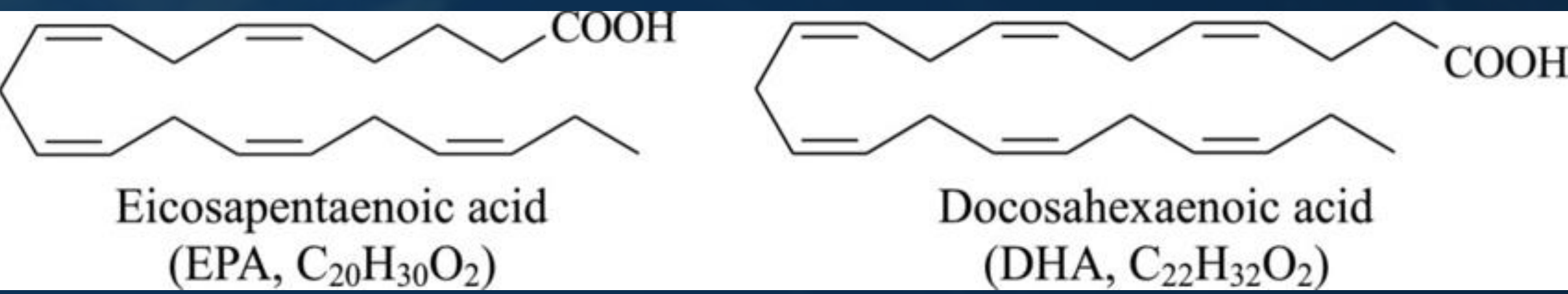


Development of a Chemometric Model For Rapid Fish Egg Quality Assessment in Aquaculture

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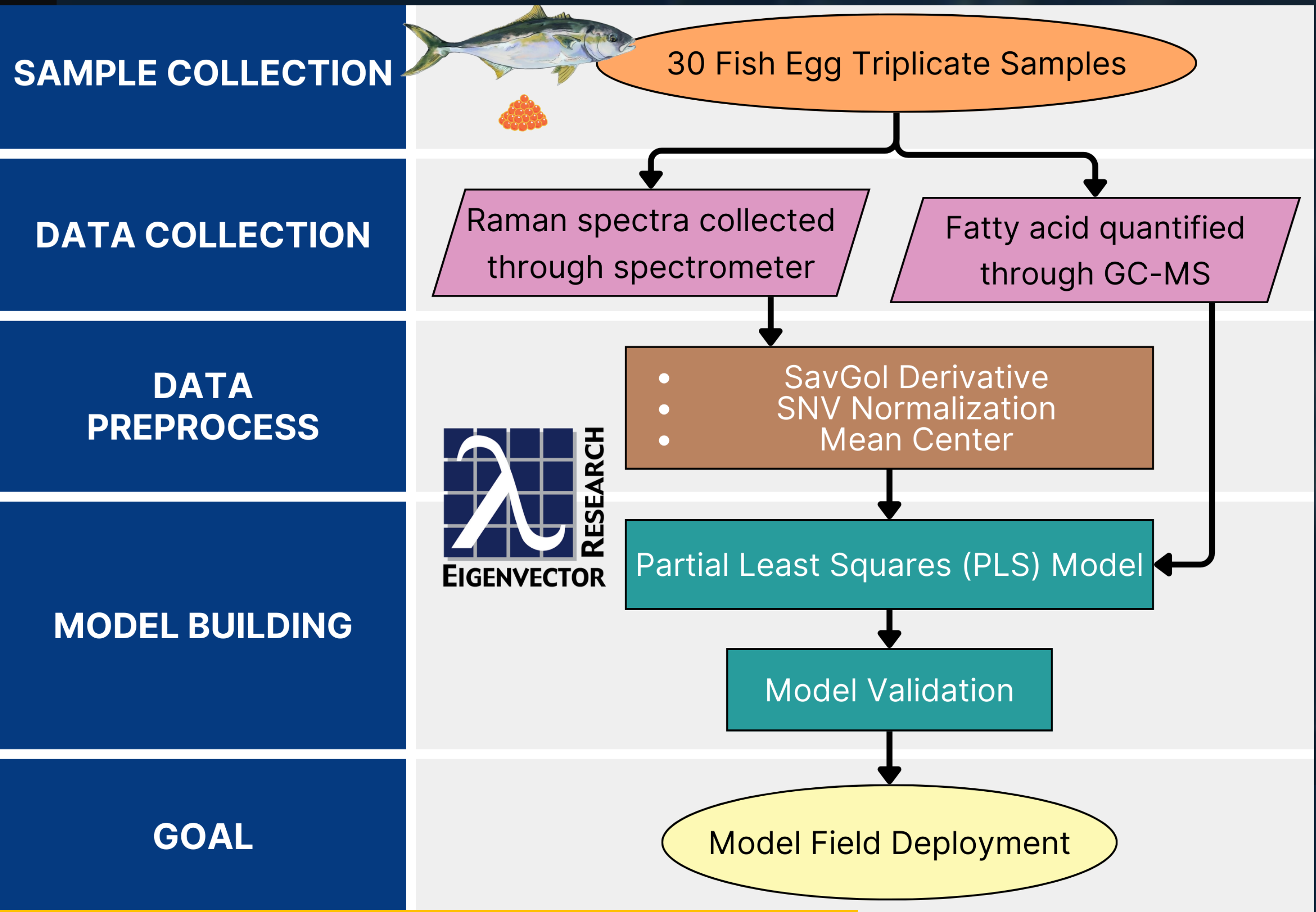
Our Fish Nutrition Lab studies the importance of Omega-3 fatty acids (FAs) in early fish development. While these FAs are powerful metrics of egg quality, farmers cannot utilize this information due to the cost and time of GCMS analysis. This chemometric model will enable the first ever in-situ prediction of Omega-3 FAs in eggs for aquaculture.

Omega-3 FAs:



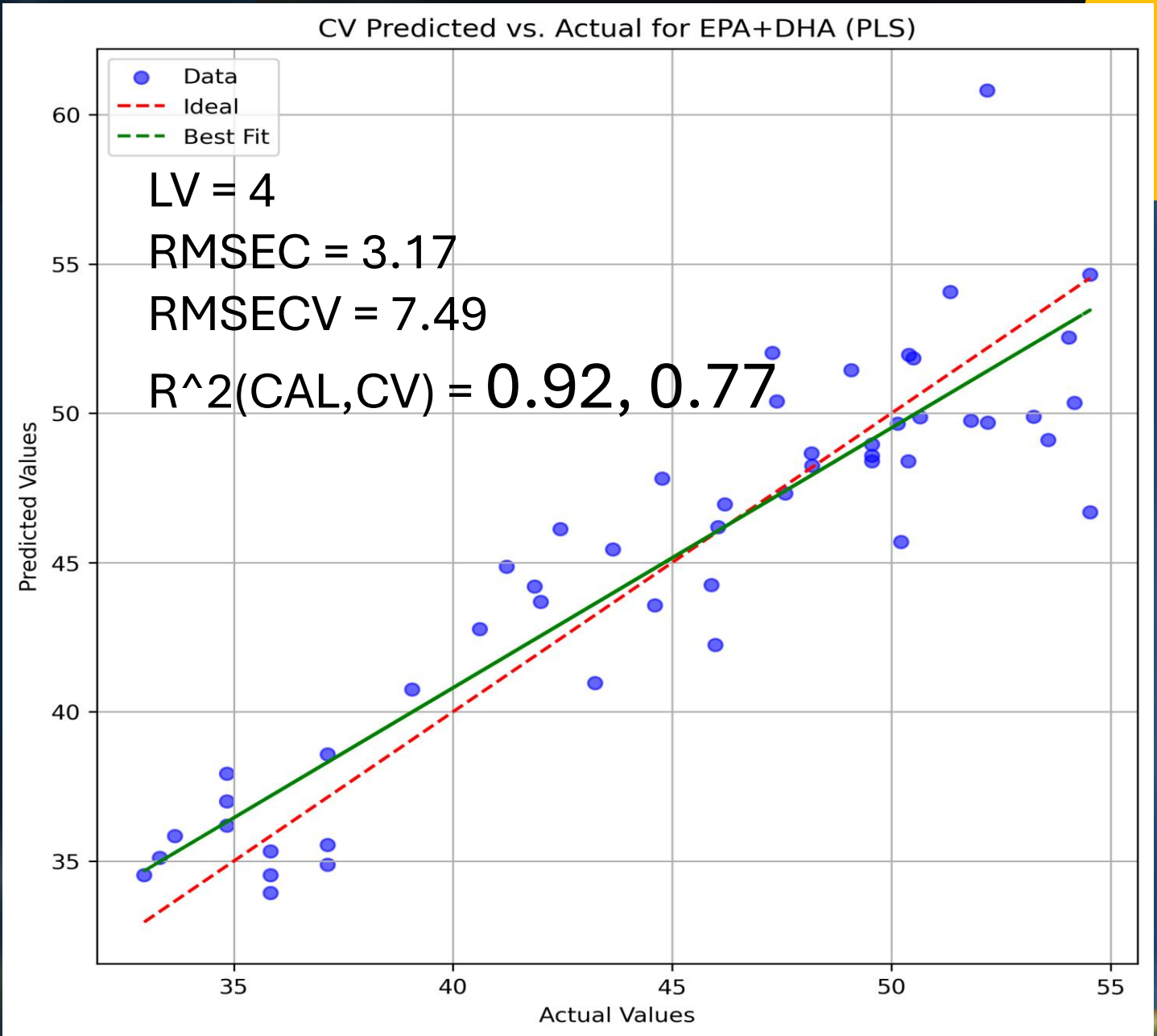
	GCMS	Raman
Analysis Time	4 days per sample	<10 minutes per sample
Cost	\$\$\$	\$
De novo quantification	✓	✗
Sensitivity	High	Low
Spectra		

METHODOLOGY



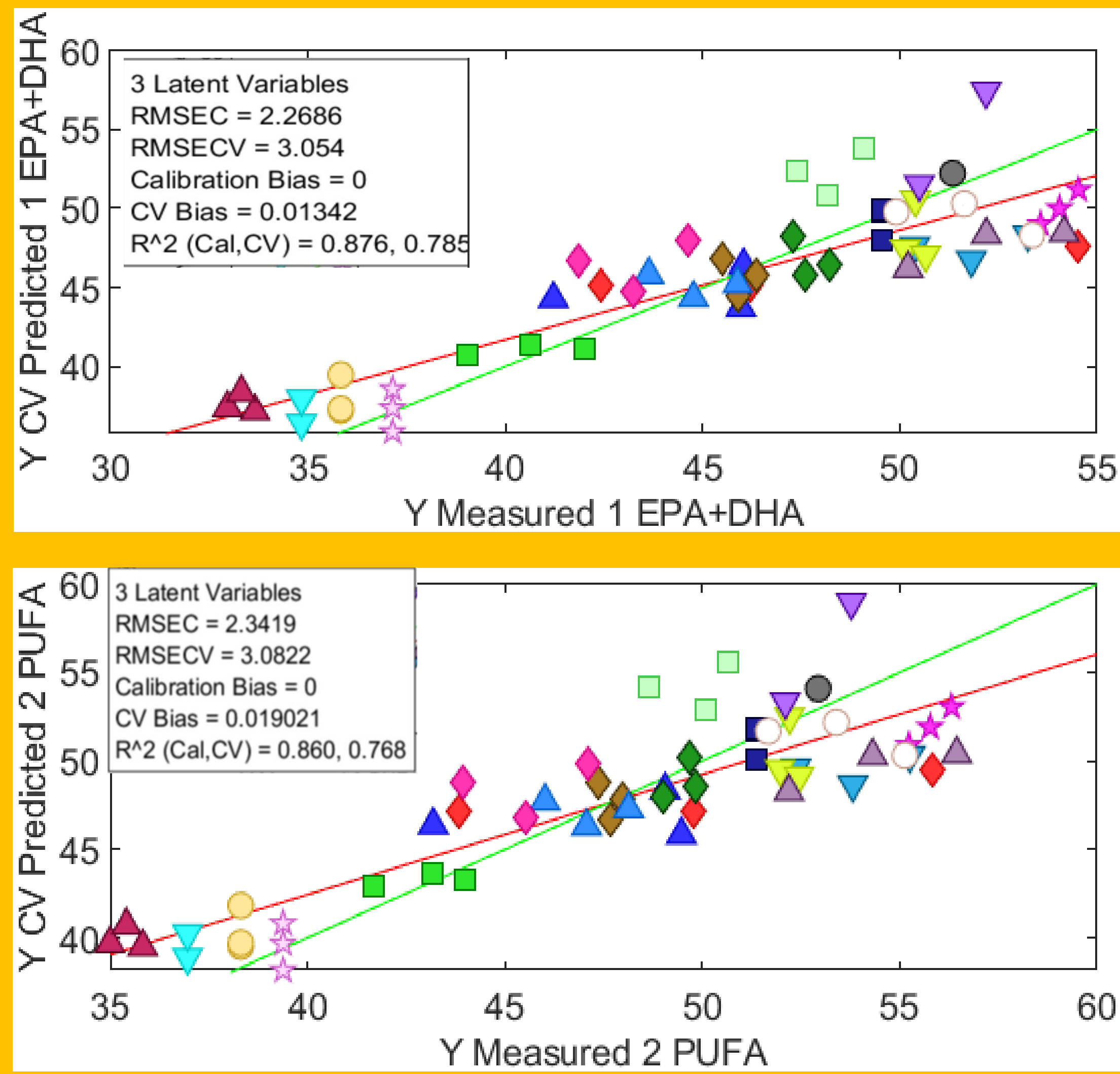
MODEL SCORES

- Total Omega-3 FA (EPA+ DHA) and total poly unsaturated FA (PUFA) showed good performance in CV with only 3 LVs.
- Individual Omega-3 FAs showed poor performance (R²<0.4) due to spectral overlap
- Results aligned with existing models from salmon fillets (Afest et al., 2022).

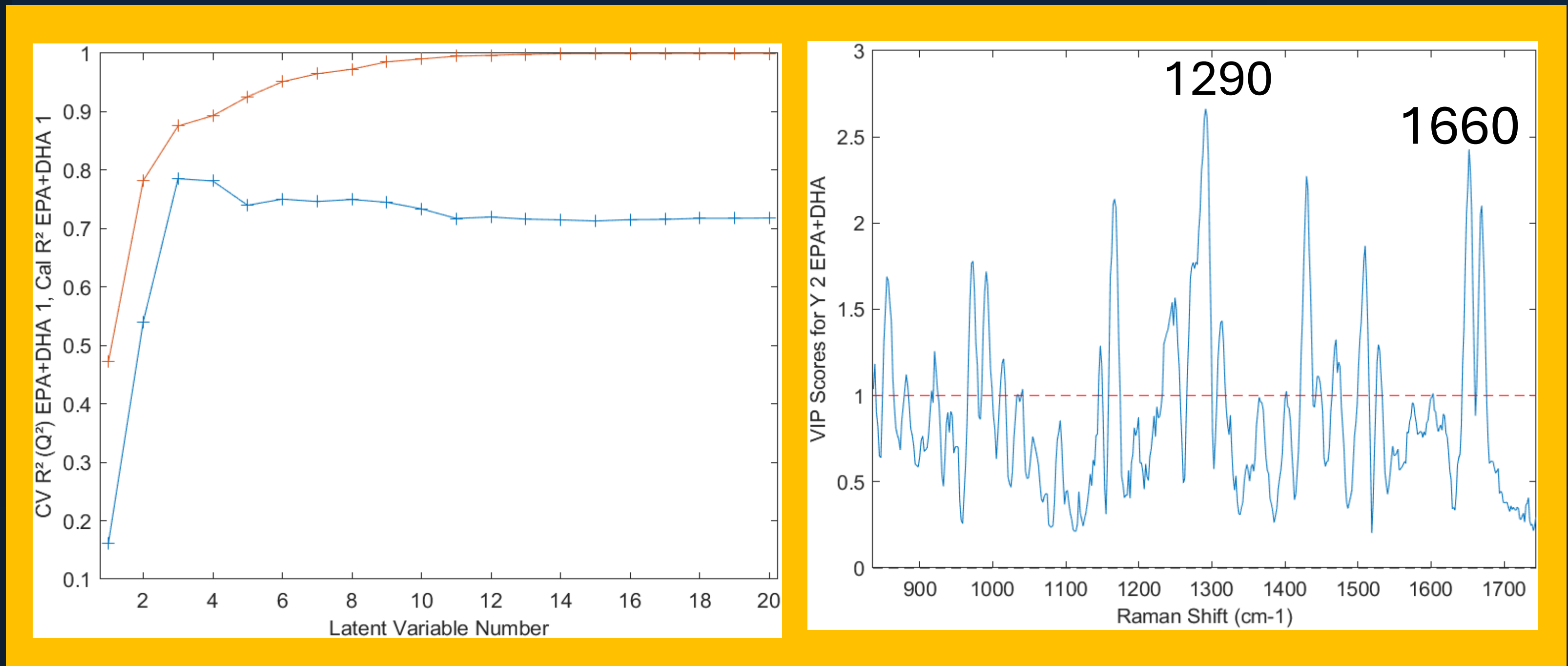


PYTHON VS. EIGENVECTOR MODEL

- A PLS model was developed in Python using RamansPy, Chemometrics and Scikit-Learn Libraries
- The Python model underperformed in comparison to the Eigenvector model



RESULTS



- Venetian Blinds CV with splits by sample replicate
- VIP plots indicate that fatty acid features contribute most significantly to the model.

FUTURE WORKS

- Deploy model on farm
- Build larger dataset of >100 samples
- Use average spectra from replicate samples
- Create a collaborative multi-species model

