



## Protein structure within infant milk formulas impact their in vitro dynamic digestion.

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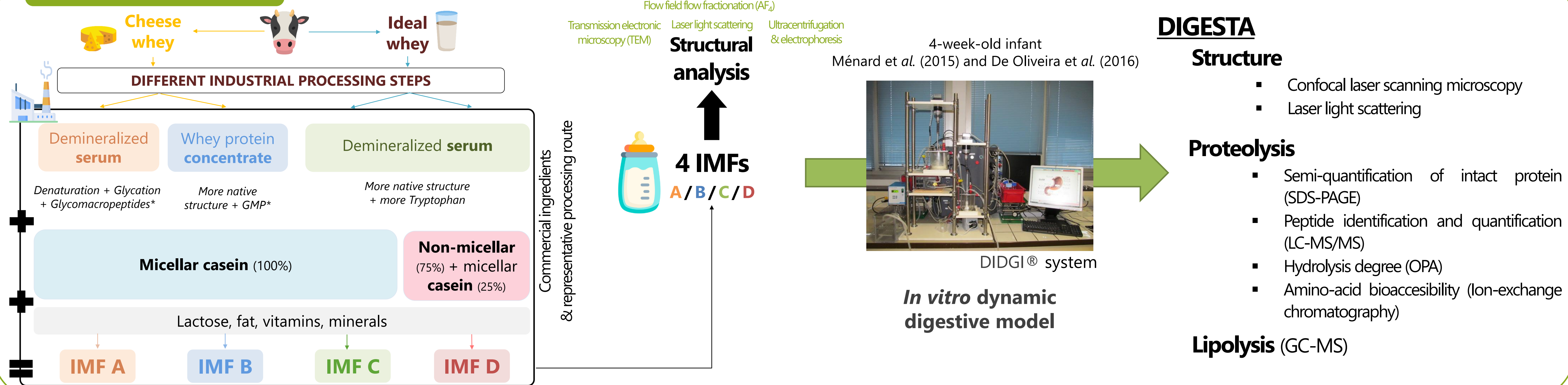
# DO PROTEIN STRUCTURE AND COMPOSITION WITHIN INFANT MILK FORMULAS IMPACT DIGESTIVE KINETICS ?

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## INTRODUCTION and OBJECTIVE

**Infant formulas**, the only **adequate substitute** to **breastmilk**, are complex matrices that require **numerous ingredients** and **processing steps** that both can vary among manufacturers and affects IF quality. A part of this thesis aims to understand **how protein structure** and **composition** **within dairy ingredients** impact **Infant Milk Formulas (IMFs) structure** and **digestive kinetics** using *in vitro* model mimicking infant stage.

## METHODOLOGY

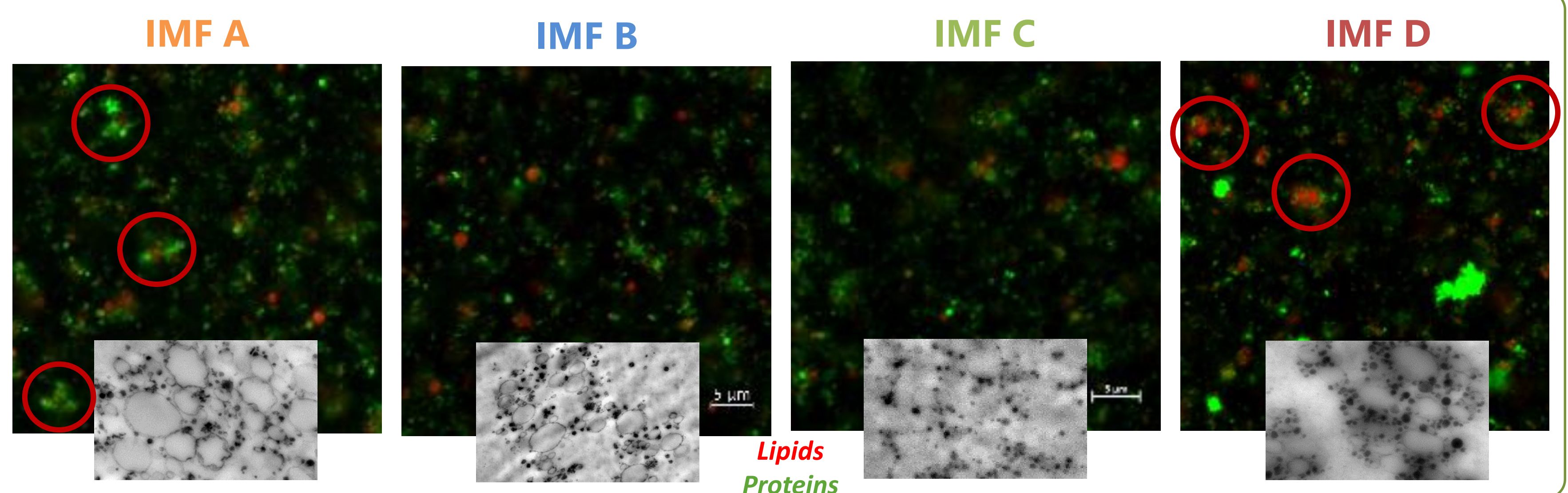


## RESULTS

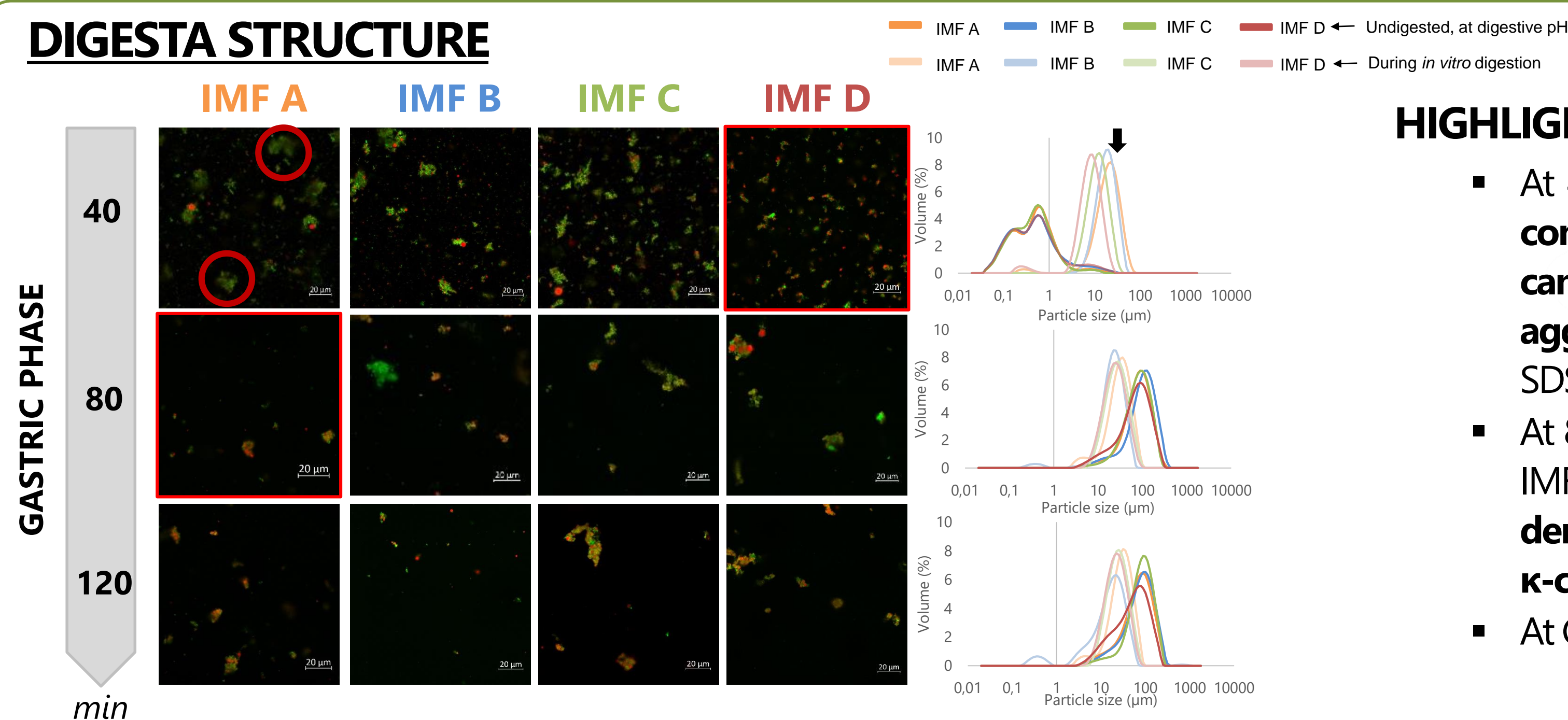
### IMFs STRUCTURE

- IMF A** : star-shape lipoprotein structure, glycosylated whey proteins
- IMF B** : no particular shape or size of the lipoprotein structures
- IMF C** : no particular shape or size of lipoprotein structures
- IMF D** : large lipoprotein structures covered by numerous caseins structures

**Differences of structure among protein ingredients was maintained after its production**



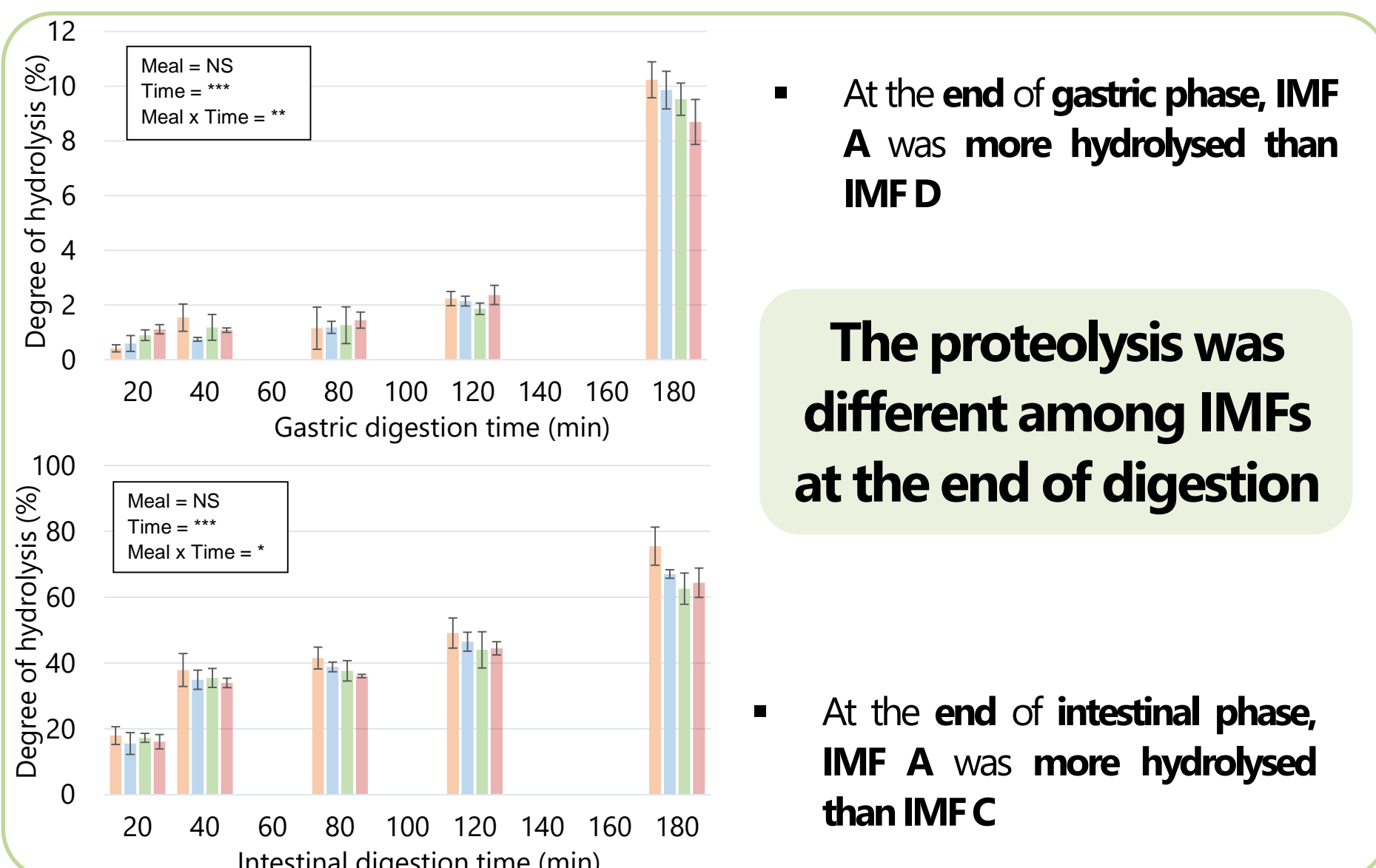
### DIGESTA STRUCTURE



### HIGHLIGHTS :

- At 40 minutes of gastric phase, **IMFs A and B** showed **larger lipoprotein structures** compared to IMFs C and D. IMF D presented **smaller particles** than IMF C which can be attributed to the presence of modified casein form. At G40, the **aggregation** observed was caused by fat droplets flocculation since the addition of SDS allowed to return to initial particle size distribution.
- At 80 minutes of gastric phase, **IMF A** had **smaller lipoprotein** particles than the other IMFs which could be due to hindered casein coagulation caused by the binding of denatured WPs aggregates at the interface of casein micelles impairing hydrolysis of k-casein
- At G120, IMFs B, C and D still had smaller lipoprotein structures than IMF A.

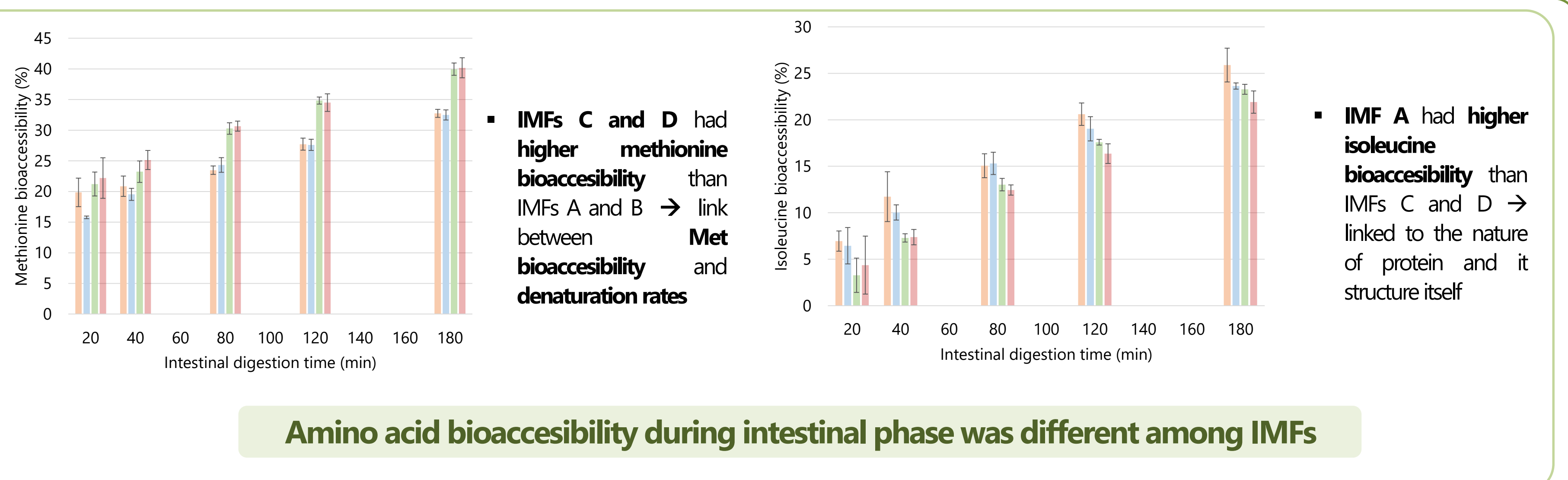
### PROTEOLYSIS



- At the end of gastric phase, IMF A was more hydrolysed than IMF D

**The proteolysis was different among IMFs at the end of digestion**

- At the end of intestinal phase, IMF A was more hydrolysed than IMF C



**Amino acid bioaccessibility during intestinal phase was different among IMFs**

**Peptides (including bioactive ones) release kinetics were also different among IMFs**

## CONCLUSION and PERSPECTIVES

**Dairy protein ingredient quality** (structure and composition) was shown to have an **impact on IMF structure** and **their hydrolysis** using a *in vitro* dynamic model of infant digestion. **Further investigations** will be performed to determine postprandial **plasma amino acid kinetics** and **physiological impacts** using an *in vivo* model of infants.

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