

Are you really what you eat? Manipulation of pigment profiles in *Gammarus locusta*

Introduction

In aquaculture, marine specimens from lower trophic levels have the potential to serve as alternative food source for farmed fish and invertebrates, replacing traditional meal and fish oils. Marine amphipods are a natural food source for many marine fish and thus became of increasing interest for feeding fish in aquaculture (Alberts-Hubatsch *et al.* 2019).

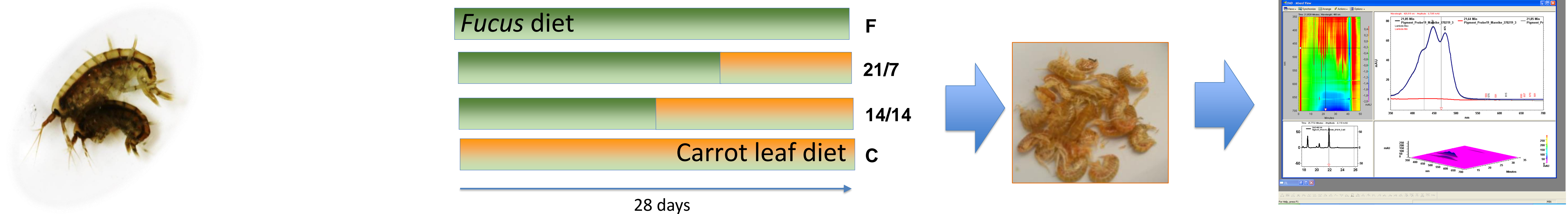
In the amphipod *Gammarus locusta*, diet can heavily impact the nutritional composition such as fatty acid profiles. This low-trophic species also produces other compounds valuable for feeding in aquaculture such as pigments, i.e. astaxanthin. This study investigated the impact of feed type on the pigment profile and content of *G. locusta* in relation to changes in feed type.



Figure 1 *Gammarus locusta* with clearly visible lipid droplets with carotenoid pigments (see arrows)

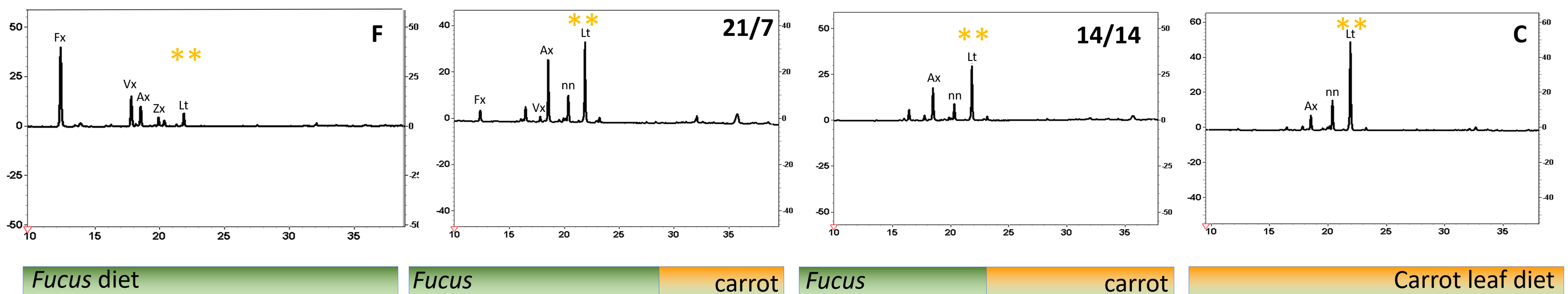
Material and Methods

Four dietary treatments



Results

- ✓ A shift in diet resulted in a shift in pigment profile
- ✓ Total carotenoid content varied between treatments, with highest amounts of carotenoids in gammarids fed the carrot leaf diet (1.04 ± 0.12 mg/kg dry weight) and lowest content in the *Fucus* diet (0.47 ± 0.13).
- ✓ Six major pigments in four treatments: Ax: Astaxanthin, Fx: Fucoxanthin; Vx: Violaxanthin; Zx: Zeaxanthin; Lt: Lutein; nn: unknown
- ✓ No differences in astaxanthin content between treatments, but significant differences in Lutein content



Discussion and Conclusions

- Pigment content in *G. locusta* biologically significant for feeding fish in aquaculture
- Pigment content and pattern in *G. locusta* is strongly affected by feed type
 - Complete change of pigment profile after 28 days
 - No changes in astaxanthin content when shifting from *Fucus* to carrot leaf diet
 - Enrichment with fucoxanthin in the *Fucus* diet
 - Highly elevated lutein content in the carrot treatment
- We suggest biosynthetic pathway through zeaxanthin (Gaillard *et al.*, 2004)
- ❖ Further investigations of biosynthetic pathway of pigments in *Gammarus locusta* needed
- ❖ Astaxanthin levels in *G. locusta* might be beneficial for aquaculture species
- ❖ Further research on the effect of lutein for crucial life stages in aquaculture needed