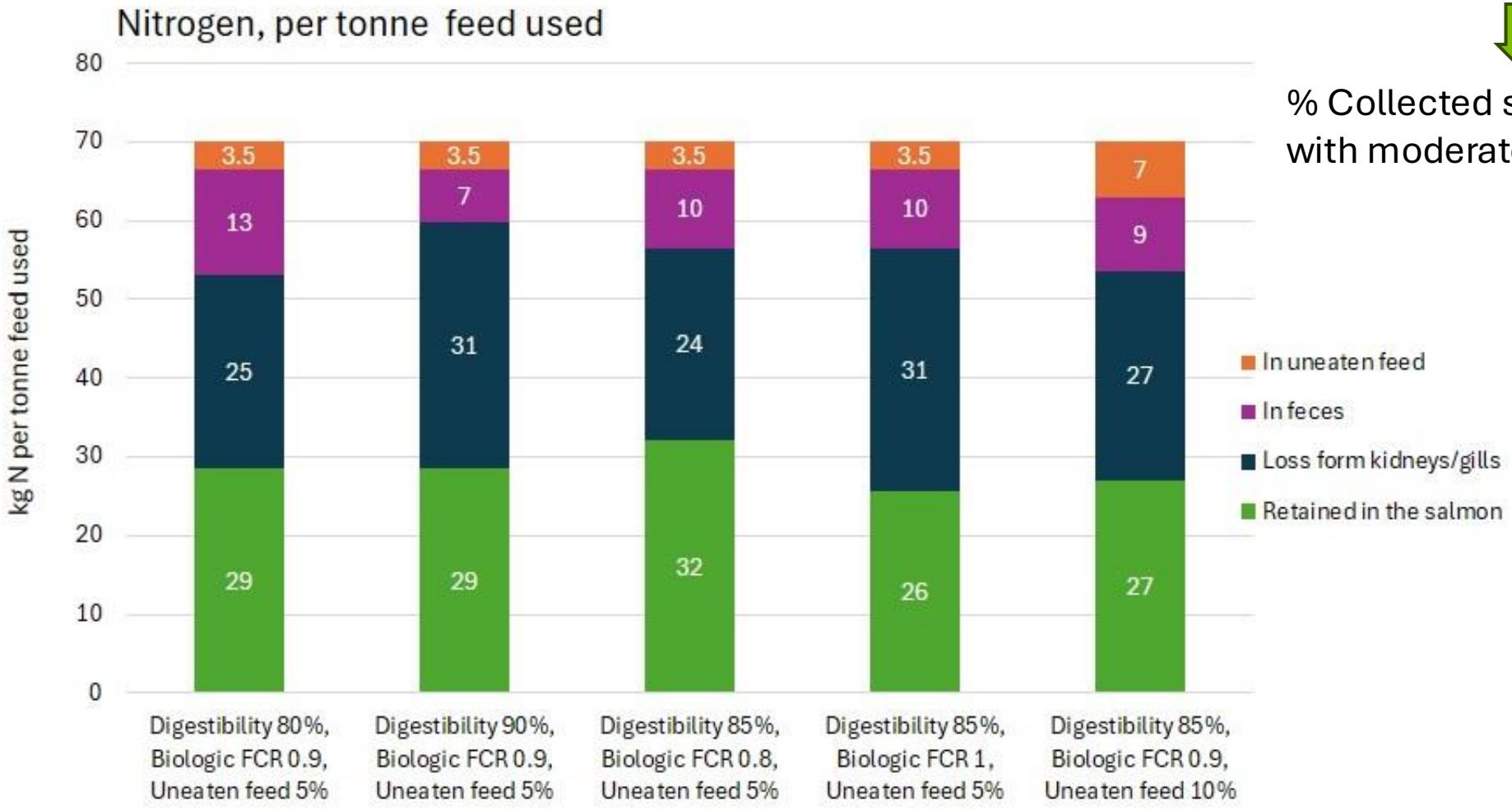
* Biologic FCR (feed conversion ratio) = $\frac{\text{Feed eaten, tonnes}}{\text{Salmon produced, tonnes}}$

Modelled nitrogen loss, per tonne feed used



Aas, T.S., Meriac, A., 2026. Beregning av utslipp av næringsstoff fra lakseoppdrett. Prosjekt 14725 Grand Slam. Nofima report. *In press*.

Modelled nitrogen loss, per tonne feed used

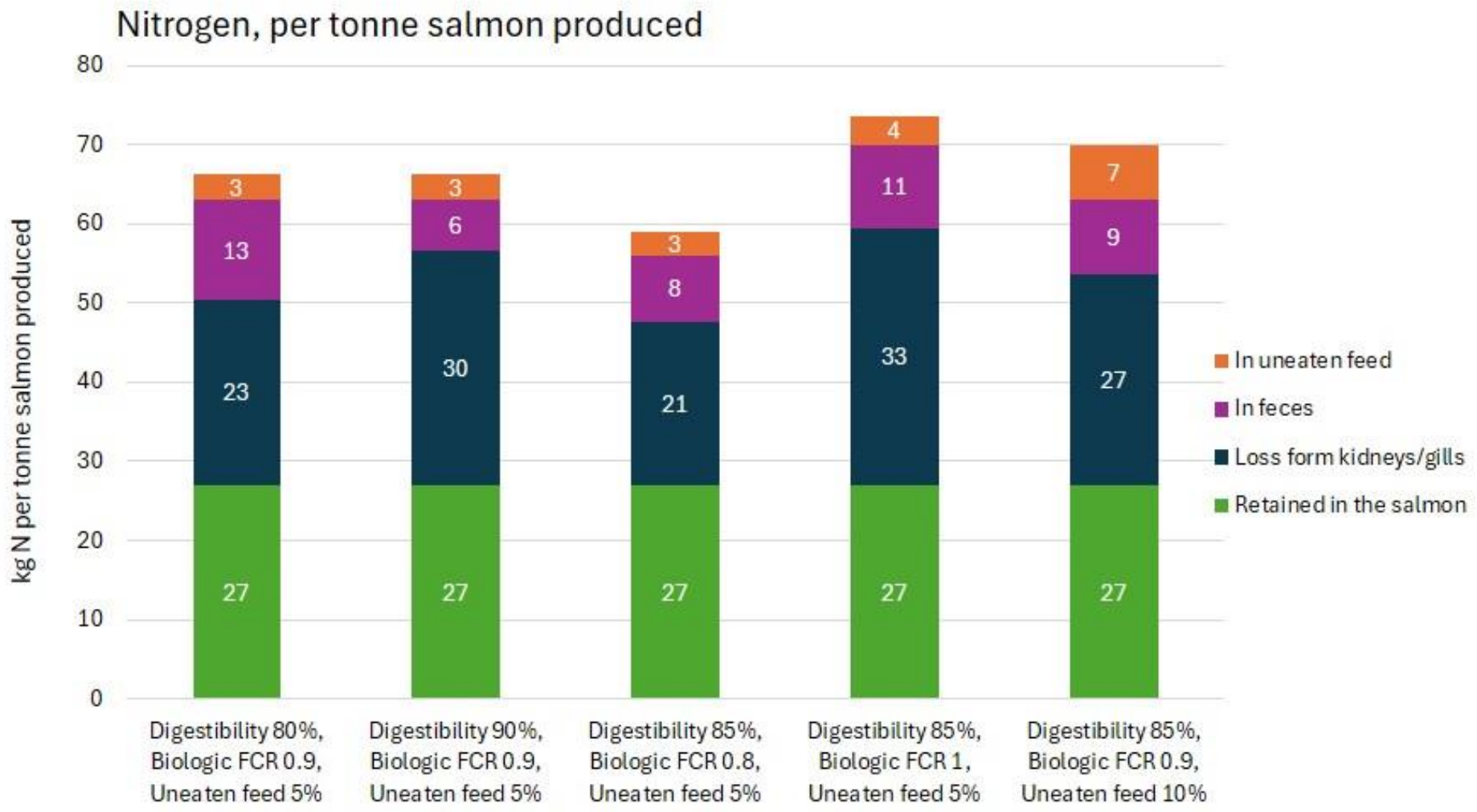


% Collected sludge:
Which values should be used?

% Collected sludge is calculated with moderate accuracy.

Aas, T.S., Meriac, A., 2026. Beregning av utslipp av næringsstoff fra lakseoppdrett. Prosjekt 14725 Grand Slam. Nofima report. *In press*.

Modelled nitrogen loss, per tonne salmon produced



Aas, T.S., Meriac, A., 2026. Beregning av utslipp av næringsstoff fra lakseoppdrett. Prosjekt 14725 Grand Slam. Nofima report. *In press*.

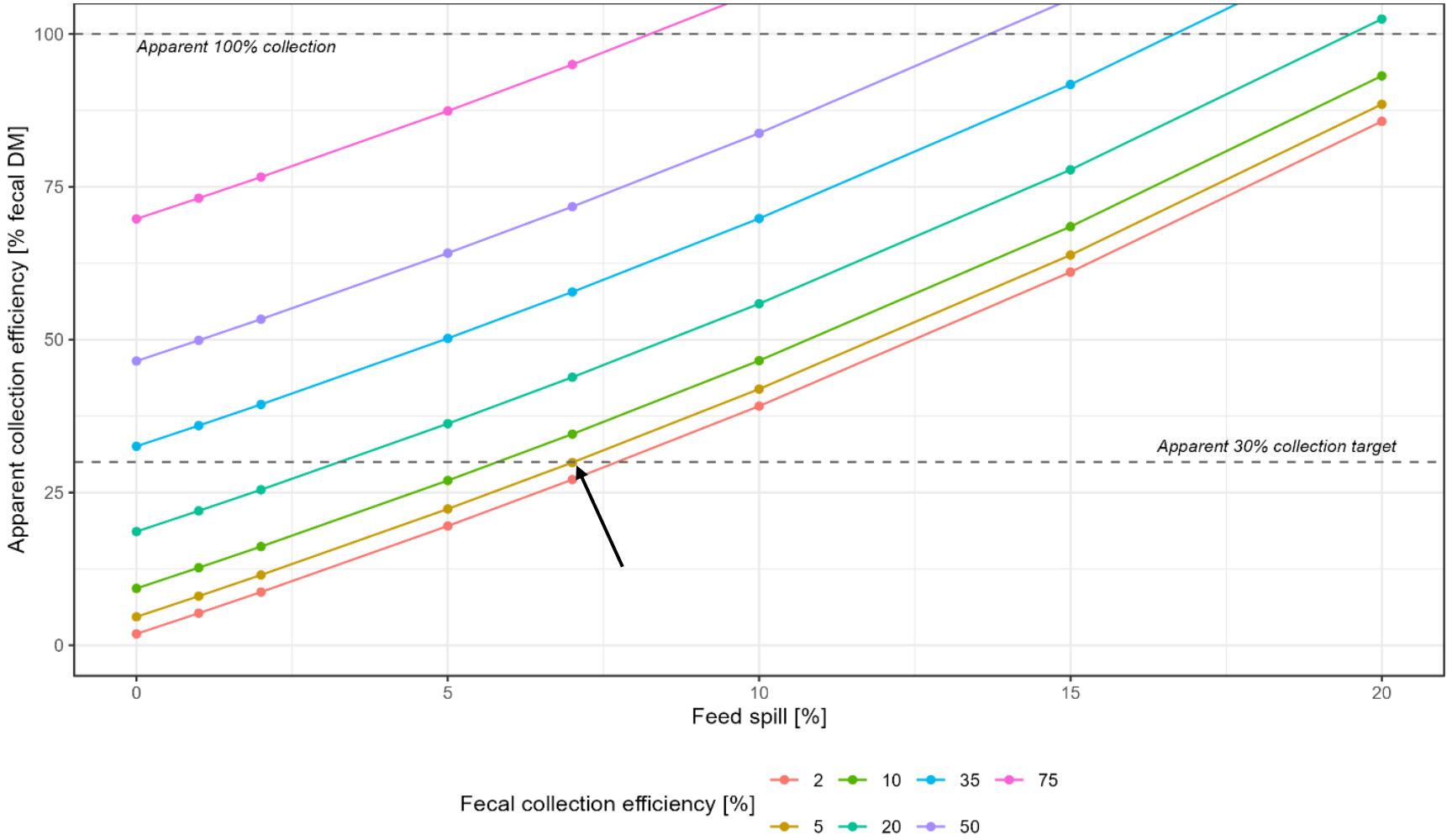
Feed in sludge

- Feed pellets are typically firm with high stability and can be collected effectively
- Feces from salmon disrupts easily. Small particles are not collected effectively



- Sludge may contain a large amount of feed pellets

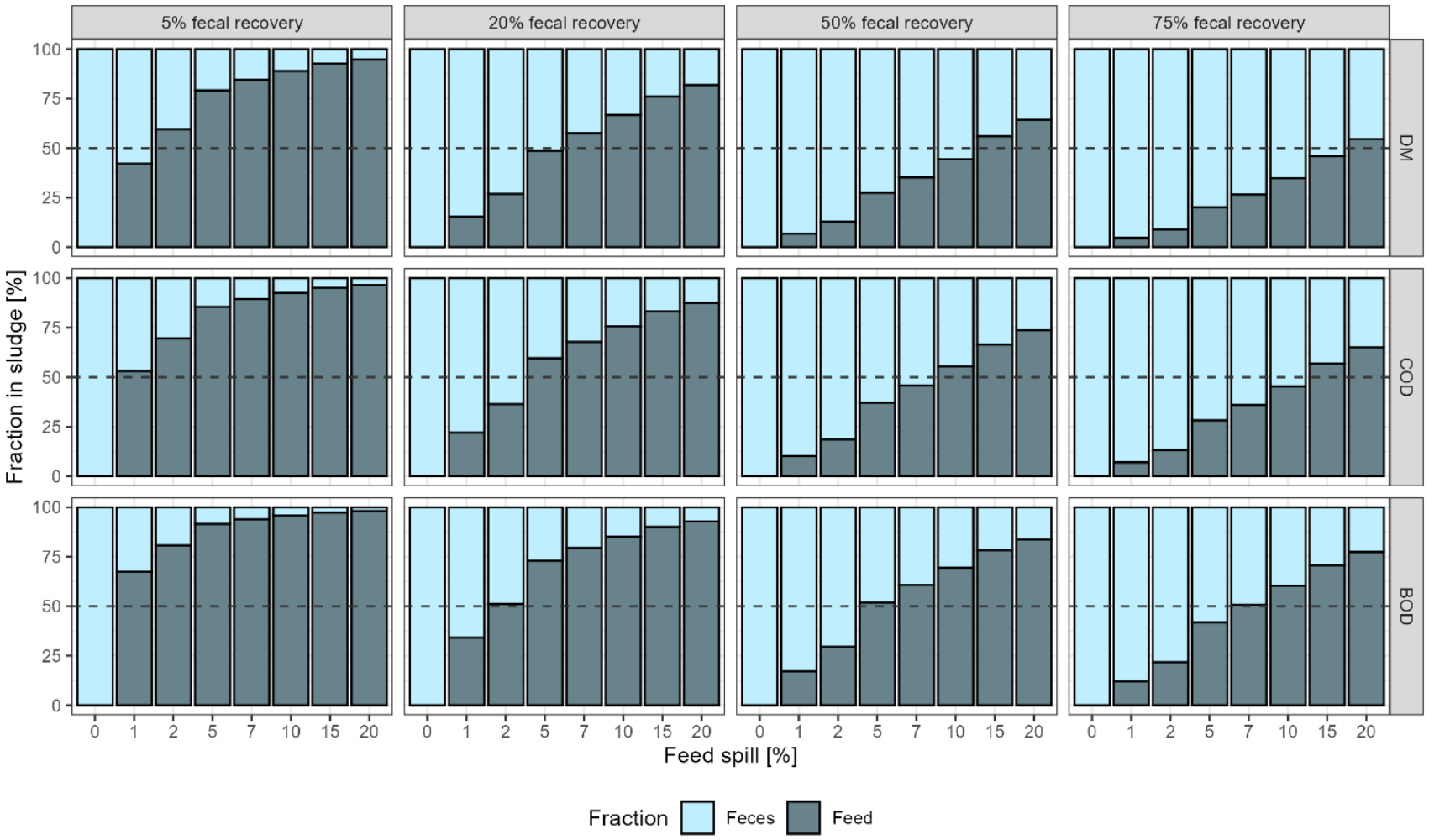
Uneaten feed increases sludge collection efficiency



E.g. at 5% collection efficiency of feces, will 7% uneaten feed result in 30% total sludge collection efficency

Aas, T.S., Meriac, A., 2026. Beregning av utslipp av næringsstoff fra lakseoppdrett. Prosjekt 14725 Grand Slam. Nofima report. *In press*.

Uneaten feed increses biogas potential of sludge



E.g. at 20% collection efficiency of feces, will 2% uneaten feed contribute to 50% of the BOD

Aas, T.S., Meriac, A., 2026. Beregning av utslipp av næringsstoff fra lakseoppdrett. Prosjekt 14725 Grand Slam. Nofima report. *In press*.

Sludge originates from feed

➡ The amount of sludge produced can be reduced by increased presision in the feeding

- Digestibility of feed/feed ingredients
- Amino acid balance
- Protein:energy ratio

Increased presision in feeding – continous adjustment to the current situation – **with the aim to reduce sludge production and emissions**



Takk for oppmerksomheten

Foto: Frank Gregersen