Rumen-bypass Nanoparticles: Between ingestion and milk production

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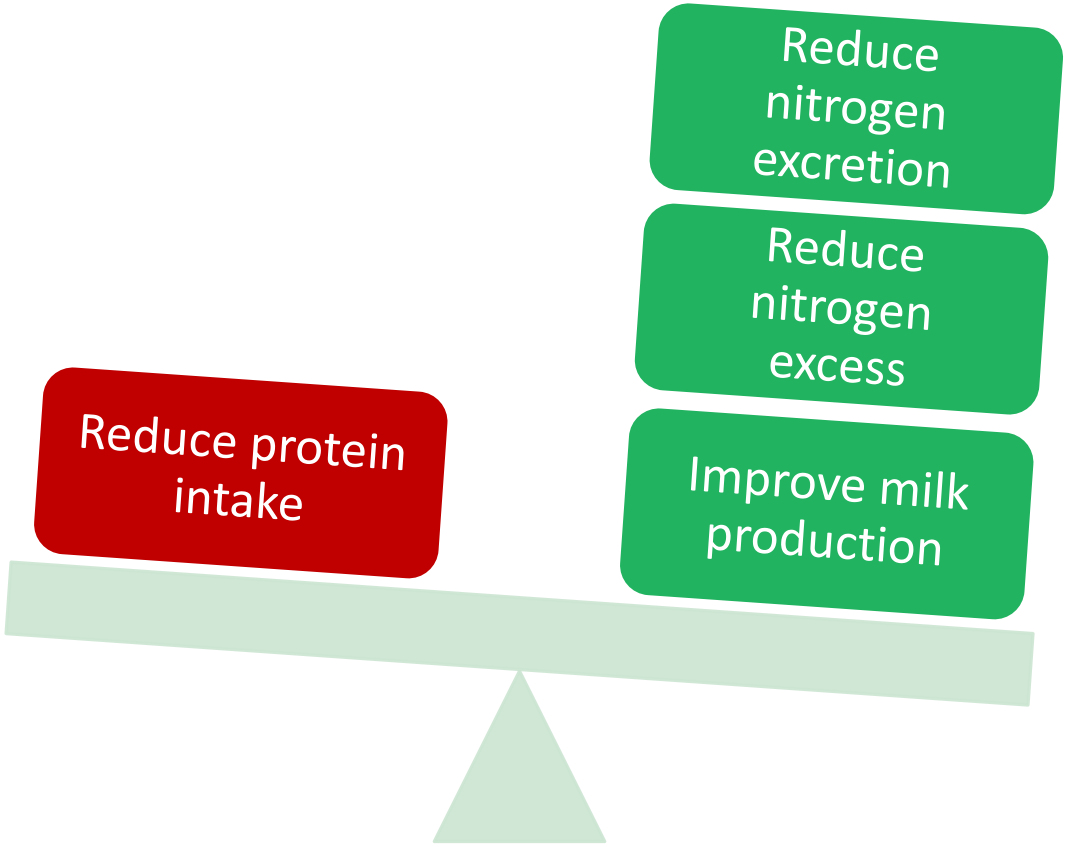
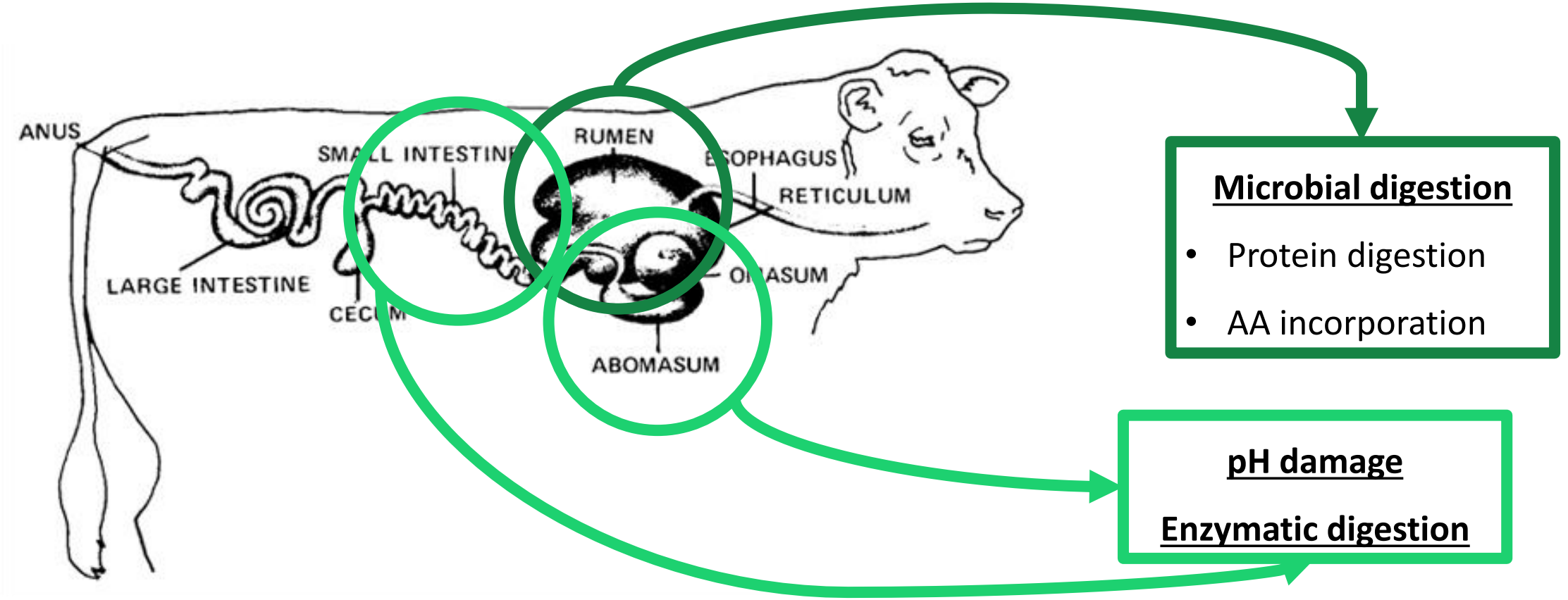
Introduction



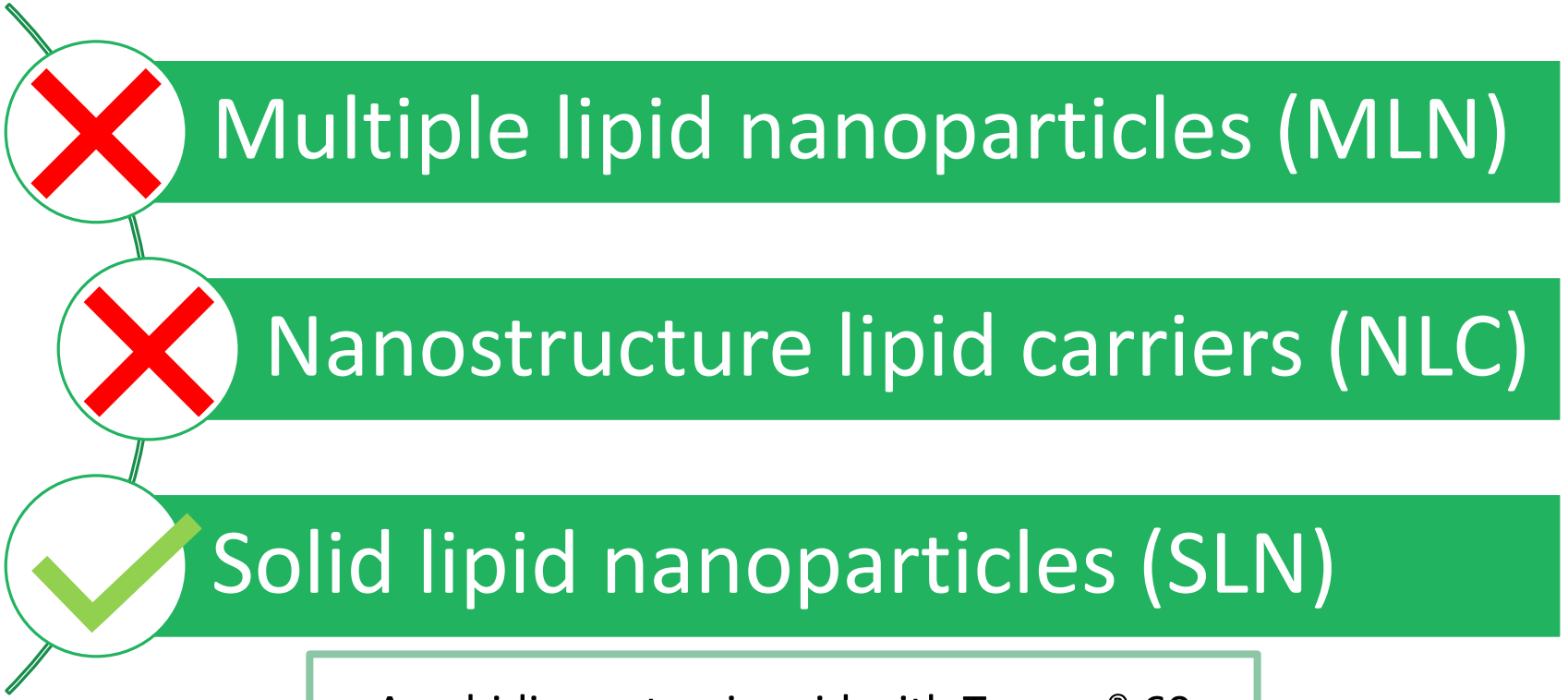
AA profile improvement

- ✓ More profitable milk production
- ✓ Improves animal health
- ✓ Reduces environmental damage

Introduction



Introduction

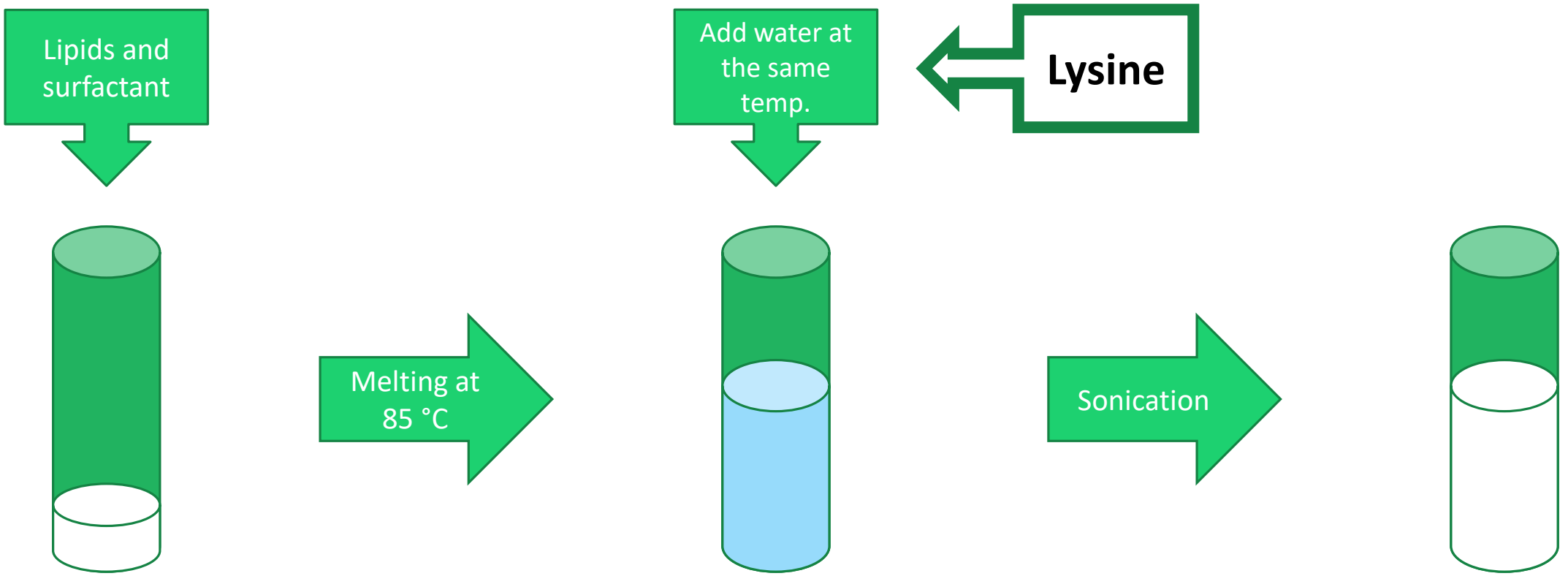


Arachidic or stearic acid with Tween ® 60

Objective

- Evaluate the stability of rumen-resistant NPs
  - In the abomasum
  - In the intestine
- Determine their capability to be degraded in the bloodstream
  - Enabling delivery of their cargo

Nanoparticle synthesis

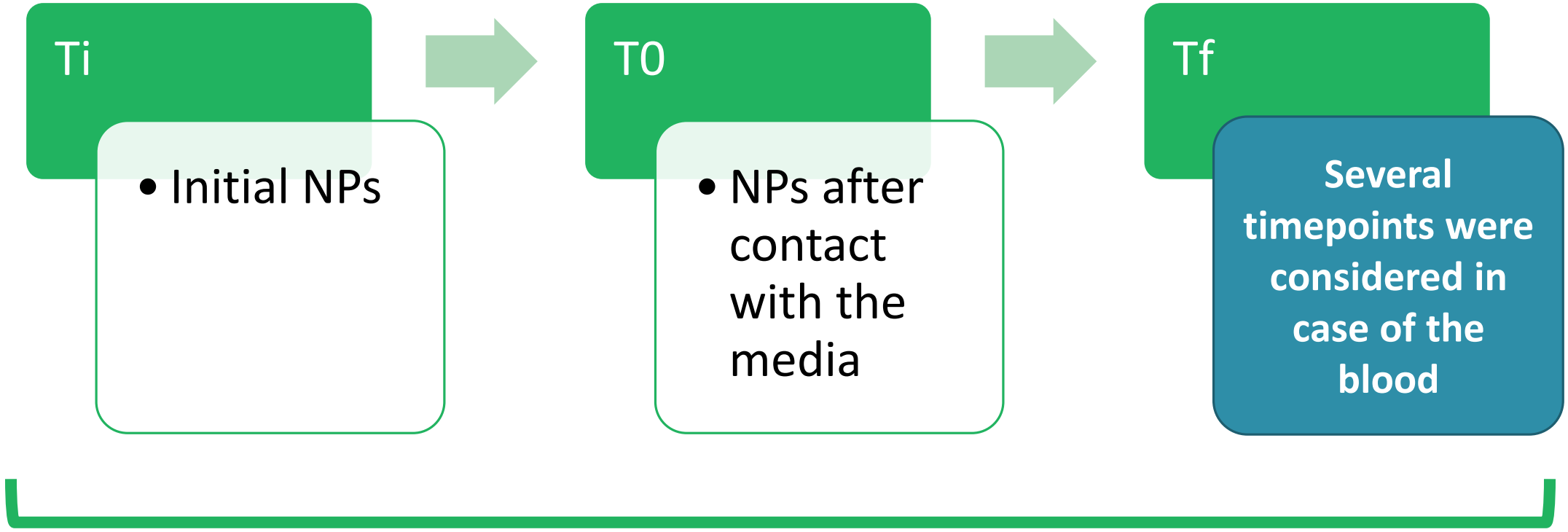


Methods

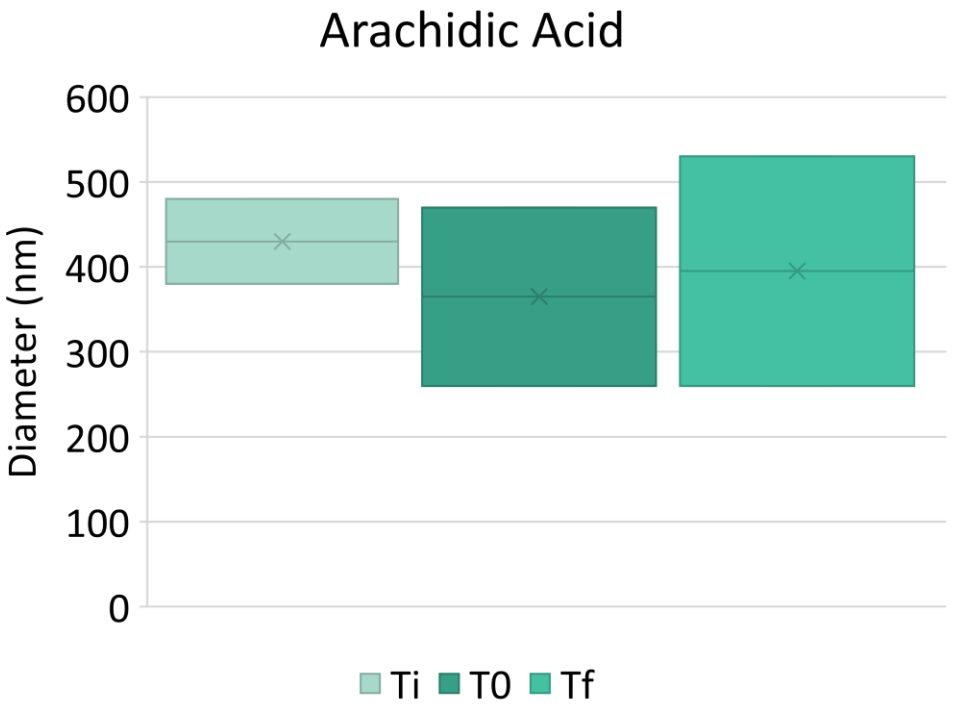
Abomasum	• Simulated gastric fluid (FaSSGF*) supplemented with pepsin for 1h
Intestine	• Simulated intestinal fluid (FeSSIF*) supplemented with pancreatin for 2h
Blood	• Fetal bovine serum (FBS) for 3h • Fresh bovine blood for up to 24h

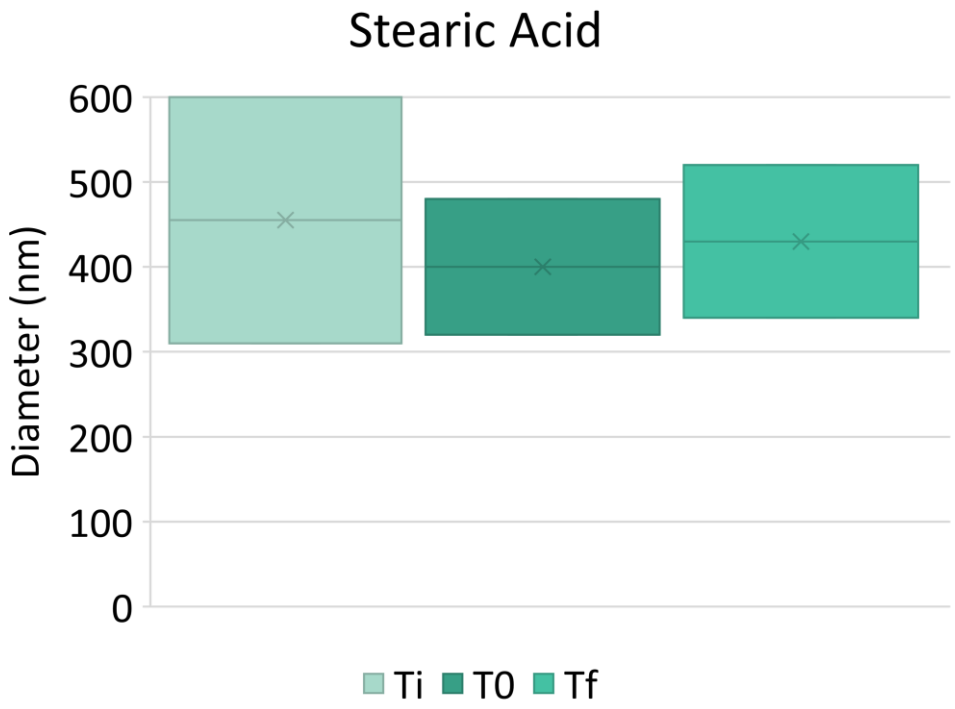
*Biorelevant.com Ltd commercial product

Methods

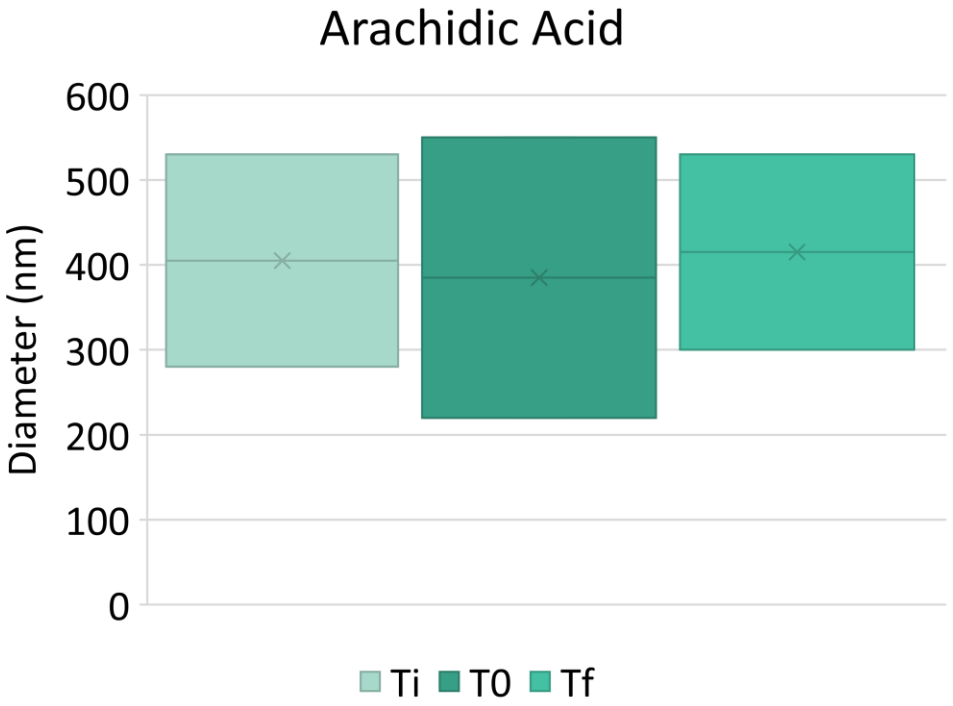

Ti
• Initial NPs
T0
• NPs after contact with the media
Tf
Several timepoints were considered in case of the blood
Characterized in terms of mean size using Dynamic Light Scattering

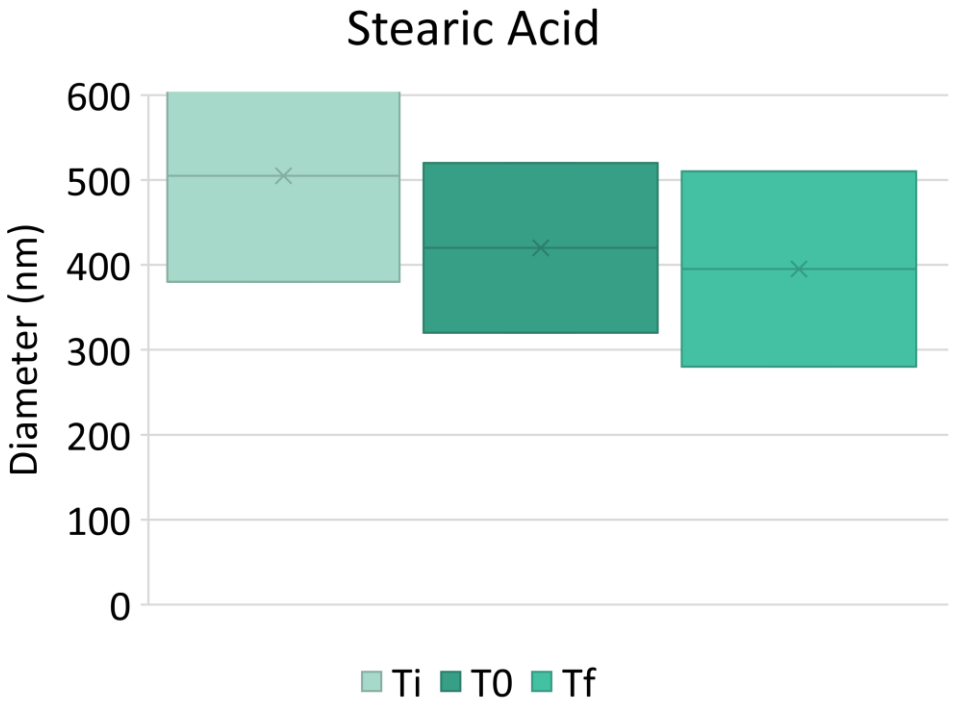
NP stability in the abomasum



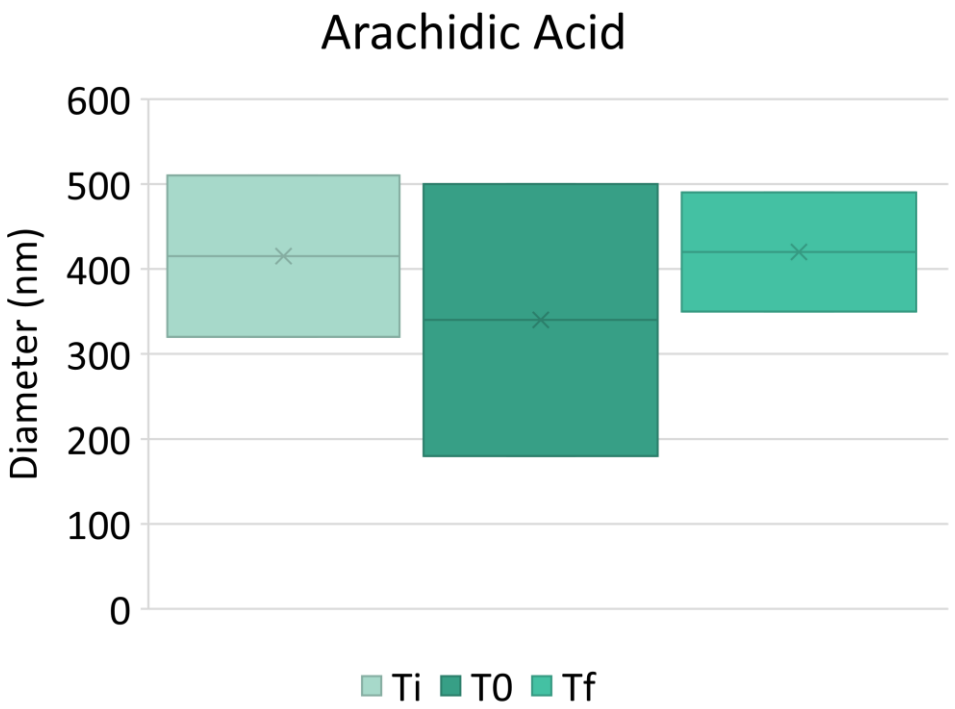


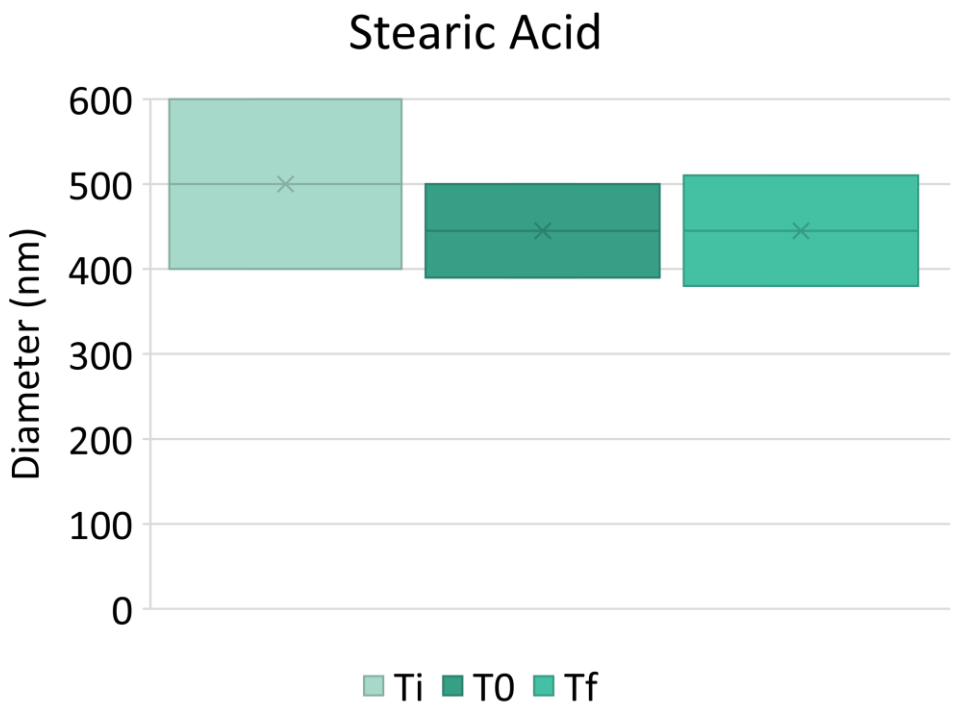
NP stability in the intestine



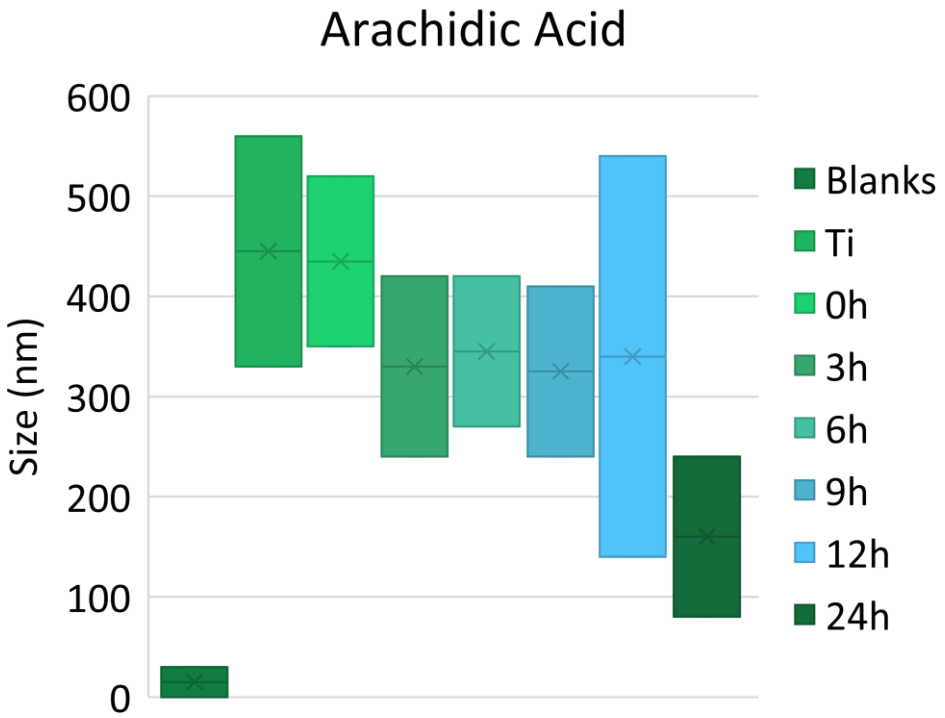


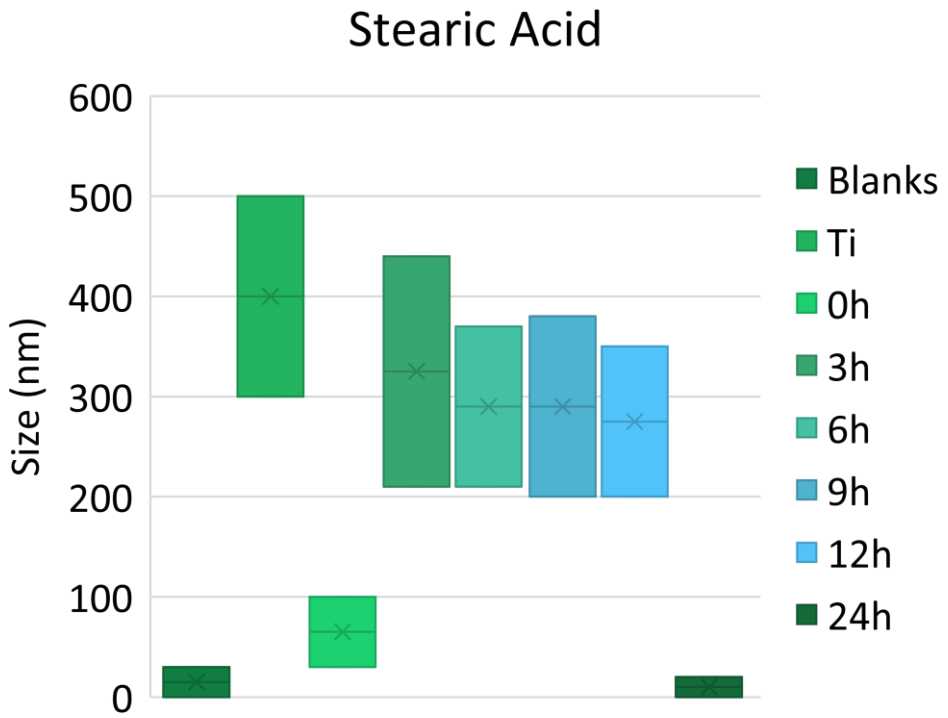
NP stability in FBS





NP stability in the blood





Conclusions

- ✓ The NPs appear to resist digestion in the abomasum
- ✓ The NPs appear to resist digestion in the small intestine
- ✓ The NPs appear to be slowly degraded in the blood
  - ✓ Completely degraded after 24h in the case of stearic acid NPs

Future work

Short term

- ❑ Assess *in vitro* biocompatibility
- ❑ Assess intestinal uptake

Long term

- ❑ Assess *in vivo* efficiency

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Thank you for your attention!