



# *Heliocidaris* in Victoria

Dr Fletcher Warren-Myers

Email: [fletcher.warren@unimelb.edu.au](mailto:fletcher.warren@unimelb.edu.au)



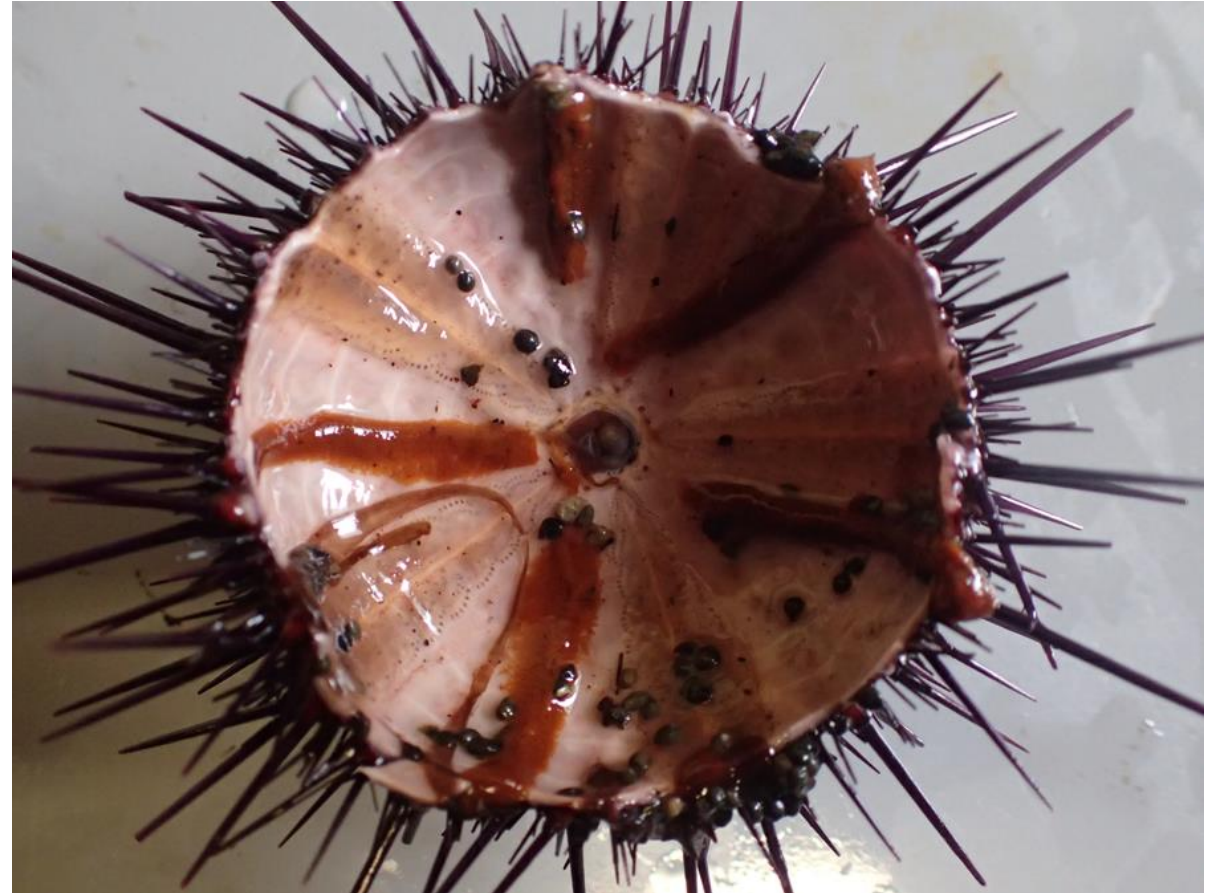
# Port Phillip Bay (PPB)

- Over abundance of sea urchins (*Heliocidaris erythrogramma*)
- Resulted in vast areas of the bay covered by urchin barrens instead of kelp beds
- Restoration?





# Roe in urchins from barrens



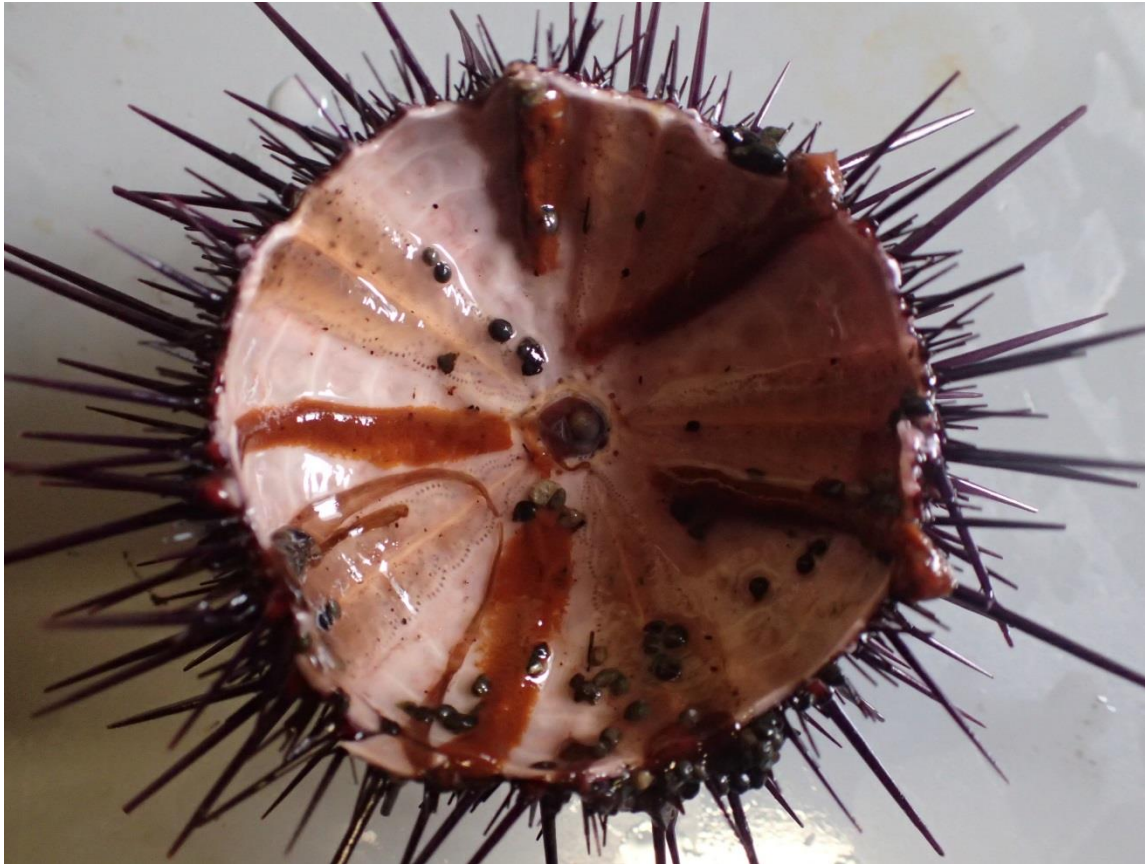


# Roe enhancement aquaculture





# After enhancement



# Bottleneck issues to solve

- 1) **Urchin collection.** Can urchins be easily collected while ensuring a high survival rate and optimal condition for roe enhancement of *H. erythrogramma*?
- 2) **Maximising gonad quantity (%GI).** What is the optimal base feed for roe enhancing *H. erythrogramma*?
- 3) **Optimising gonad quality.** What feed supplements are effective to optimise roe quality of *H. erythrogramma*?



# 1) Collection from barrens

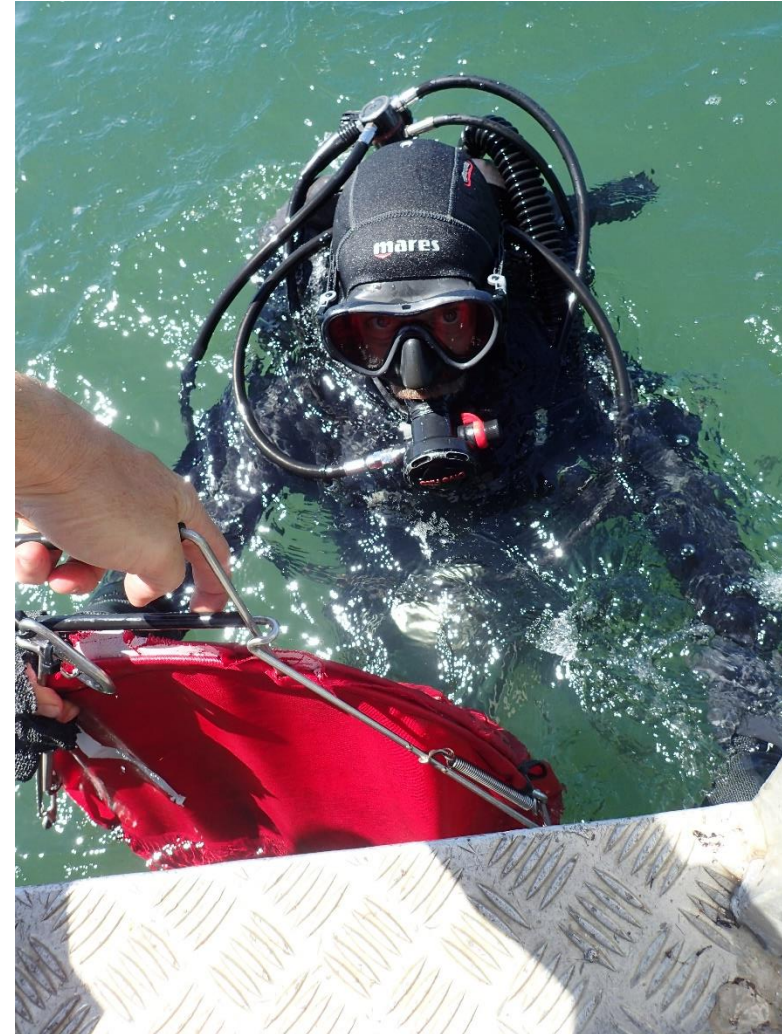


# 1) Collection from barrens

## Optimal method:

- A diver on scuba with catch bags and a garden hook can select pick ~400 urchins per hour
- Transported in seawater aerated with pure Oxygen
- 98% survival rate

**Warren-Myers et al. (2019)** Harvest method does not affect survival and condition during gonad enhancement of an overabundant sea urchin. *Aquacult Enviro Interact.*





# Bottleneck issues to solve

- 1) **Urchin collection.** Can urchins be easily collected while ensuring a high survival rate and optimal condition for roe enhancement of *H. erythrogramma*? **Yes**
- 2) **Maximising gonad quantity (%GI).** What is the optimal base feed for roe enhancing *H. erythrogramma*?
- 3) **Optimising gonad quality.** What feed supplements are effective to optimise roe quality of *H. erythrogramma*?

## 2) Maximising gonad quantity (%GI)

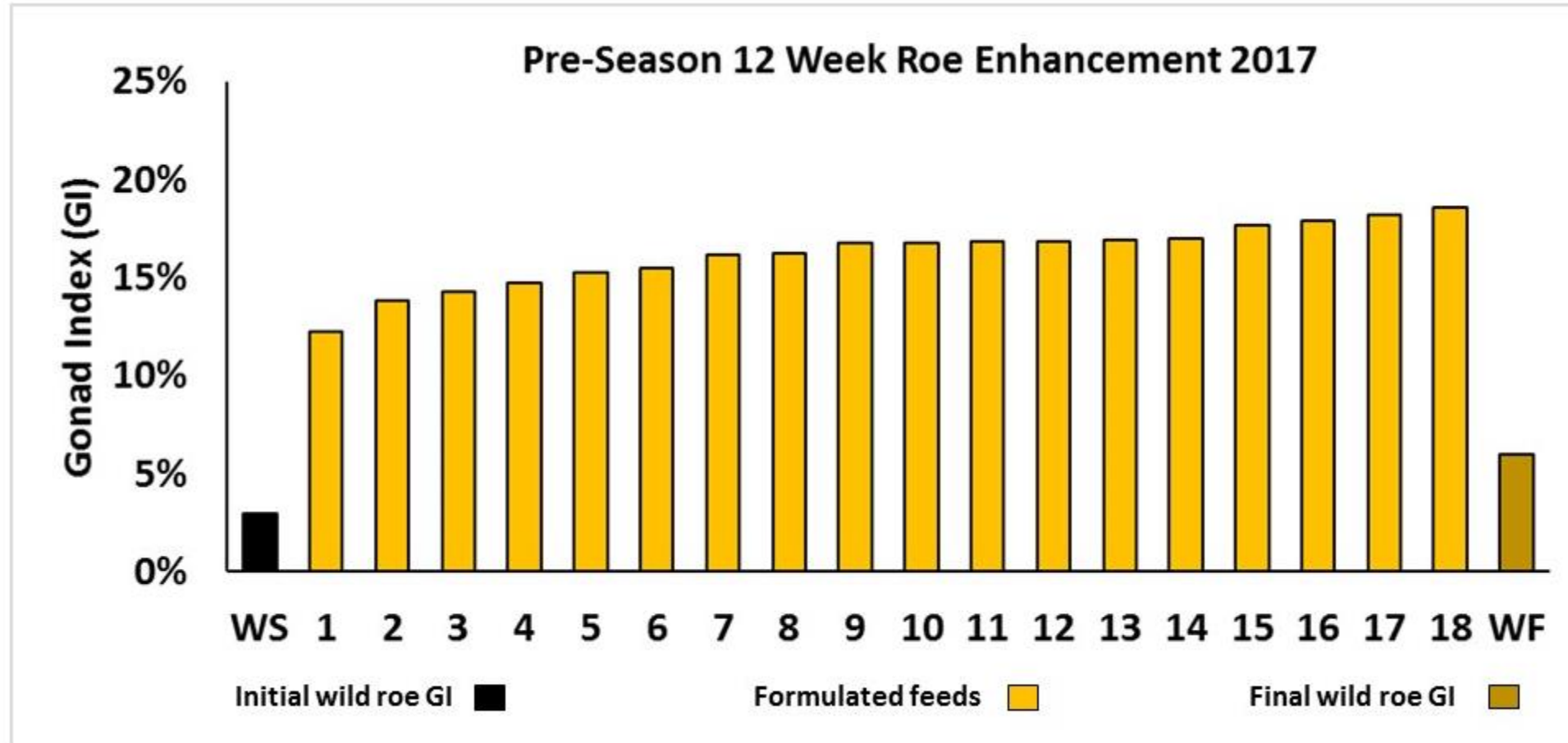
- Produced pelleted feeds (Nutrition and Seafood Laboratory (NuSea.Lab))



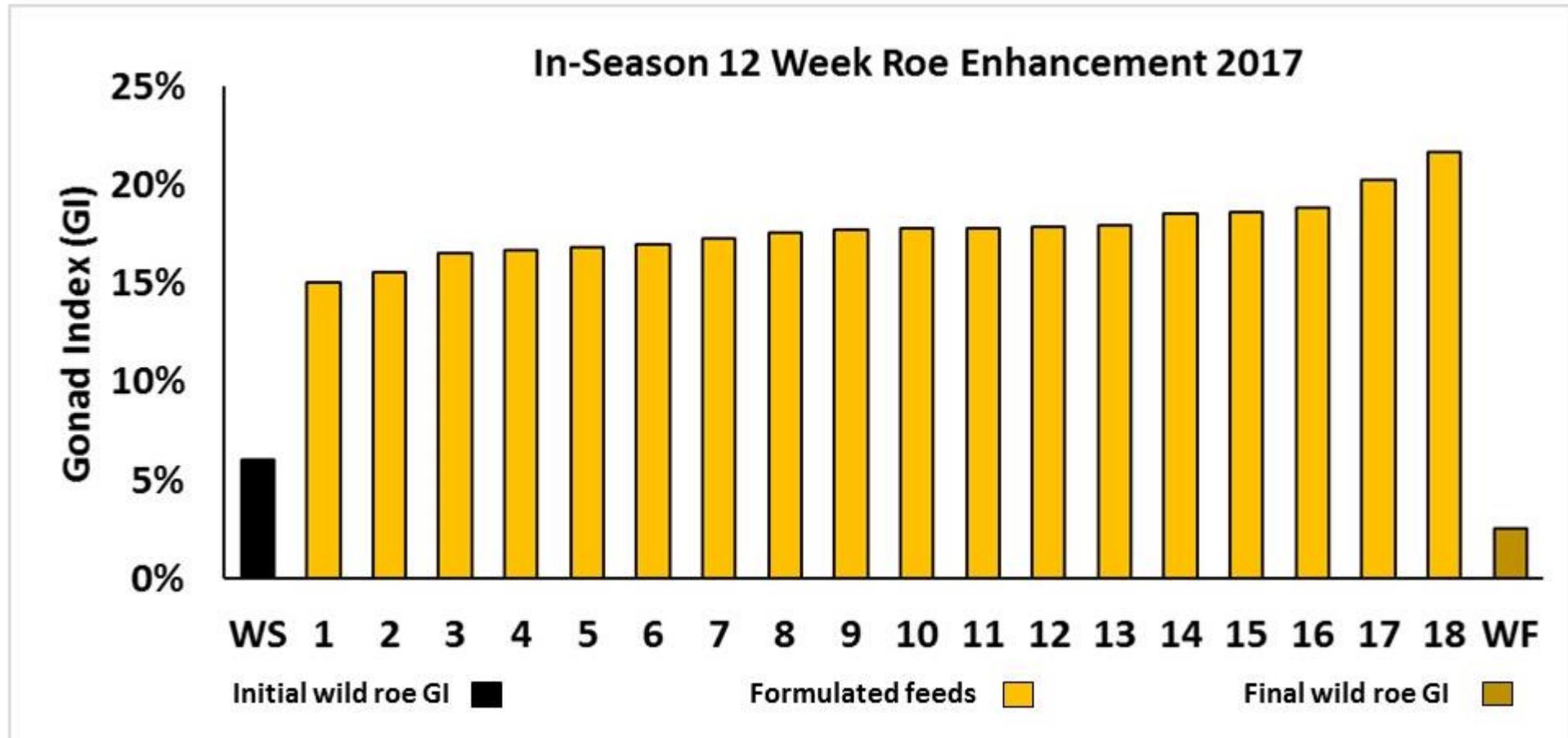
- Tested 18 feed types with varying amounts of protein, lipid and carbohydrate content
- To determine an suitable base feed for *H. erythrogramma*



## 2) April – July (%GI)



## 2) July – October (%GI)





# Bottleneck issues to solve

- 1) **Urchin collection.** Can urchins be easily collected while ensuring a high survival rate and optimal condition for roe enhancement of *H. erythrogramma*? **Yes**
- 2) **Maximising gonad quantity (%GI).** What is the optimal base feed for roe enhancing *H. erythrogramma*? **Yes**
- 3) **Optimising gonad quality.** What feed supplements are effective to optimise roe quality of *H. erythrogramma*?

### 3) Optimising gonad quality

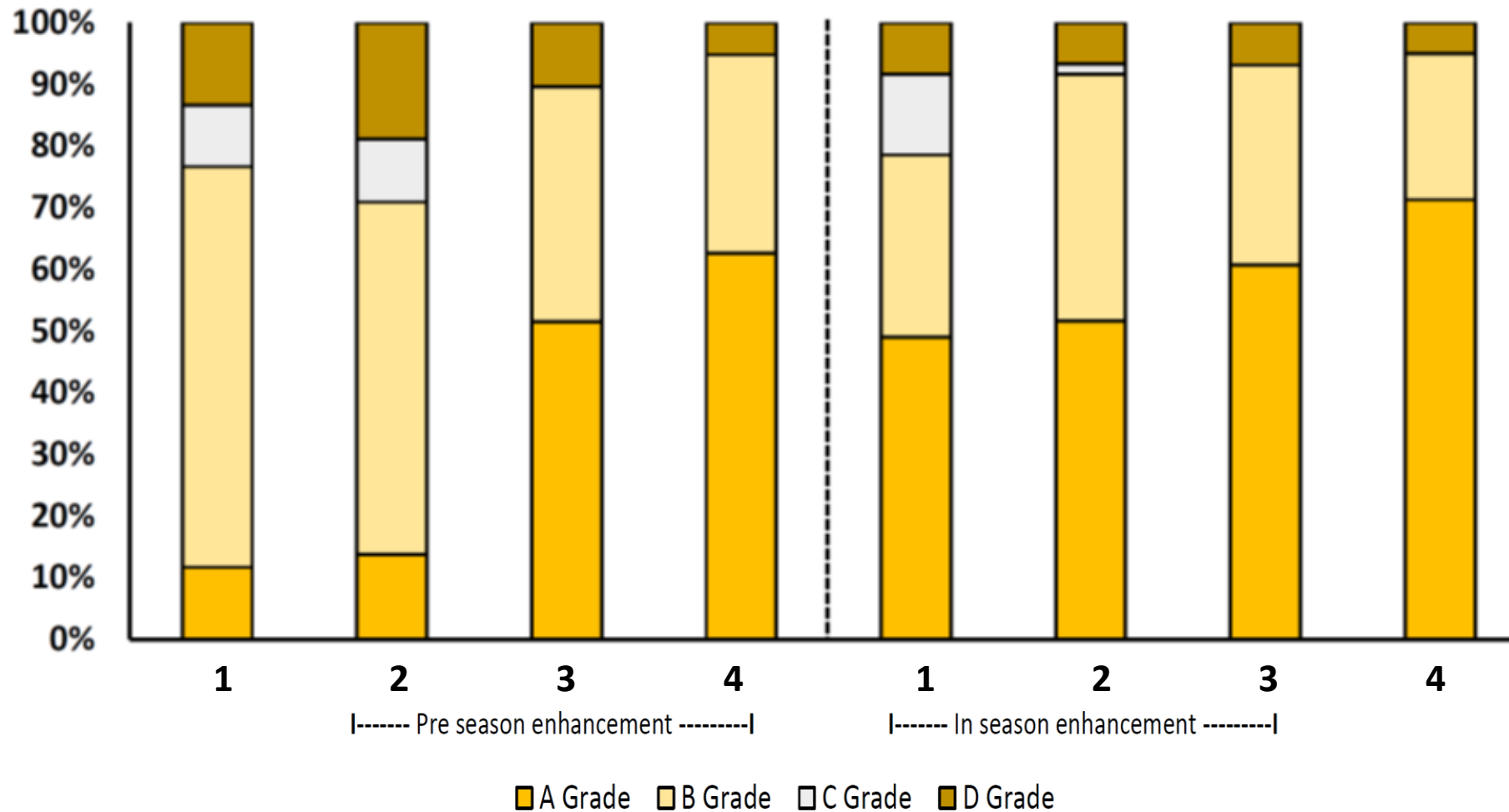
- Use the 2017 optimal pelleted feed (Nutrition and Seafood Laboratory (NuSea.Lab))



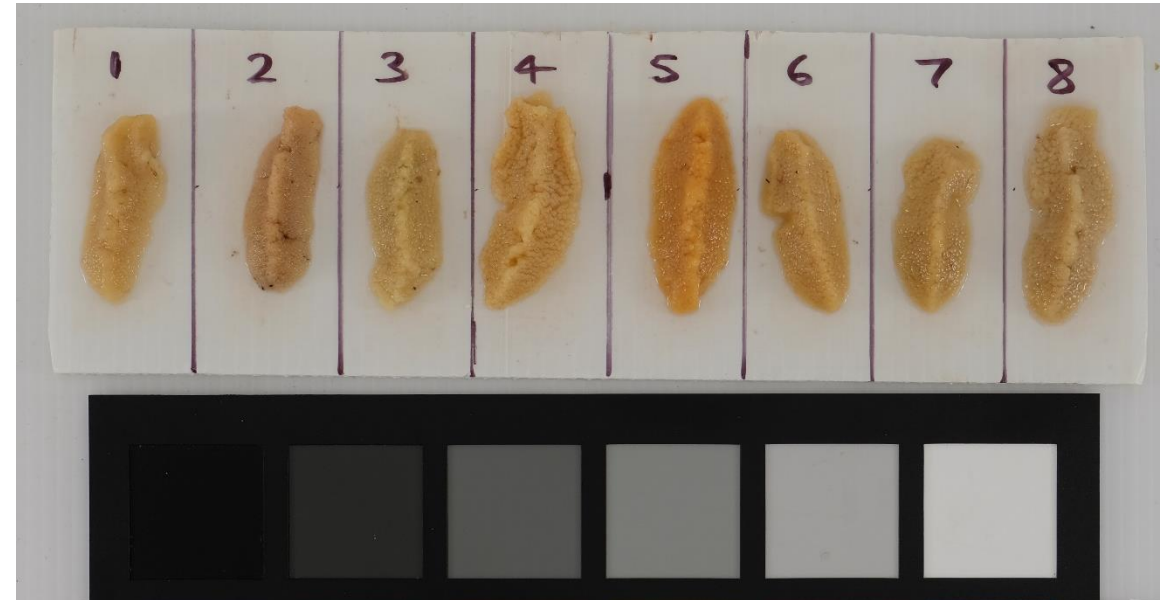
- Add a range of supplements to the feed (e.g. specific seaweed species)
- To improve grade distribution and taste *H. erythrogramma*



### 3) Grade distribution



### 3) Consistent colour and texture





# 3) Consumer taste testing

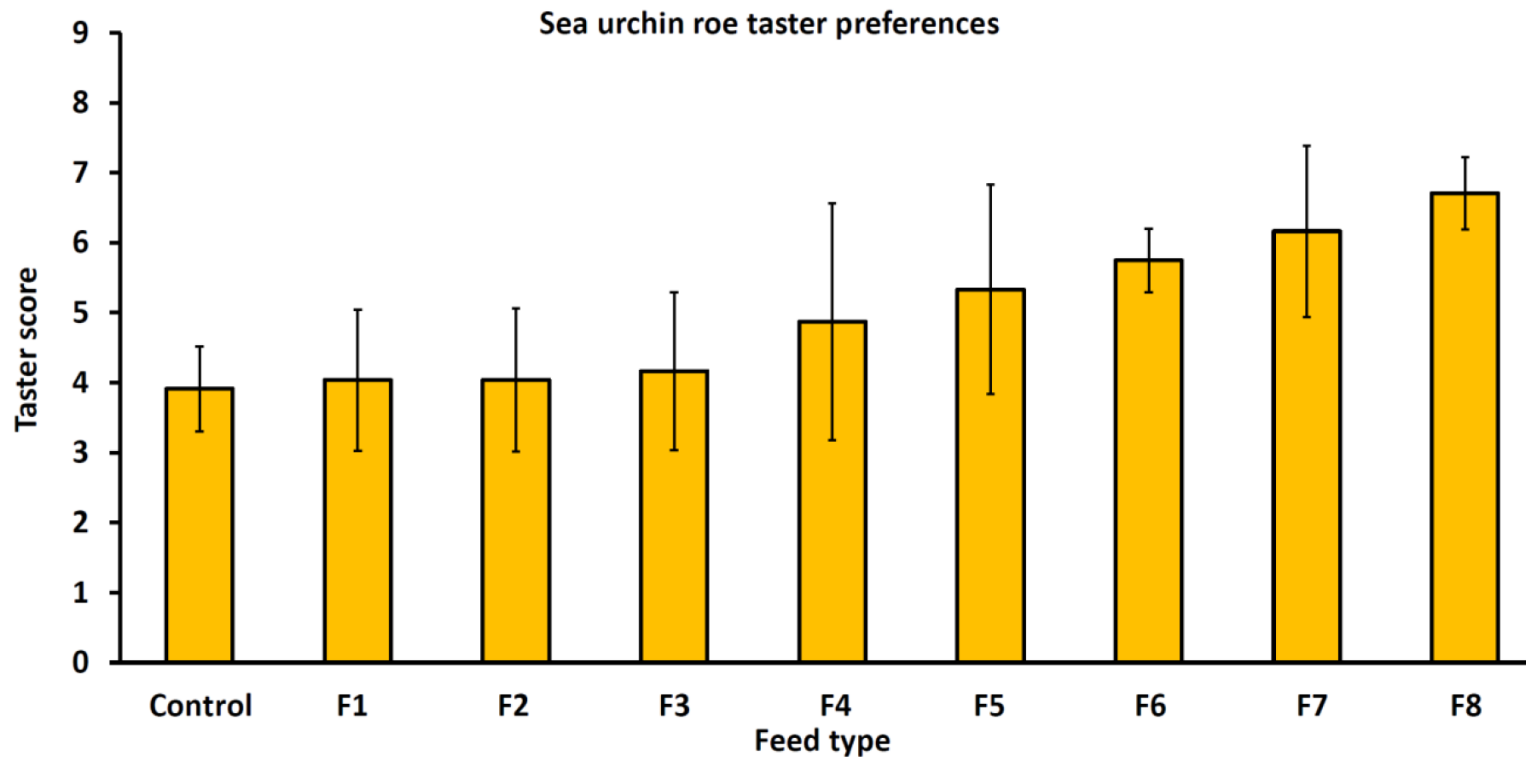


Figure 1. Consumer taste preferences of roe from the purple sea urchin fed different finishing diets. Error bars =  $\pm 1$  SE.



# Summary

- 1) Divers select pick urchins at ~ 400 urchins per hour with 98% survival
- 2) Roe enhance to >20% GI in 12 weeks
- 3) Produce roe with good colour and taste

**Next step – Can this be done on a larger scale?**



