

Strain diversity in vitamin B1 yield in *Saccharomyces cerevisiae*

Can we use fermentation to create a meat flavour?

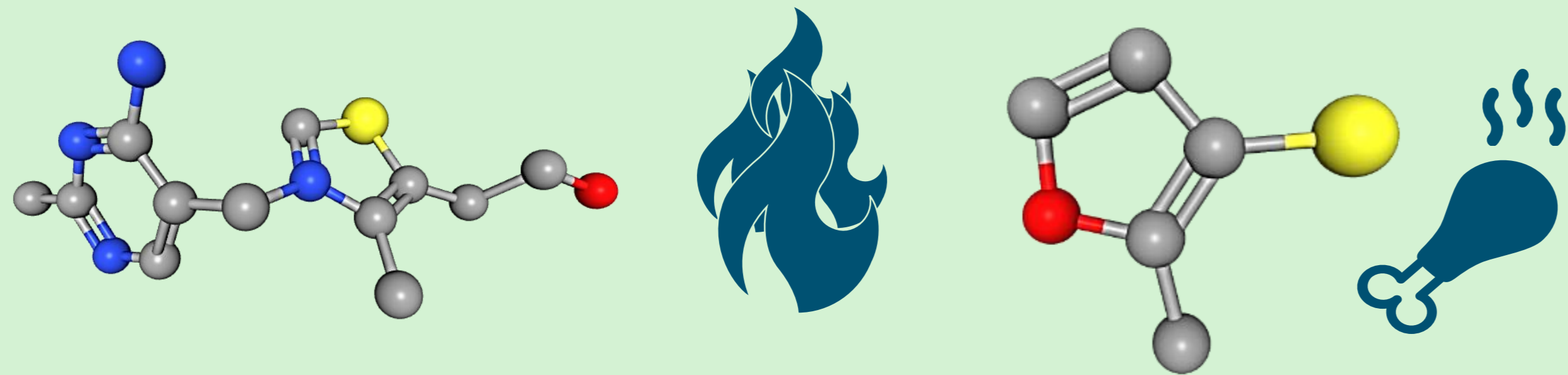
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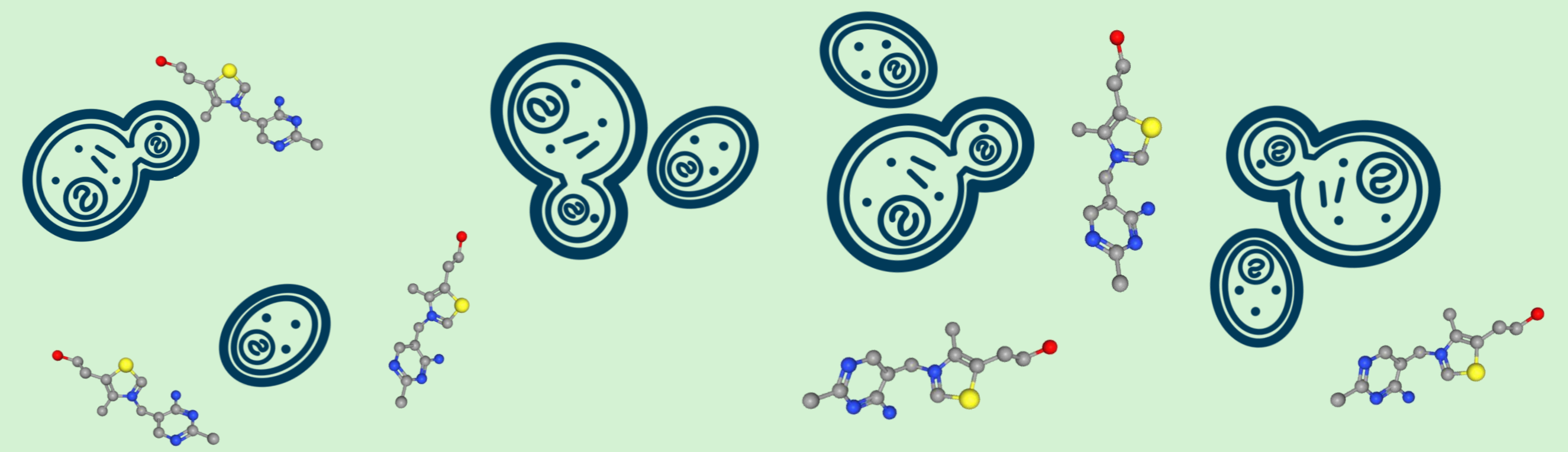
Background and aim

- Yeasts can synthesize Vitamin B1 (thiamine) *de novo*
- Three thiamine vitamers are found in yeasts: thiamine, thiamine monophosphate, and the biologically active form thiamine diphosphate

Thiamine is a precursor of meat flavour

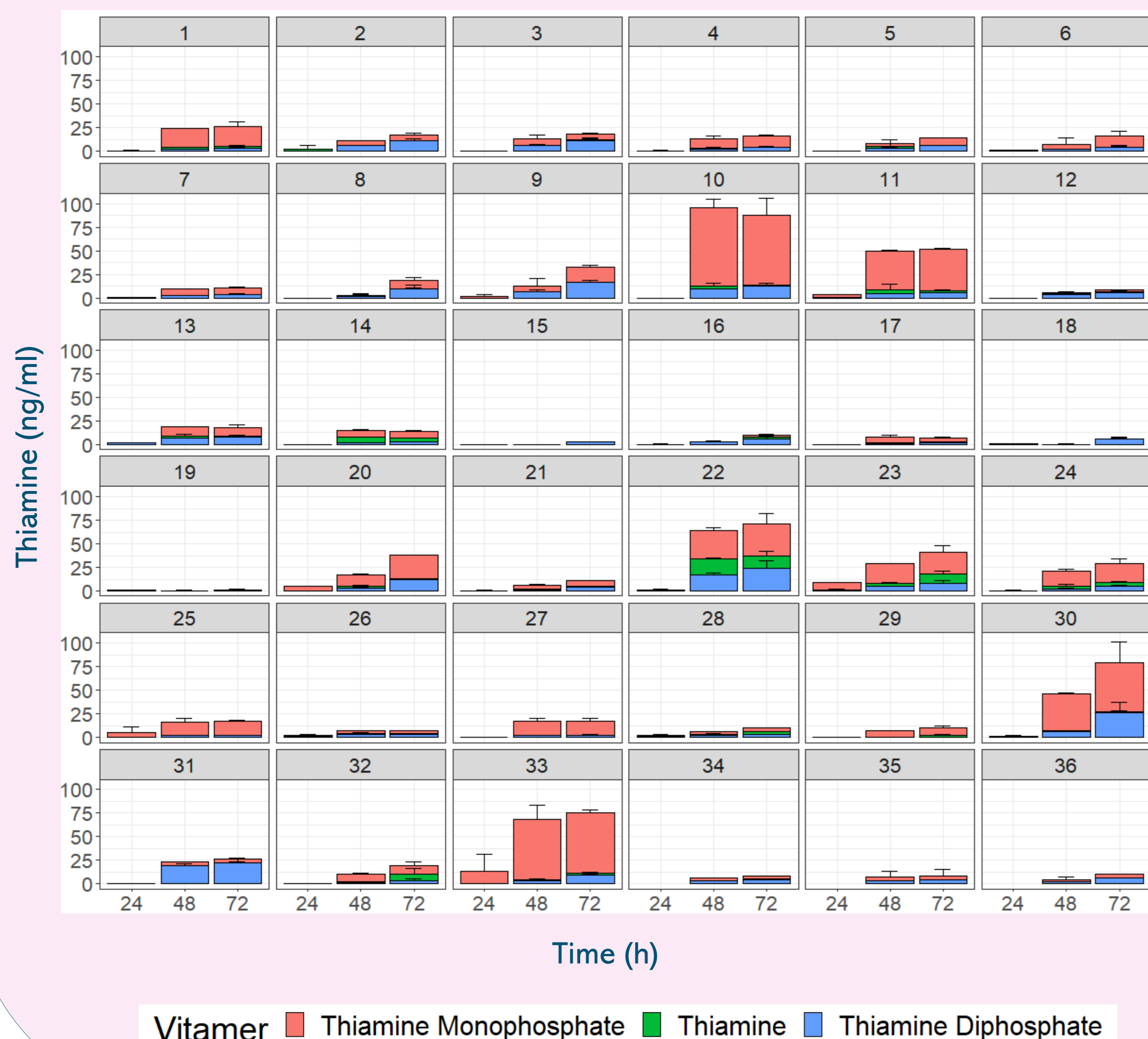


- In this study we investigated strain variation in production of vitamin B1 by screening 36 strains of *S. cerevisiae*

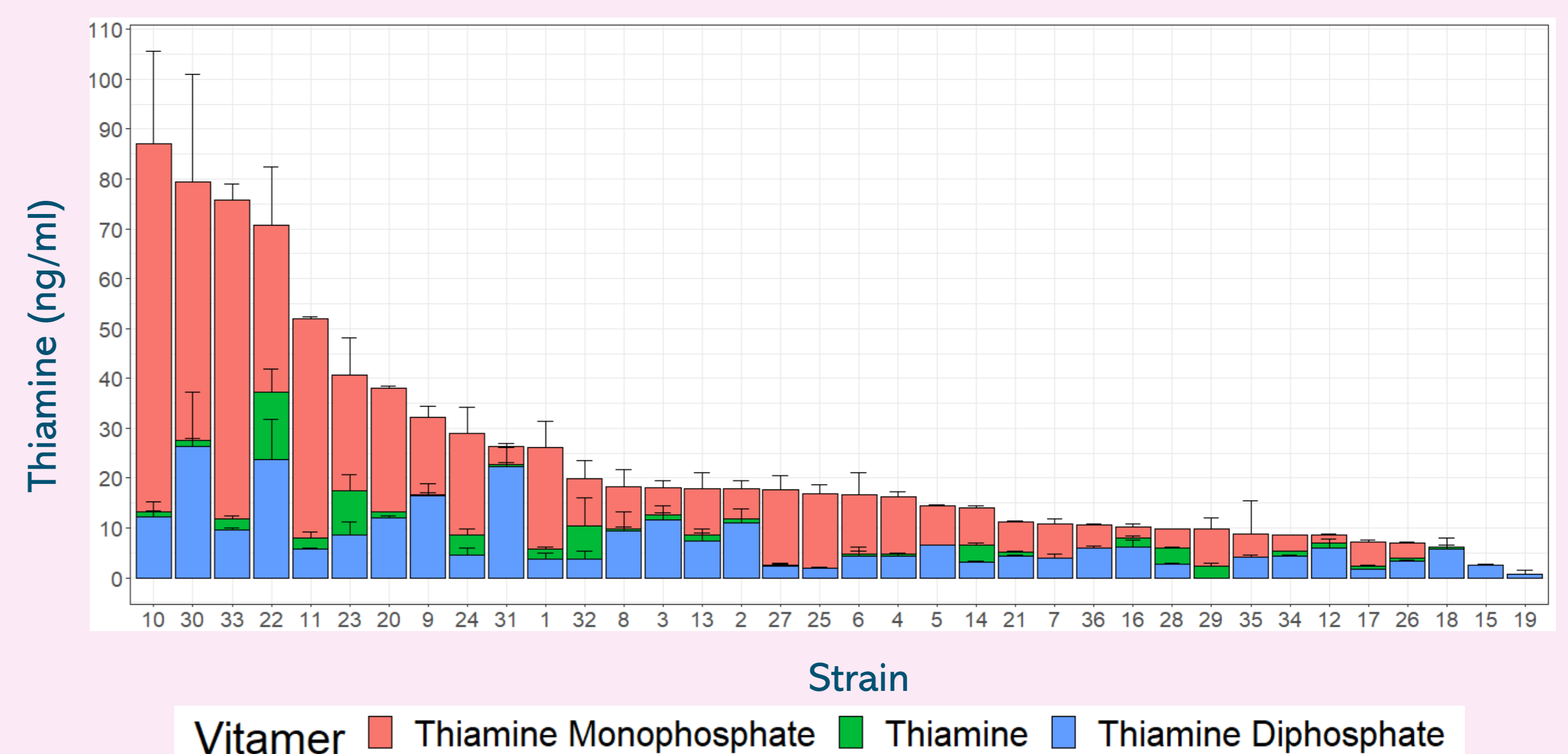


Assessing strain diversity

Thiamine, thiamine monophosphate, and thiamine diphosphate present in the supernatants of 36 *S. cerevisiae* strains after 24, 48, and 72 hours of growth



Thiamine, thiamine monophosphate, and thiamine diphosphate present in the supernatants of 36 *S. cerevisiae* strains after 72 hours of growth

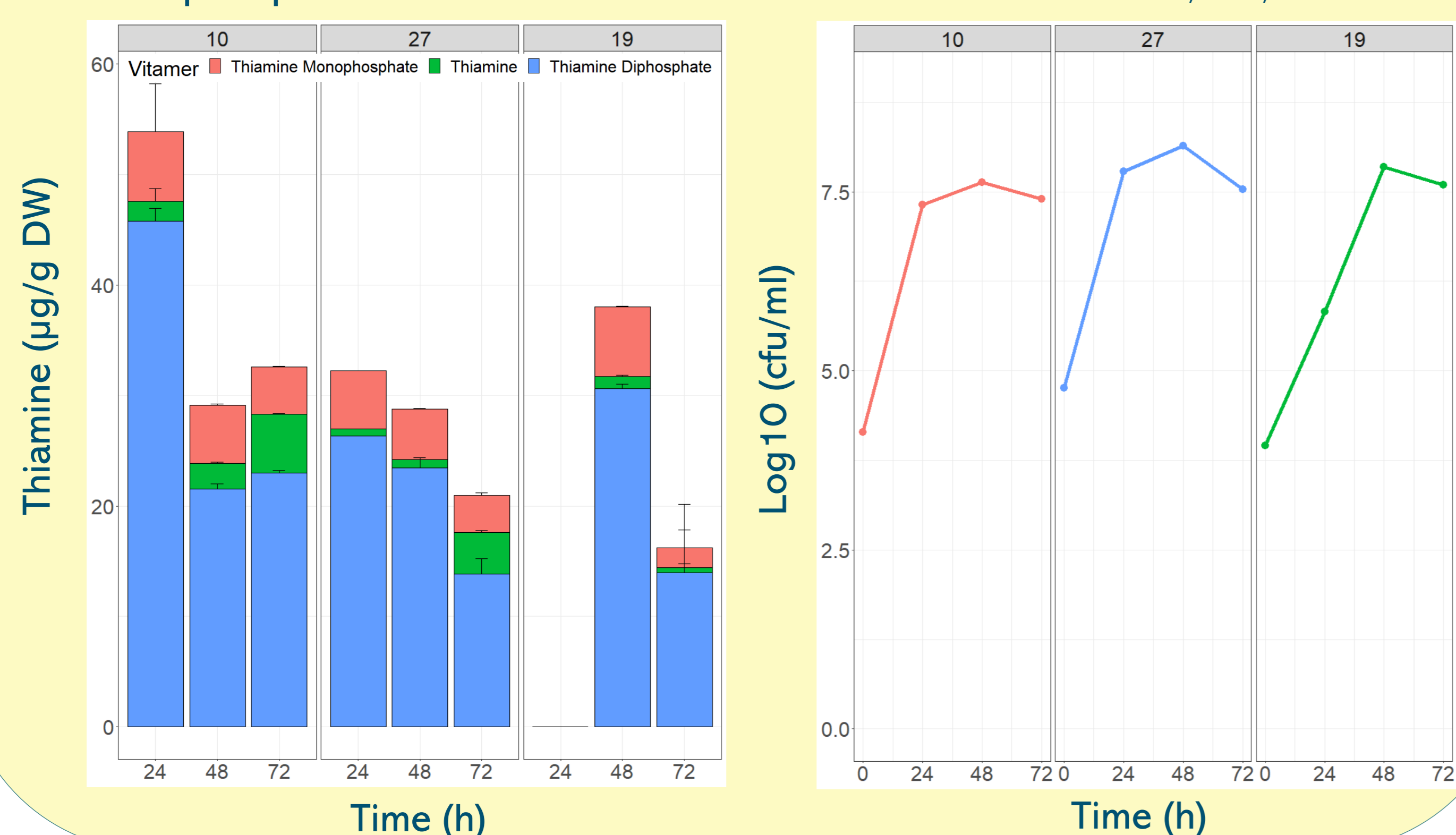


- After 24 hours of growth traces of thiamine diphosphate, thiamine monophosphate, and thiamine are present in the supernatant of most strains
- After 72 hours there are large differences in thiamine release among different strains in the supernatant
- The highest extracellular concentration of thiamine and phosphates is found in the supernatant of strain 10 after 48 and 72 hours of growth ~0.1 ppm
- The lowest extracellular thiamine producer strain (19) had about 100-fold lower extracellular thiamine compared to strain 10

Studying thiamine production

Strain 10, 27, and 19, were chosen to further study. Strain 10 was the highest thiamine excretor, strain 19 was the lower excretor, and strain 27 was in between the other two. Intracellular thiamine production and viable cell count were measured.

µg/g DW thiamine, thiamine monophosphate, and thiamine diphosphate extracted from three *S. cerevisiae* strains 10, 27, and 19



- In all the strains intracellular thiamine was highest during end of exponential growth while it decreased during stationary phase
- Highest thiamine excretor strain also had highest intracellular thiamine

Conclusions

- There is large variation among different strains of *S. cerevisiae* for the excretion of extracellular vitamin B1
- Intracellular thiamine concentration is growth stage dependent
- Highest thiamine excreting strain produced ~100 ng/ml of thiamine

Production of thiamine by yeasts is a promising solution for creating a meat flavour!