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

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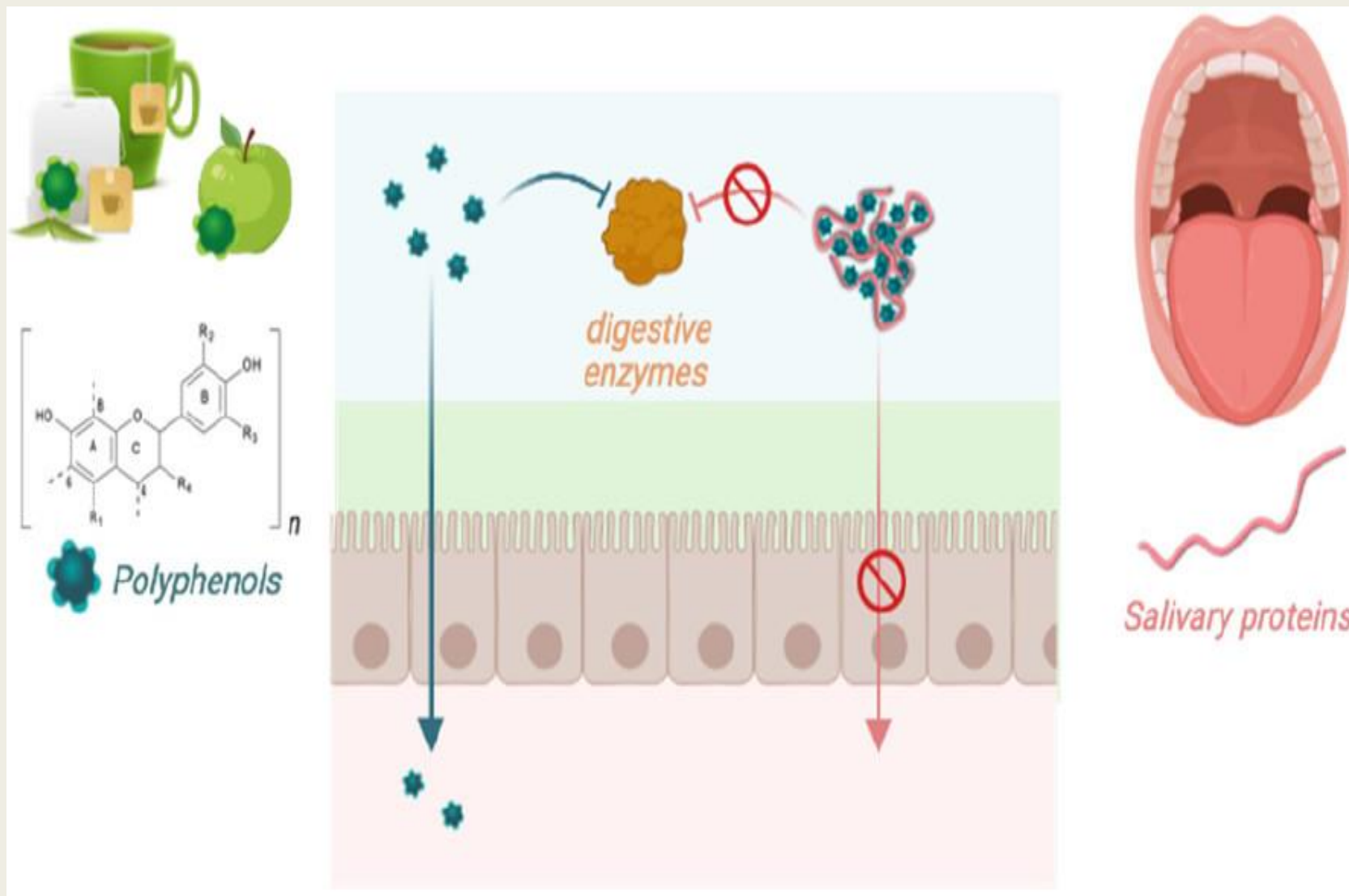
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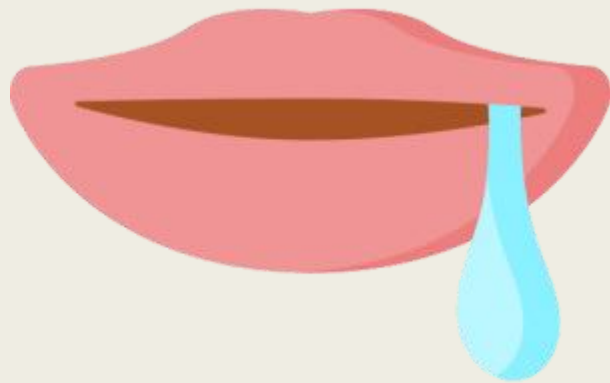
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# Tannins / saliva / digestive enzymes



# 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

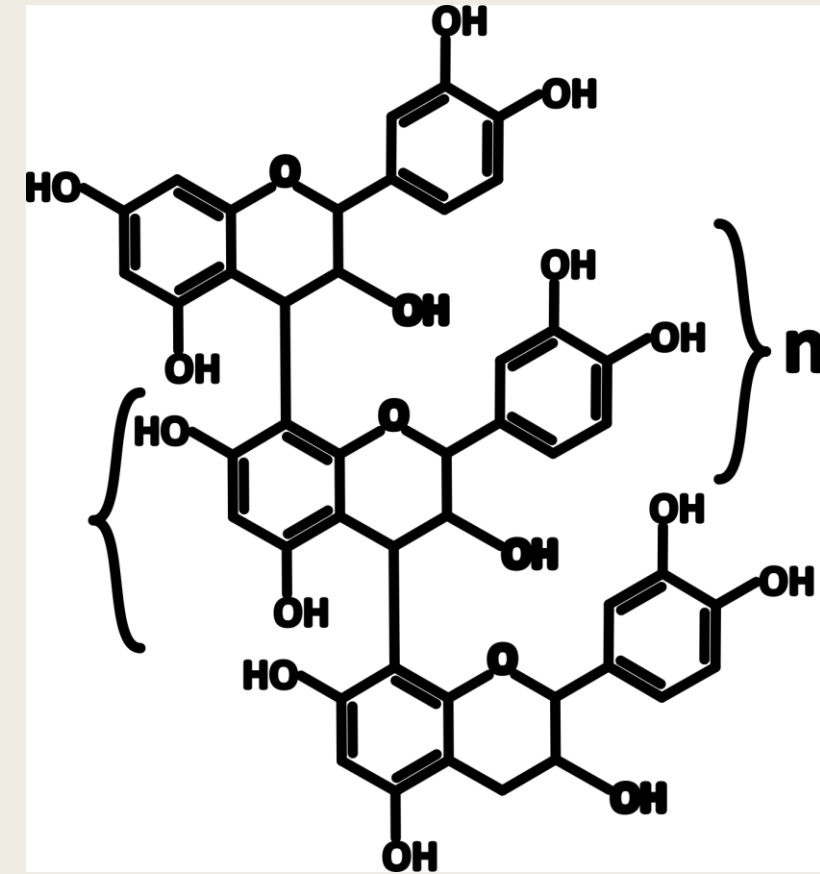
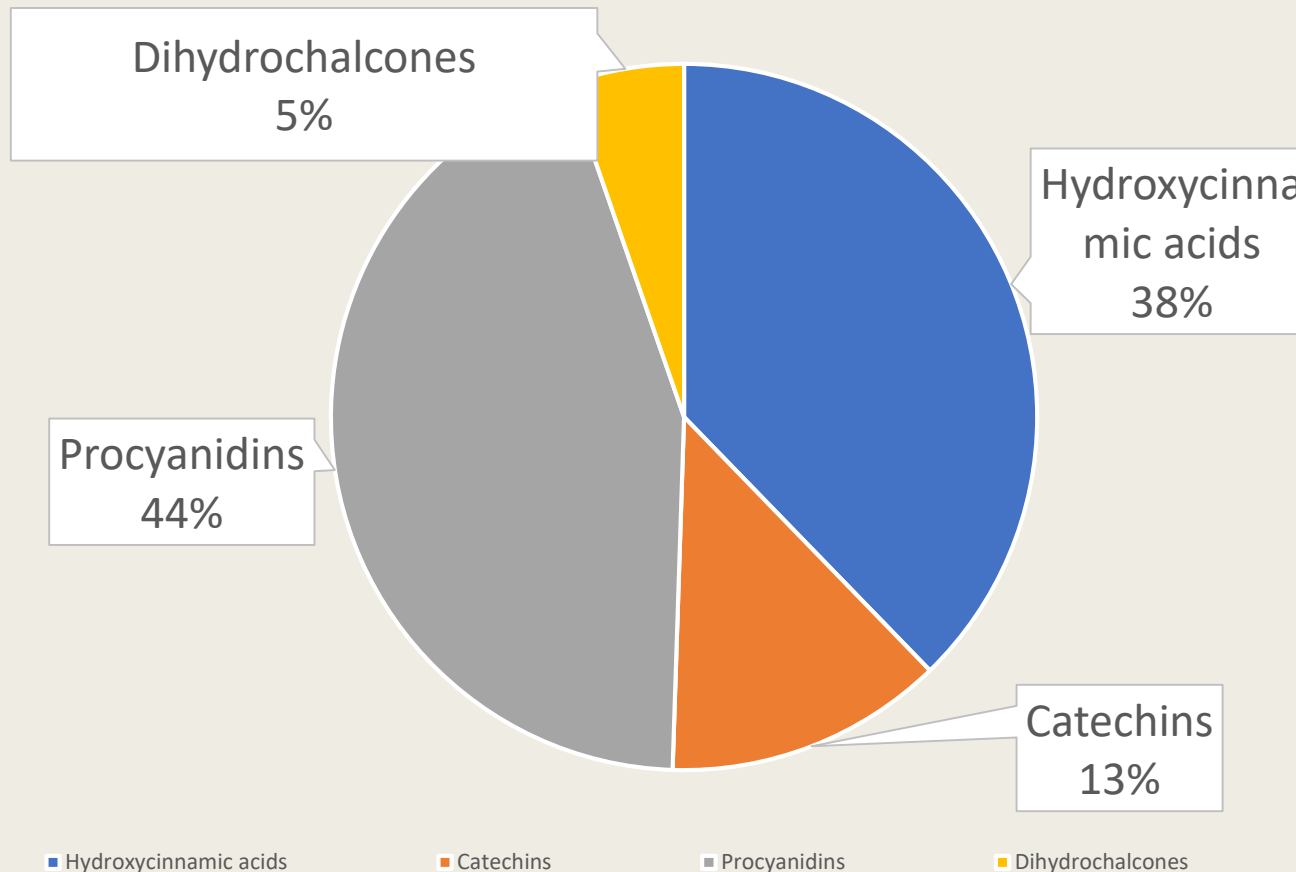


# The experiments (Materials)

- 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.

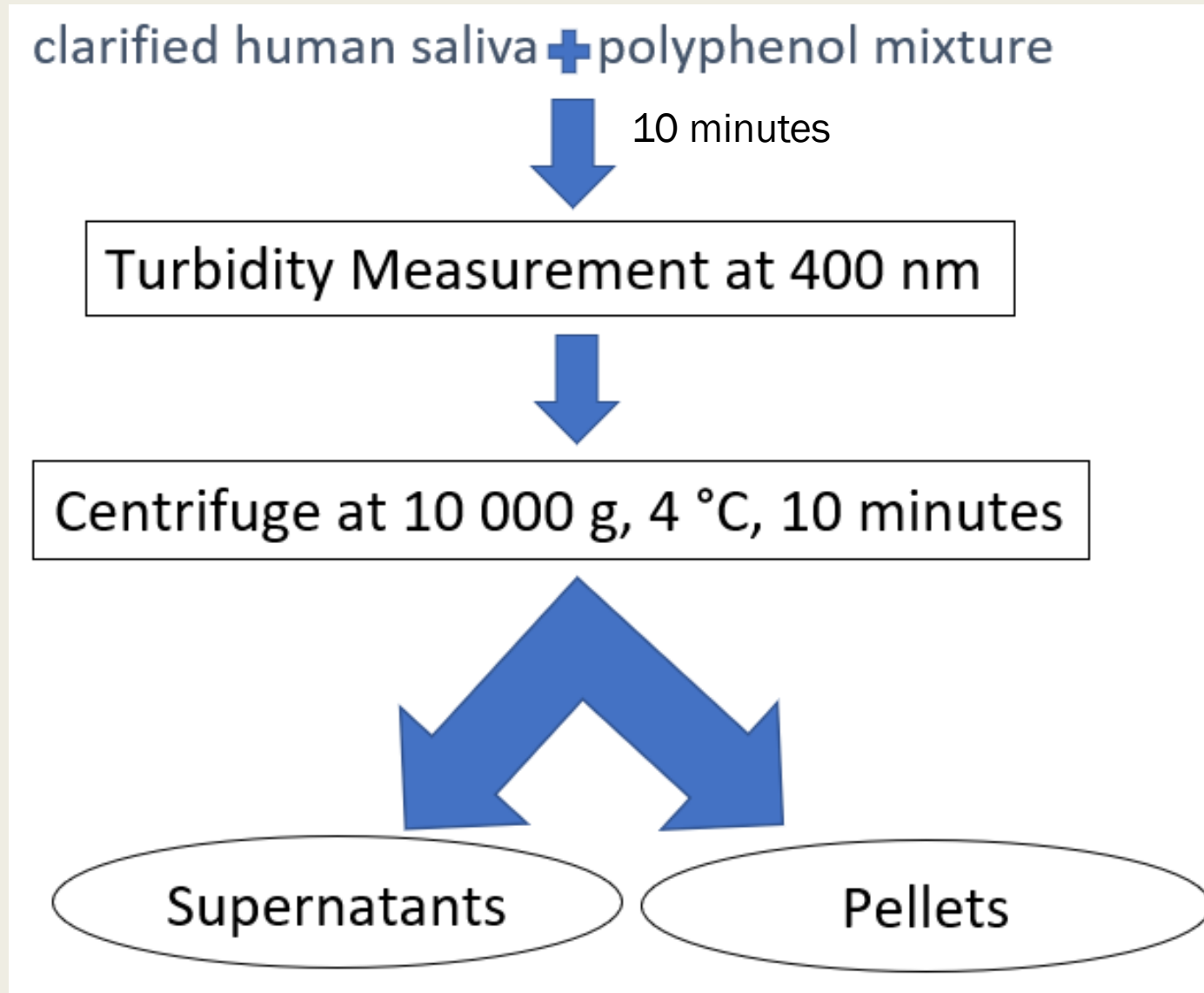
# Polyphenols in the apple cider variety Dous Moën extract

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



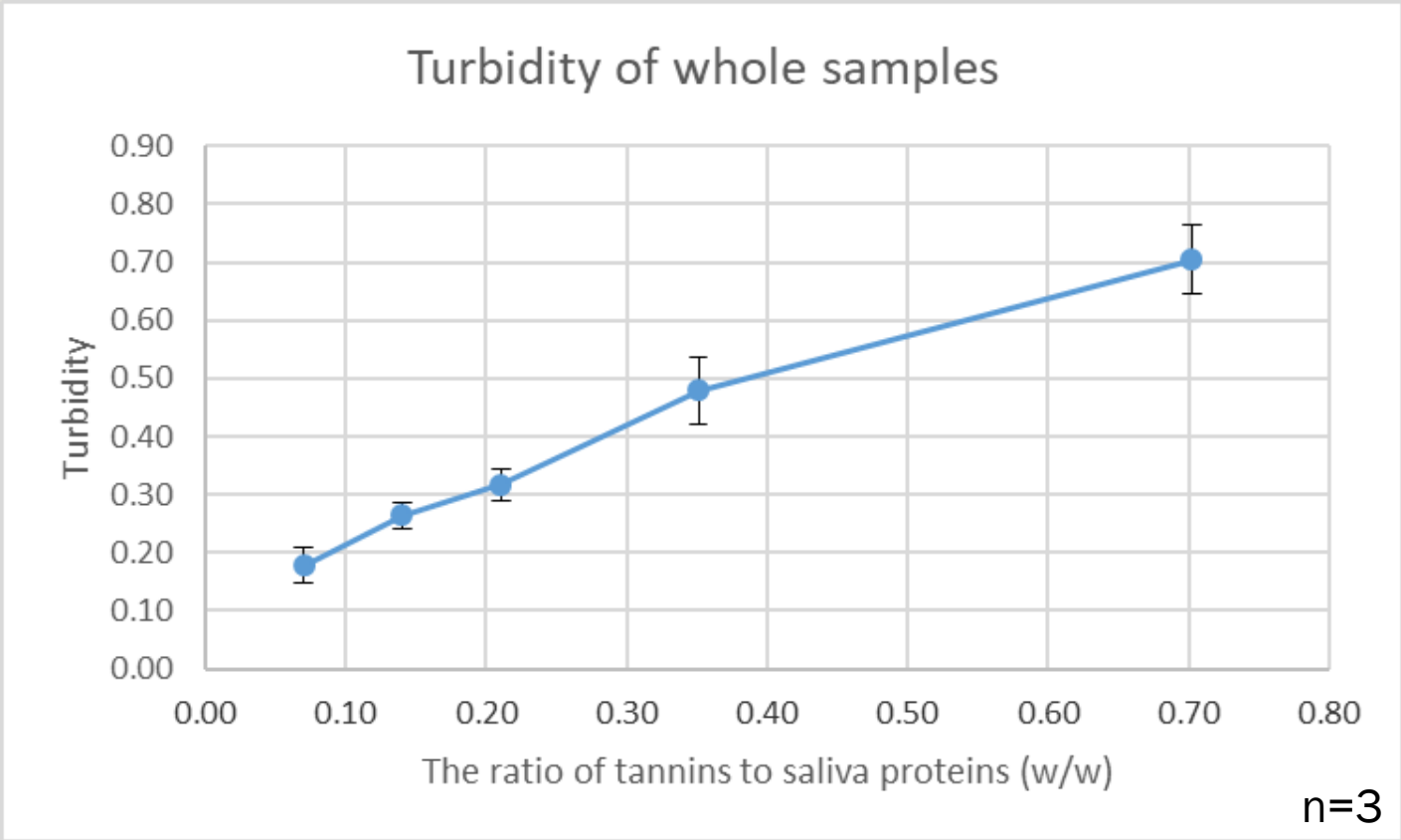
Mean degree of polymerization (n)=3.23

# The experiments (Flow chart)



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

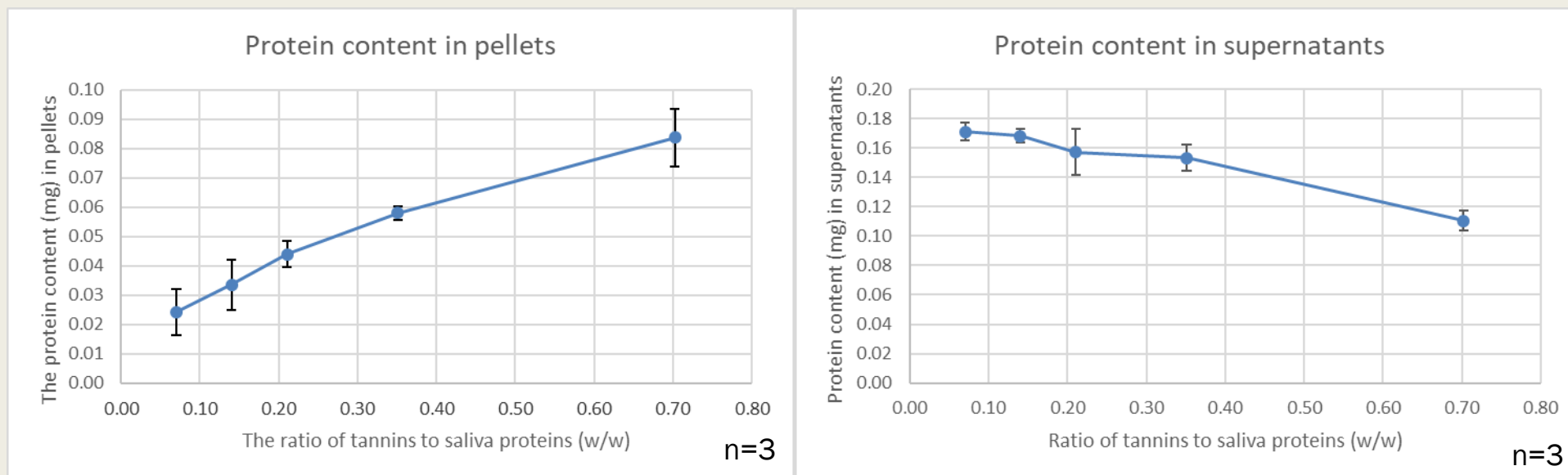
# Turbidity of whole samples



Formation of larger aggregates



# Protein content in pellets and supernatants



Consistent with the formation of larger aggregates

# Condensed Tannins

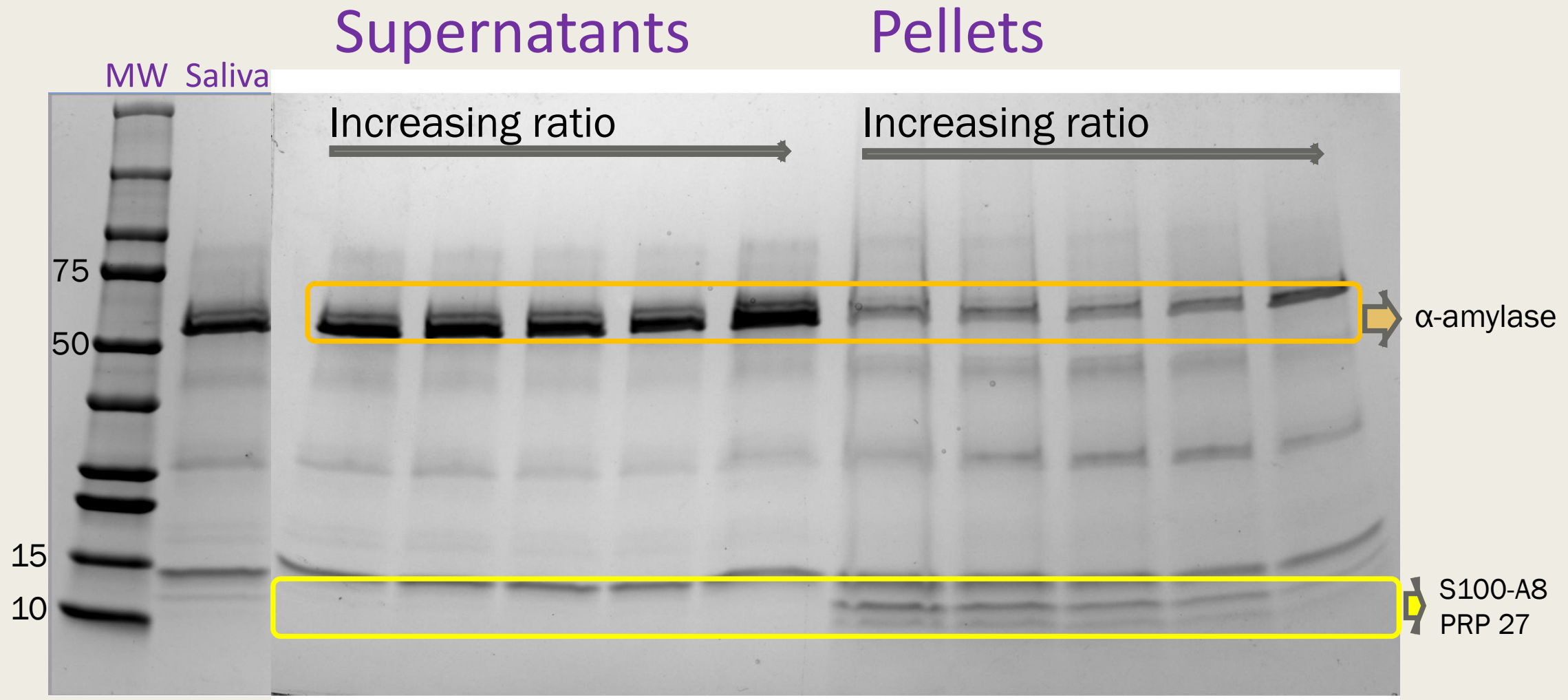
The ratio of tannins to salivary proteins (w/w)	The initial concentration of tannins in our mixtures ( $\mu\text{g/mL}$ )	Tannins concentration in supernatants ( $\mu\text{g/mL}$ )	Percentage (%) of tannins in supernatants	Percentage (%) of tannins in pellets
0.07	25.4	3.9	15.2	84.8
0.14	50.8	15.7	30.9	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

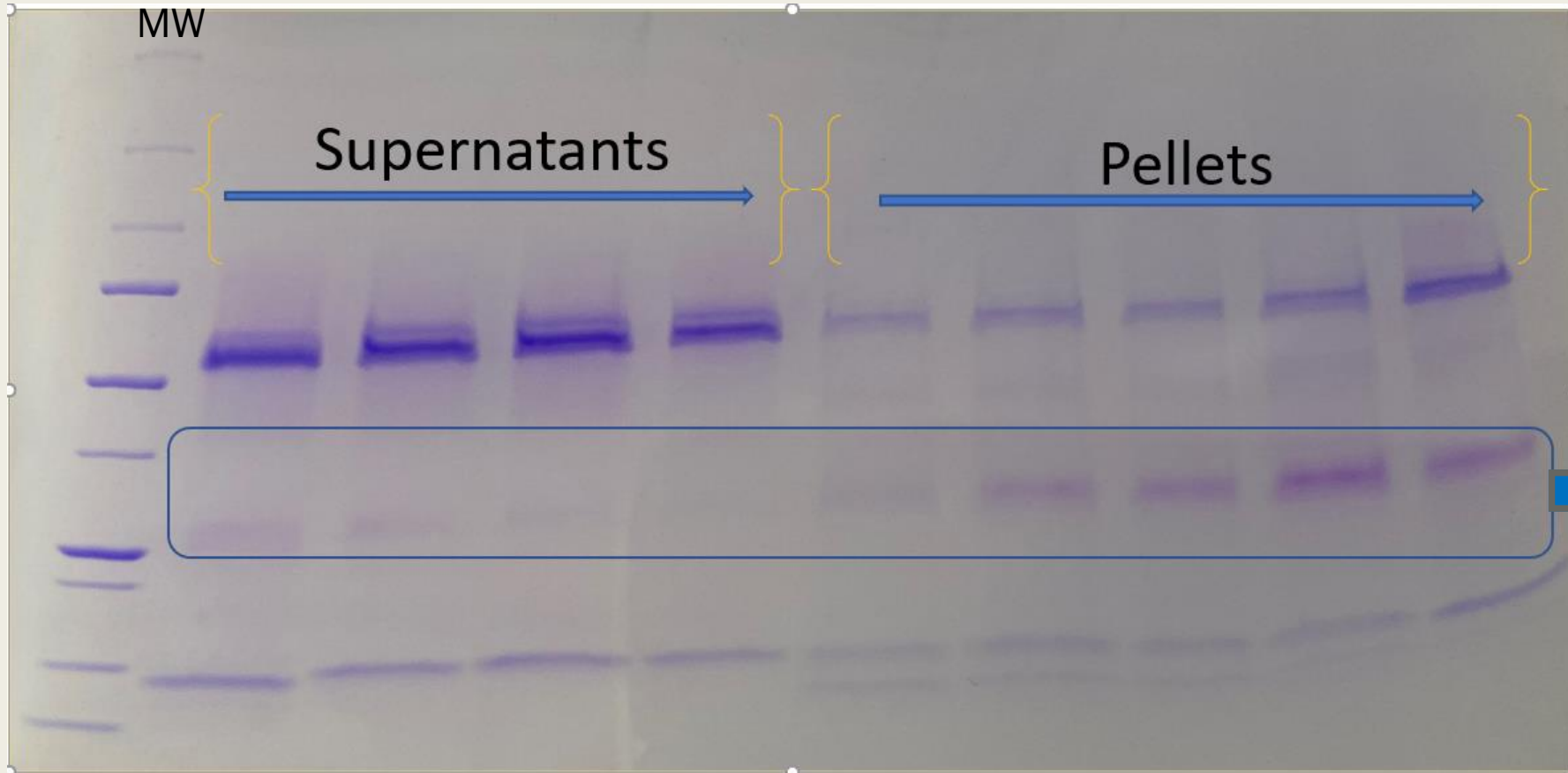
With increasing the ratio of tannins, the interaction sites are becoming less available.

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

# Protein Profiles



# Detection of PRPs by CBB R-250 dye

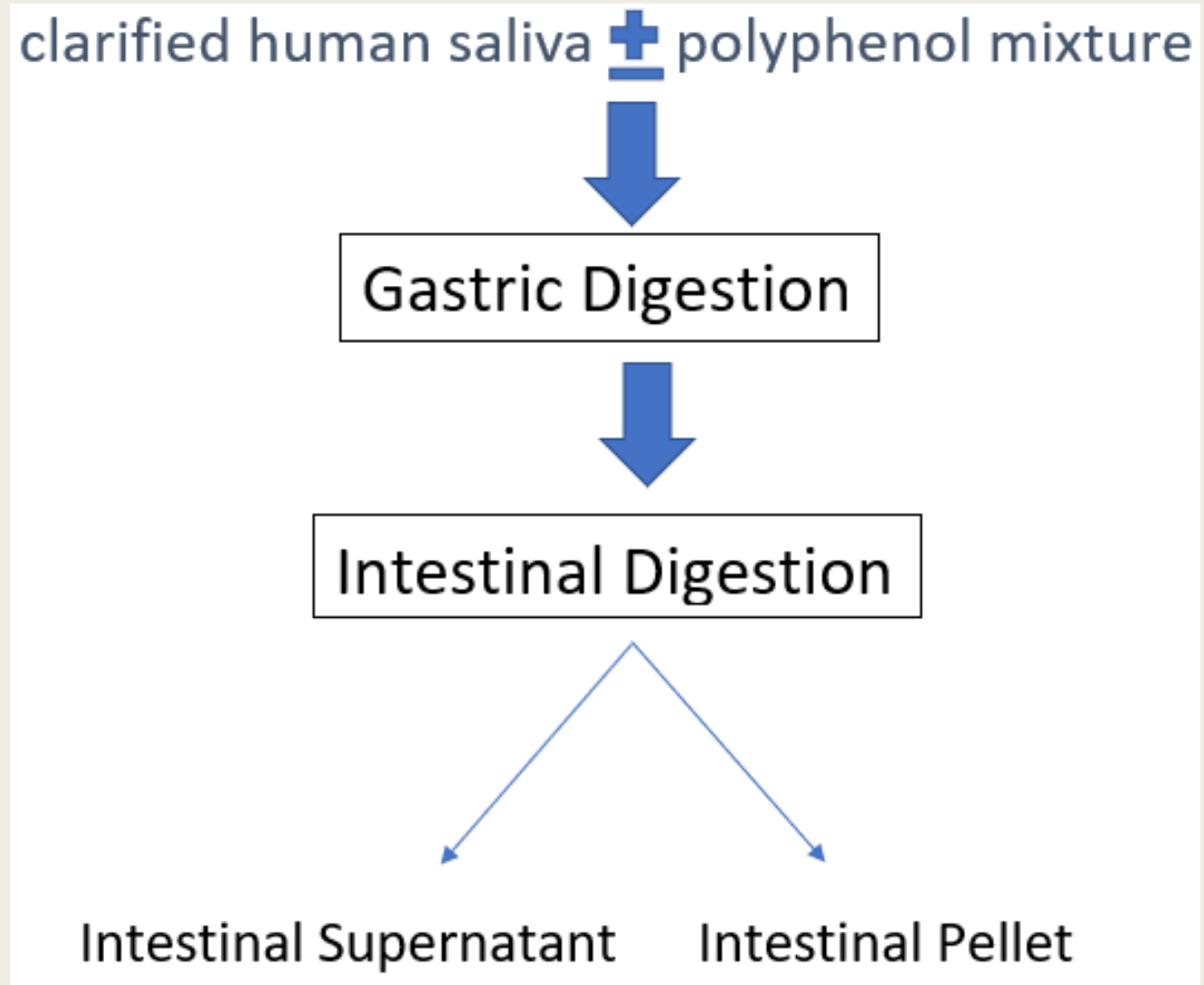


These pink-purple bands contain proline-rich proteins (PRPs)

# To summarize the first stage of work;

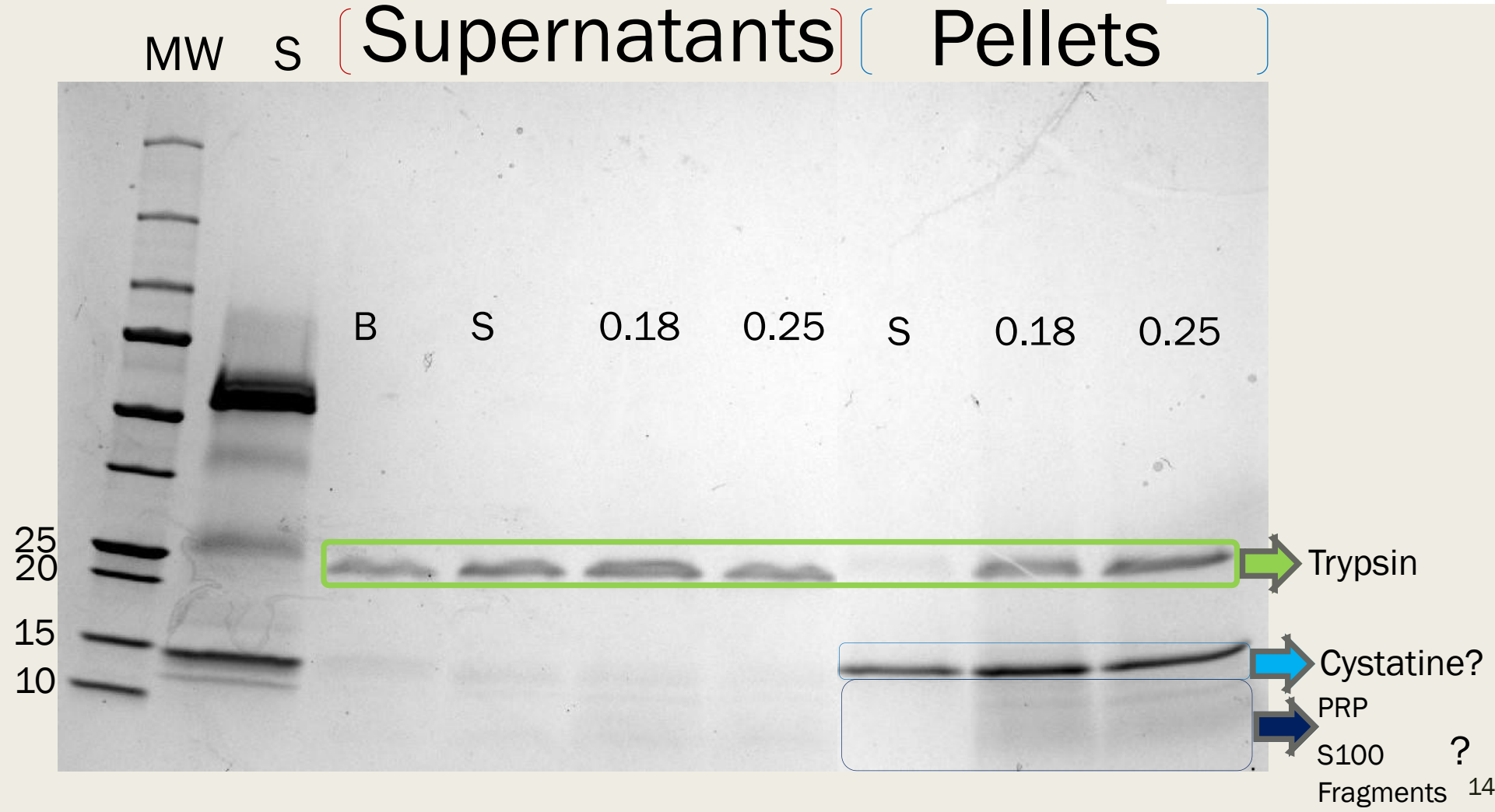
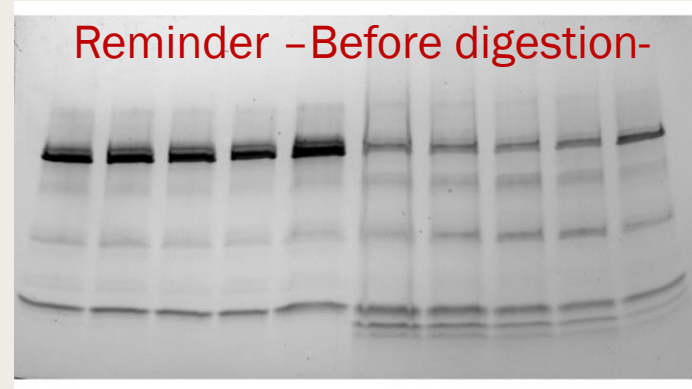
- Larger saliva protein-tannin aggregates come out as the ratio of tannins to saliva proteins increases.
- Tannins preferably precipitate low molecular weight saliva proteins (S100-A8) and PRPs.

# 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

