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SALIVA PROTEINS-TANNINS INTERACTIONS AND THE FATE OF COMPLEXES DURING DIGESTION

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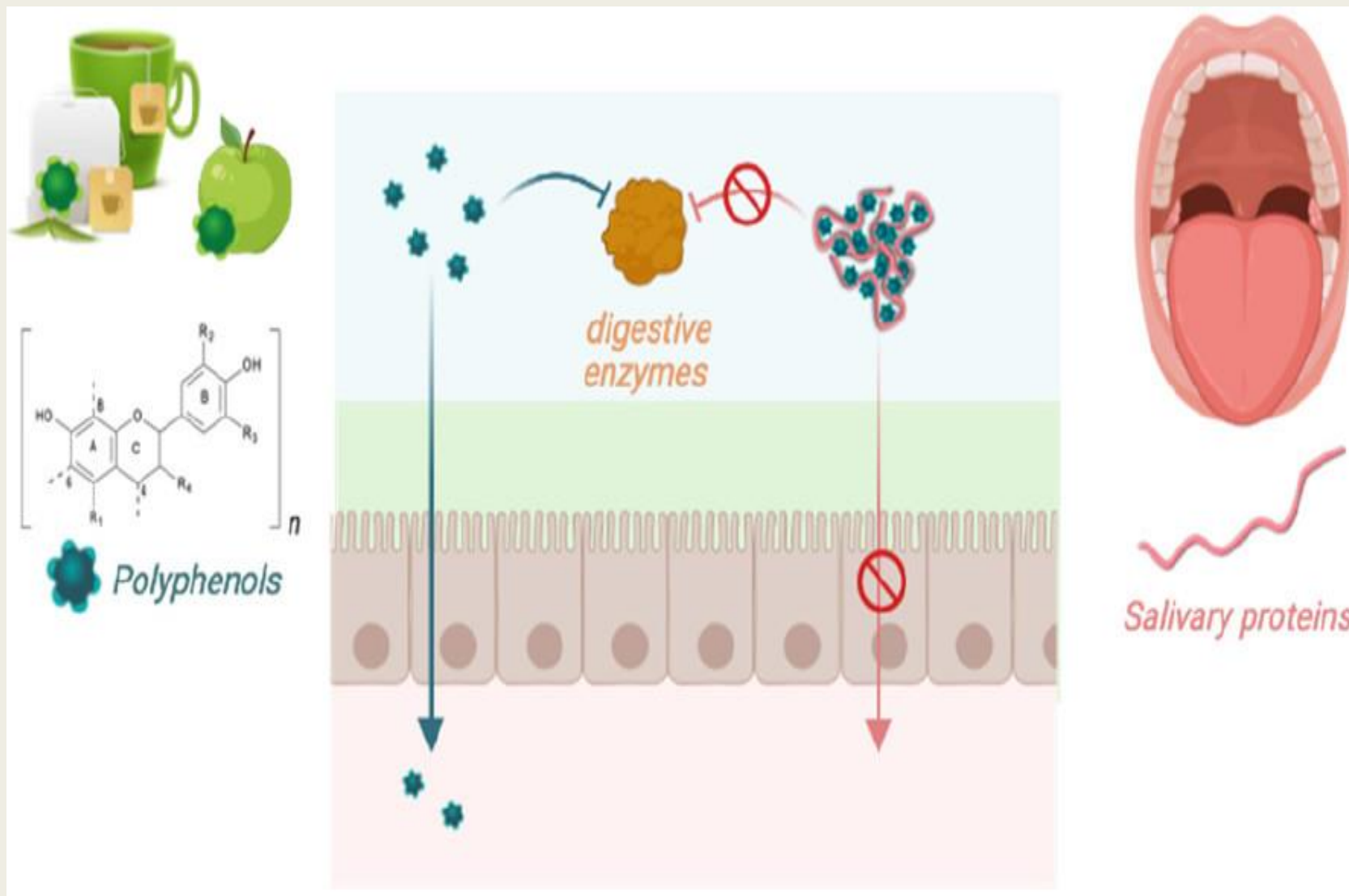
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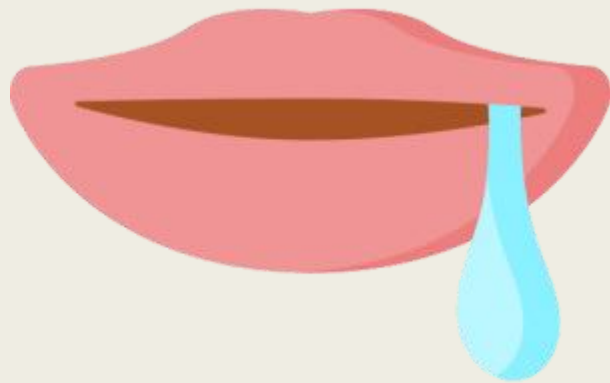
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Tannins / saliva / digestive enzymes



The aim of our project

- Describe the interactions between saliva proteins and tannins from apples and
- Follow the fate of the complexes during *in vitro* digestion

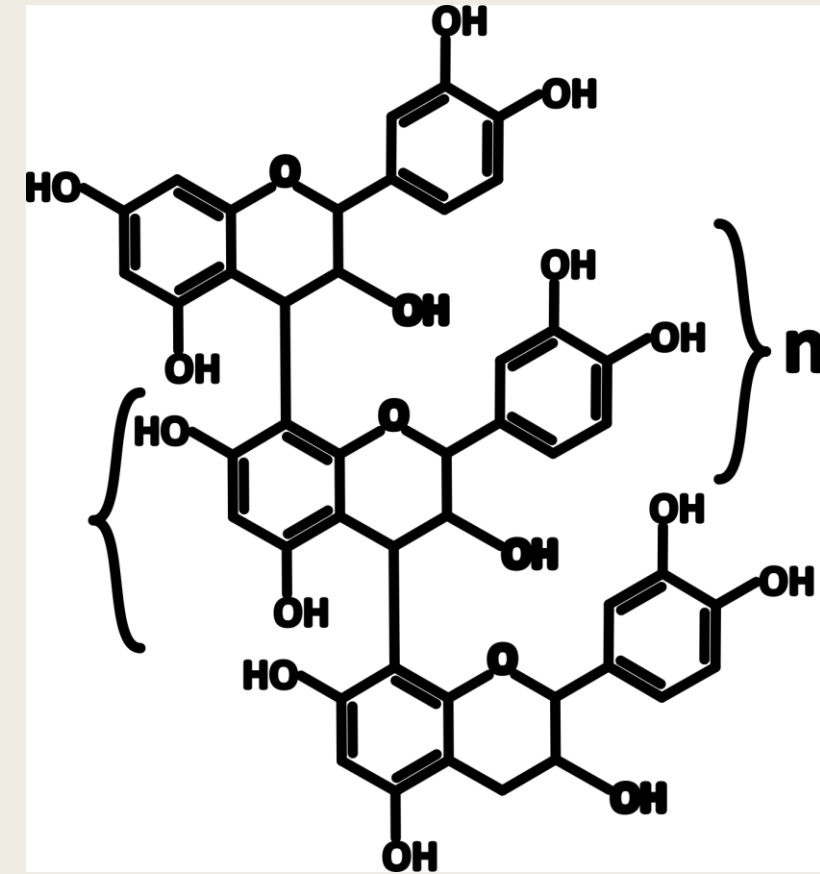
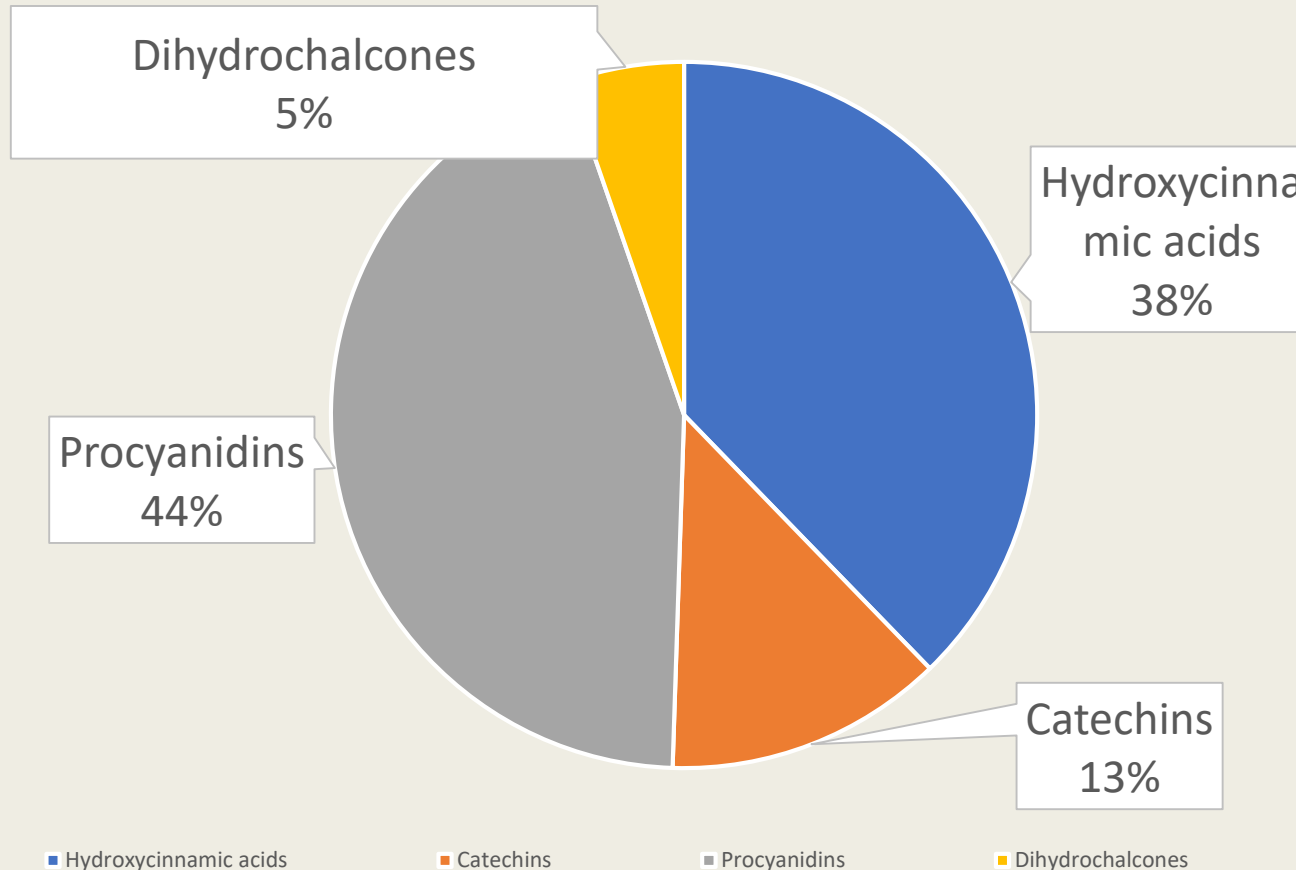


The experiments (Materials)

- We used on one hand a polyphenol mixture extracted from the apple cider variety Dous Moën.
- On the other hand, clarified human saliva at a protein concentration of 0.72 mg/mL.

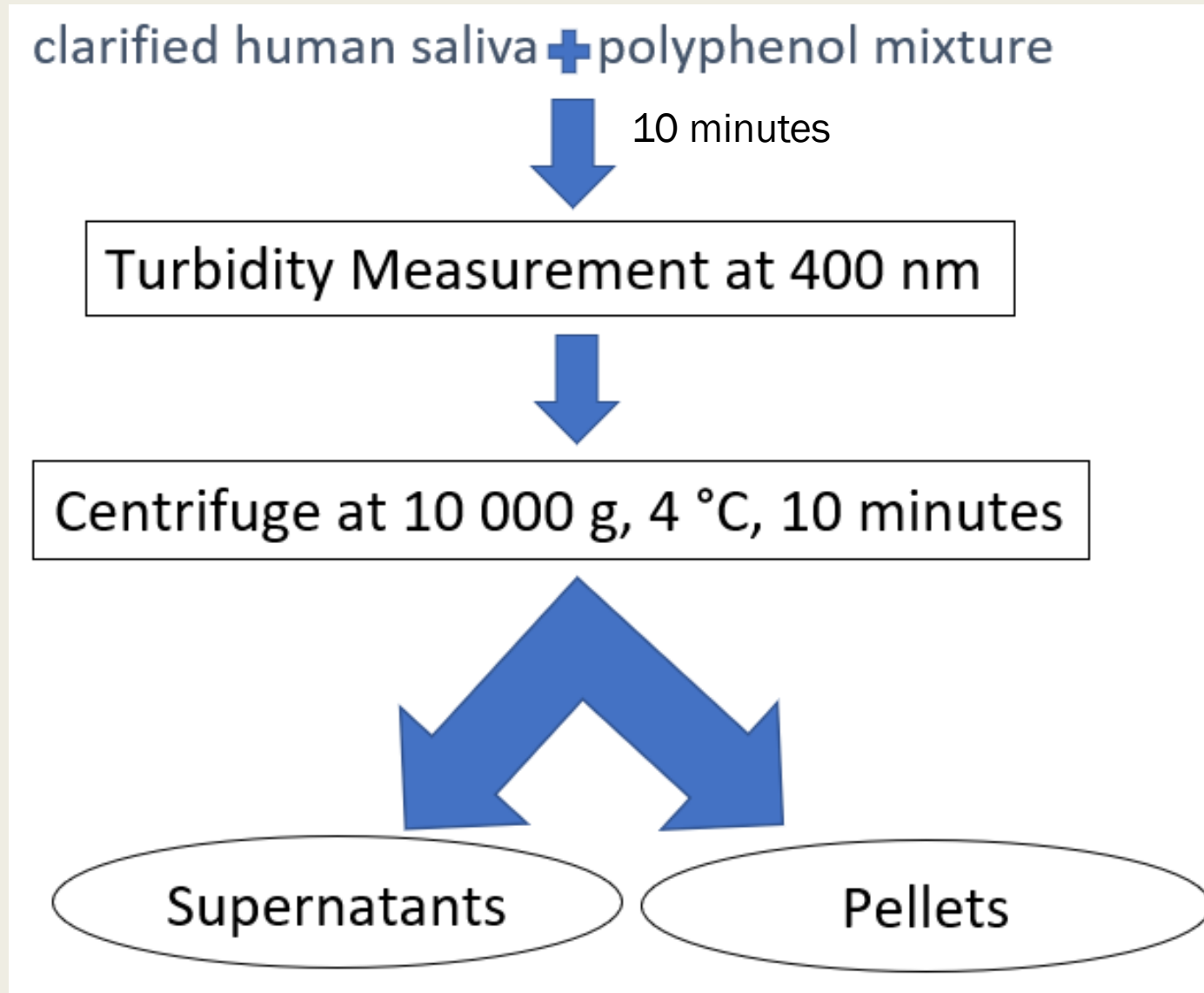
Polyphenols in the apple cider variety Dous Moën extract

- Total polyphenols=730 g/kg
- Total condensed tannins (Procyanidins)=322 g/kg



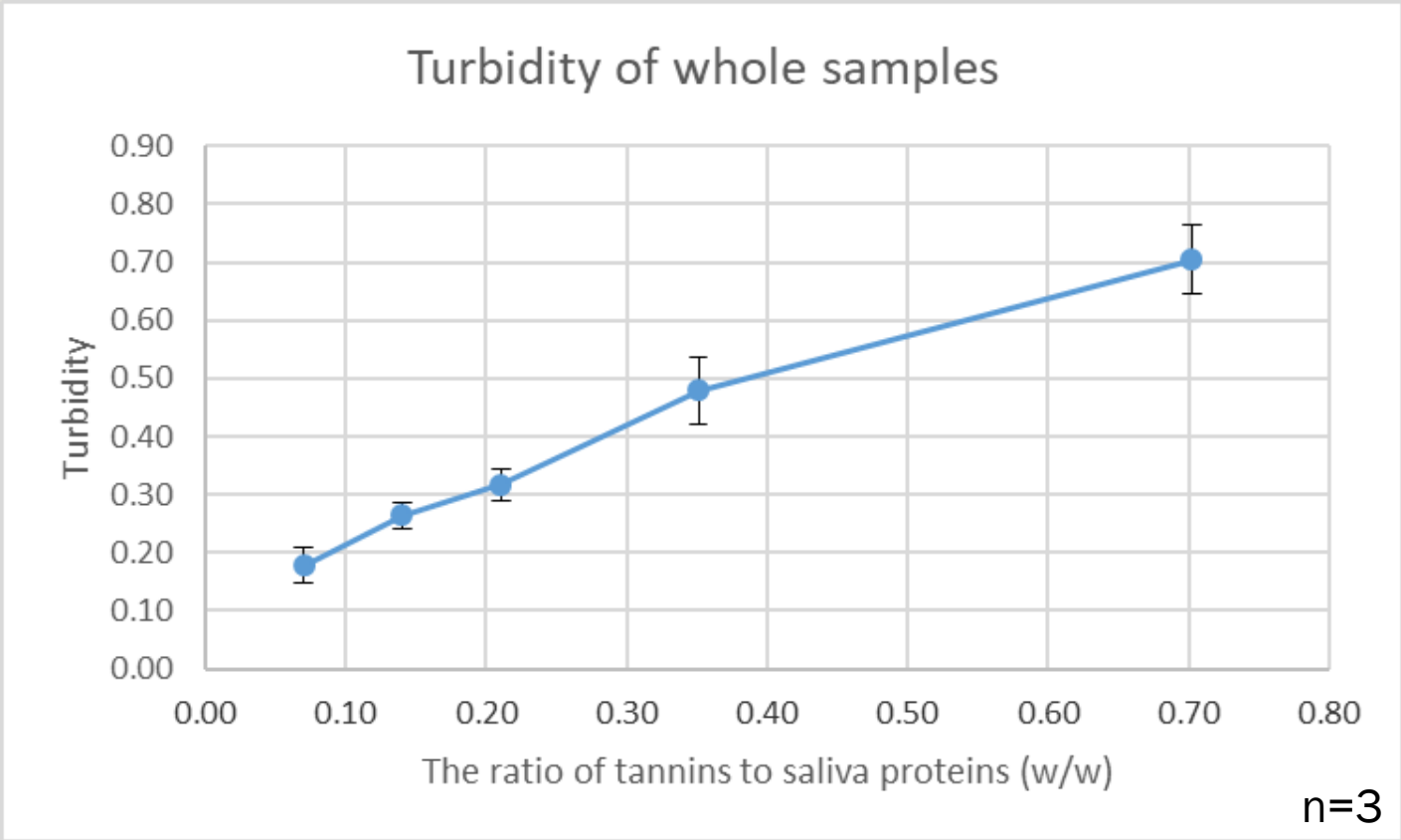
Mean degree of polymerization (n)=3.23

The experiments (Flow chart)



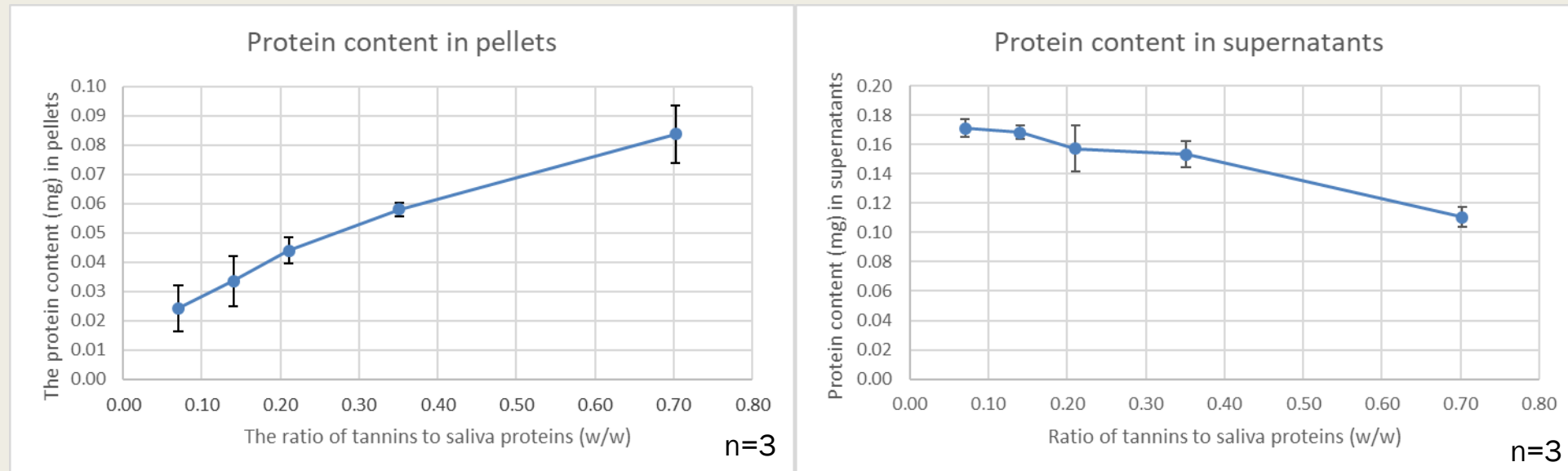
ratios of tannins to saliva
proteins (w/w)
0.07/0.14/0.21/0.35/0.70

Turbidity of whole samples



Formation of larger aggregates

Protein content in pellets and supernatants



Consistent with the formation of larger aggregates

Condensed Tannins

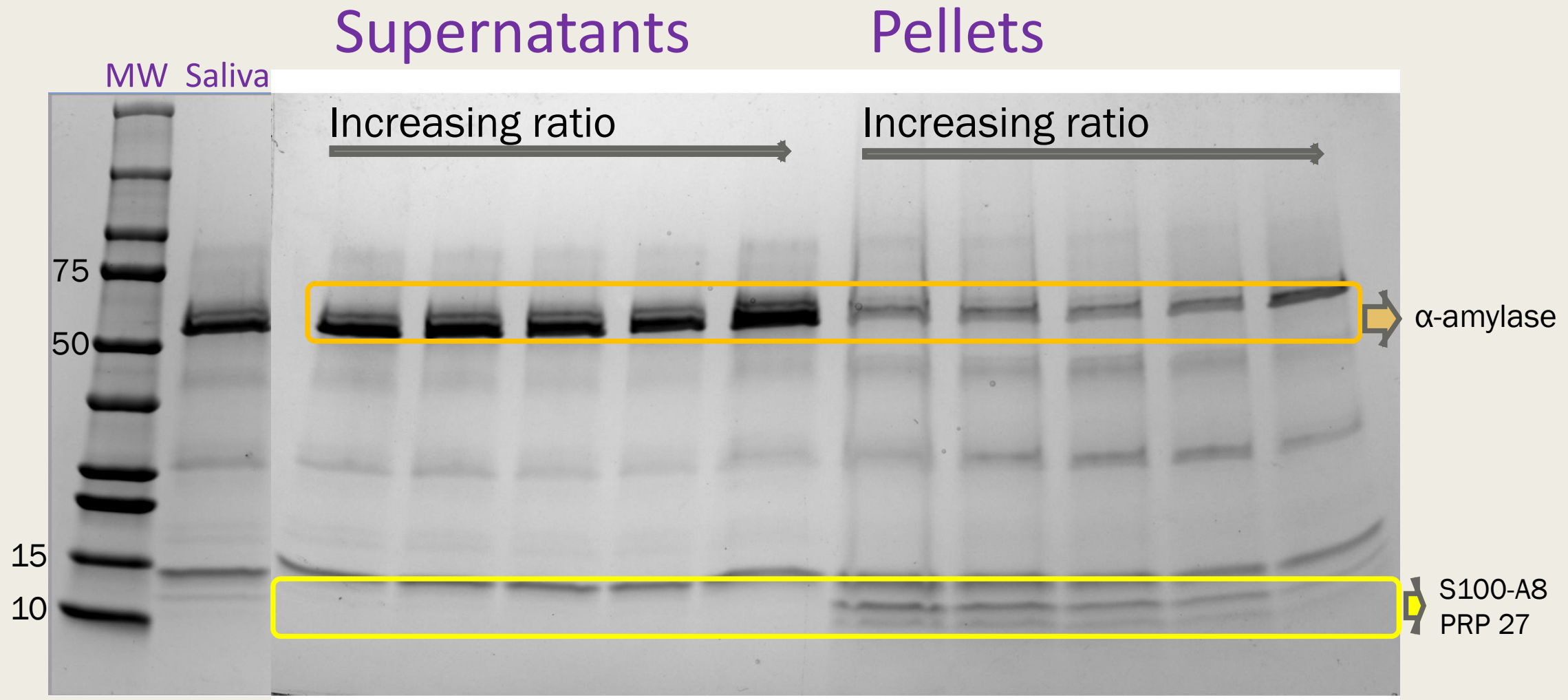
The ratio of tannins to salivary proteins (w/w)	The initial concentration of tannins in our mixtures ($\mu\text{g/mL}$)	Tannins concentration in supernatants ($\mu\text{g/mL}$)	Percentage (%) of tannins in supernatants	Percentage (%) of tannins in pellets
0.07	25.4	3.9	15.2	84.8
0.14	50.8	15.7	30.9	69.1
0.21	76.2	27.8	36.5	63.5
0.35	127.0	52.4	41.3	58.7
0.70	197.0	85.4	43.3	56.7

Butanol-HCl method

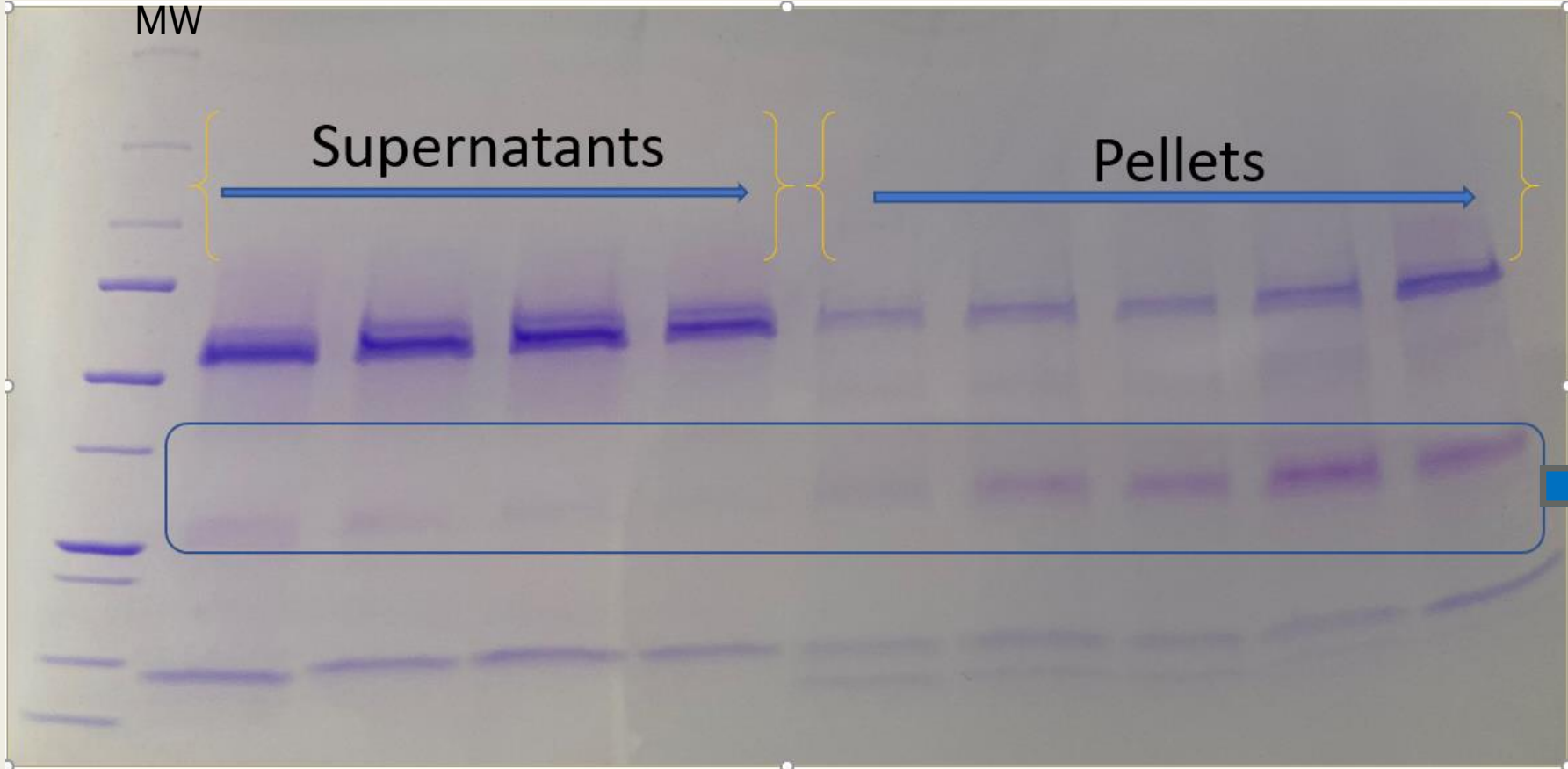
With increasing the ratio of tannins, the interaction sites are becoming less available.

In supernatants, tannins are free or in soluble small complexes.

Protein Profiles



Detection of PRPs by CBB R-250 dye

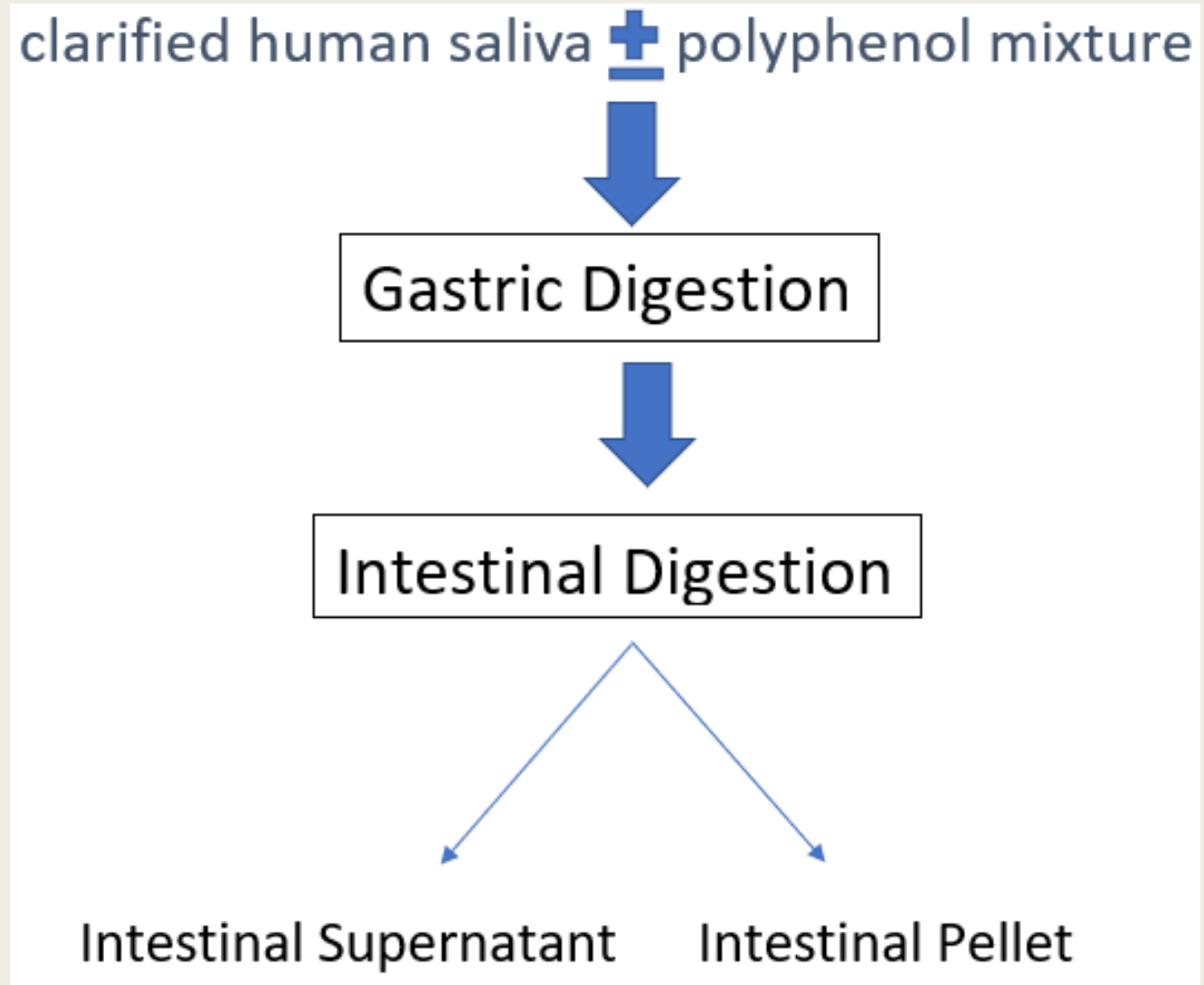


These pink-purple bands contain proline-rich proteins (PRPs)

To summarize the first stage of work;

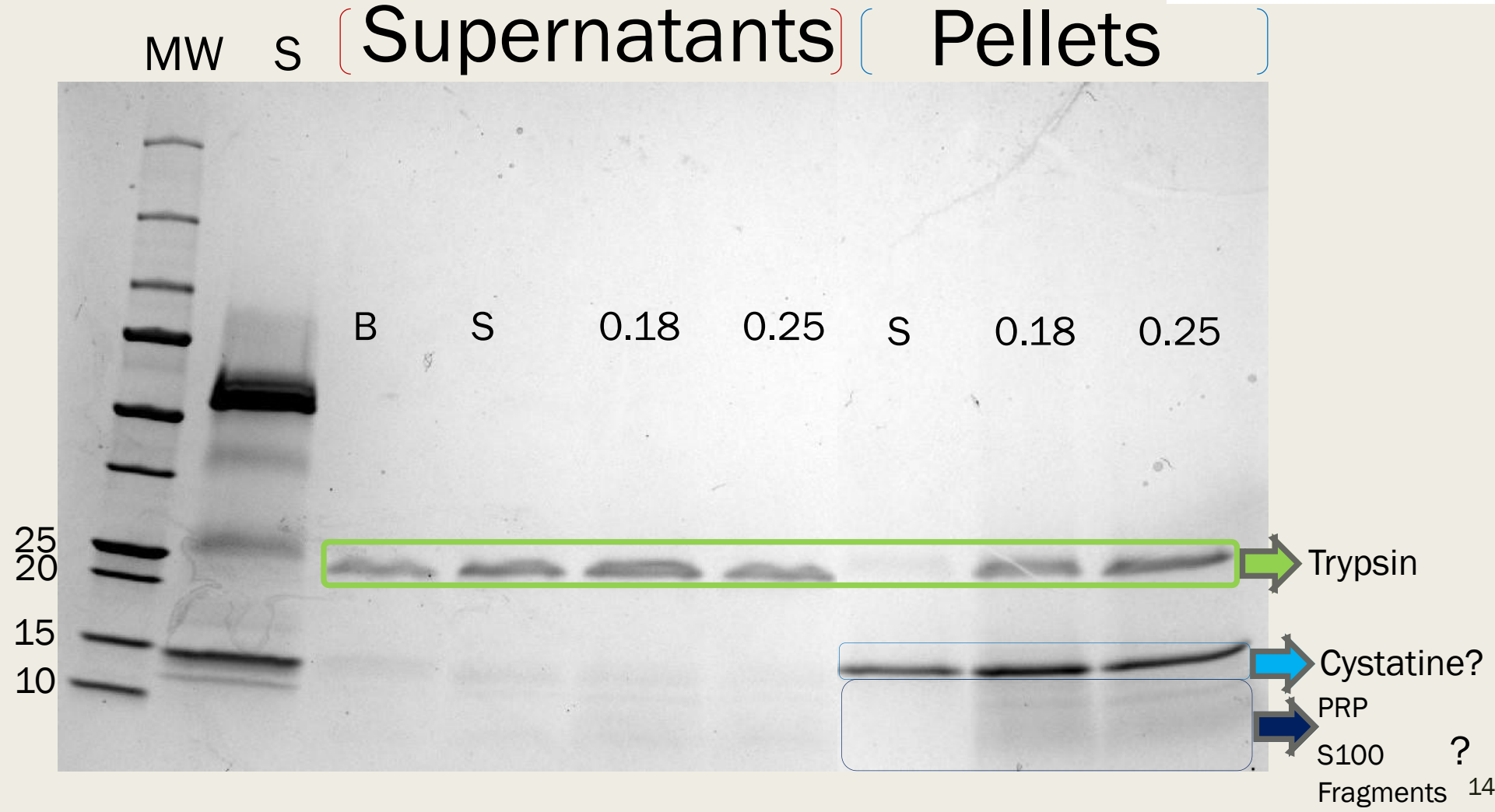
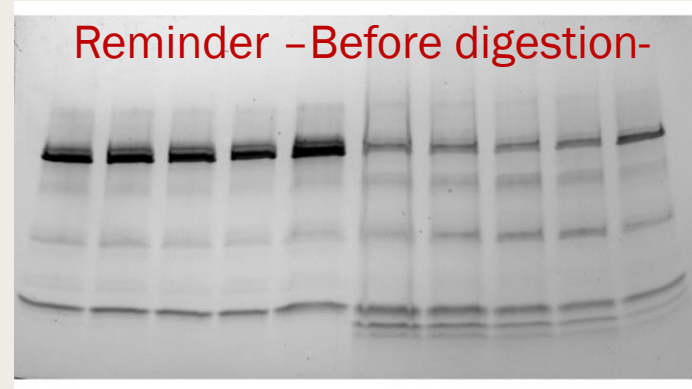
- Larger saliva protein-tannin aggregates come out as the ratio of tannins to saliva proteins increases.
- Tannins preferably precipitate low molecular weight saliva proteins (S100-A8) and PRPs.

INFOGEST *in vitro* digestion



The ratios of tannins to saliva proteins are adjusted in our mixtures;
0.18
0.25

INFOGEST *in vitro* digestion



In Conclusion

- When the ratio of tannins to saliva protein increases, larger saliva proteins-tannins aggregates form.
- Tannins precipitate preferentially low molecular weight saliva proteins and PRPs.
- A salivary protein around 15 kDa was resistant to *in vitro* digestion and detectable in the pellets.
- After *in vitro* digestion, small salivary proteins which are around 10 kDa partially degraded in the presence of tannins, while they were fully degraded in the absence of tannins.

Further Research

- Individual phenolics will be identified in undigested and digested mixtures to know the fate of phenolics in the presence of saliva during *in vitro* digestion and determine which phenolics precipitate with saliva proteins.
- Our work is ongoing on the Caco-2/HT29-MTX cell line to investigate the effects of tannins on the intestinal mucus layer in the presence of saliva.

Thank you
for your attention

