

PROVA GAMBERI IN ACQUAPONICA



Cenni sulla prova zootecnica in acquaponica e
presentazione analisi performance di crescita e benessere
animale.

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PROVA ZOOTECNICA

Specie:

- *Macrobrachium rosenbergii*
- *Lactuca sativa* varietà ascolana gretta

Disegno sperimentale:

- HM0: dieta di controllo
- HM3: sostituzione del 3% di farina di pesce con farina di prepupe di *Hermetia illucens* (full-fat) cresciute su substrato organico (coffee silverskin) arricchito con *Arthrospira platensis* (15% w/w).
- HM20: sostituzione del 20% di farina di pesce con farina di prepupe di *Hermetia illucens* (full-fat) cresciute su substrato organico (coffee arricchito con *Arthrospira platensis* (15% w/w).

Durata prova: 2 mesi

Parametri dell'acqua: pH, temperatura (mantenuta a 28 °C), ammonio, nitriti, nitrati, fosfati.



PERFORMANCE DI CRESCITA – *M. rosenbergii*

Numero iniziale esemplari per vasca: 219

Parametri di sopravvivenza e crescita calcolati:

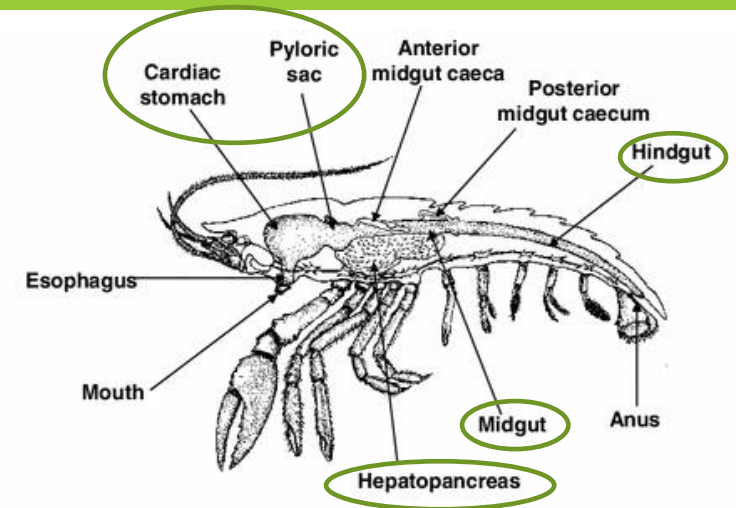
- Survival rate = (numero finale – numero iniziale) x 100
- Weight gain = peso finale – peso iniziale
- Specific growth rate = $[(\ln \text{ peso finale} - \ln \text{ peso iniziale}) / \text{tempo}] \times 100$



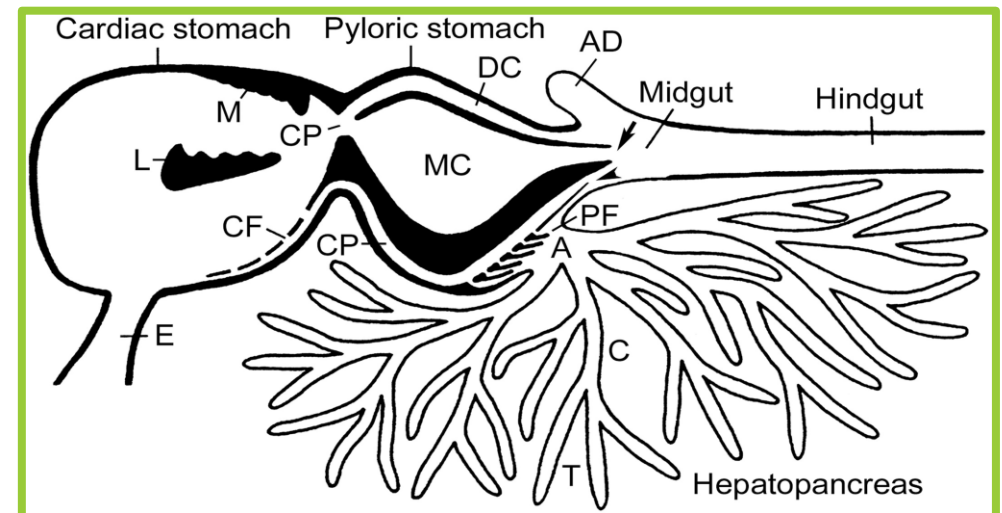
Non sono state evidenziate differenze significative tra i gruppi sperimentali

ANALISI ISTOLOGICHE – *M. rosenbergii*

The decapod crustacean gut is essentially an internal tube that is divided into three functional areas, the **foregut**, **midgut**, and **hindgut**. The foregut houses the gastric mill apparatus which functions in mastication (cutting and grinding) of the ingested food. The processed food passes into the pyloric region of the foregut which controls movement of digesta into the midgut region and hepatopancreas where intracellular digestion takes place.



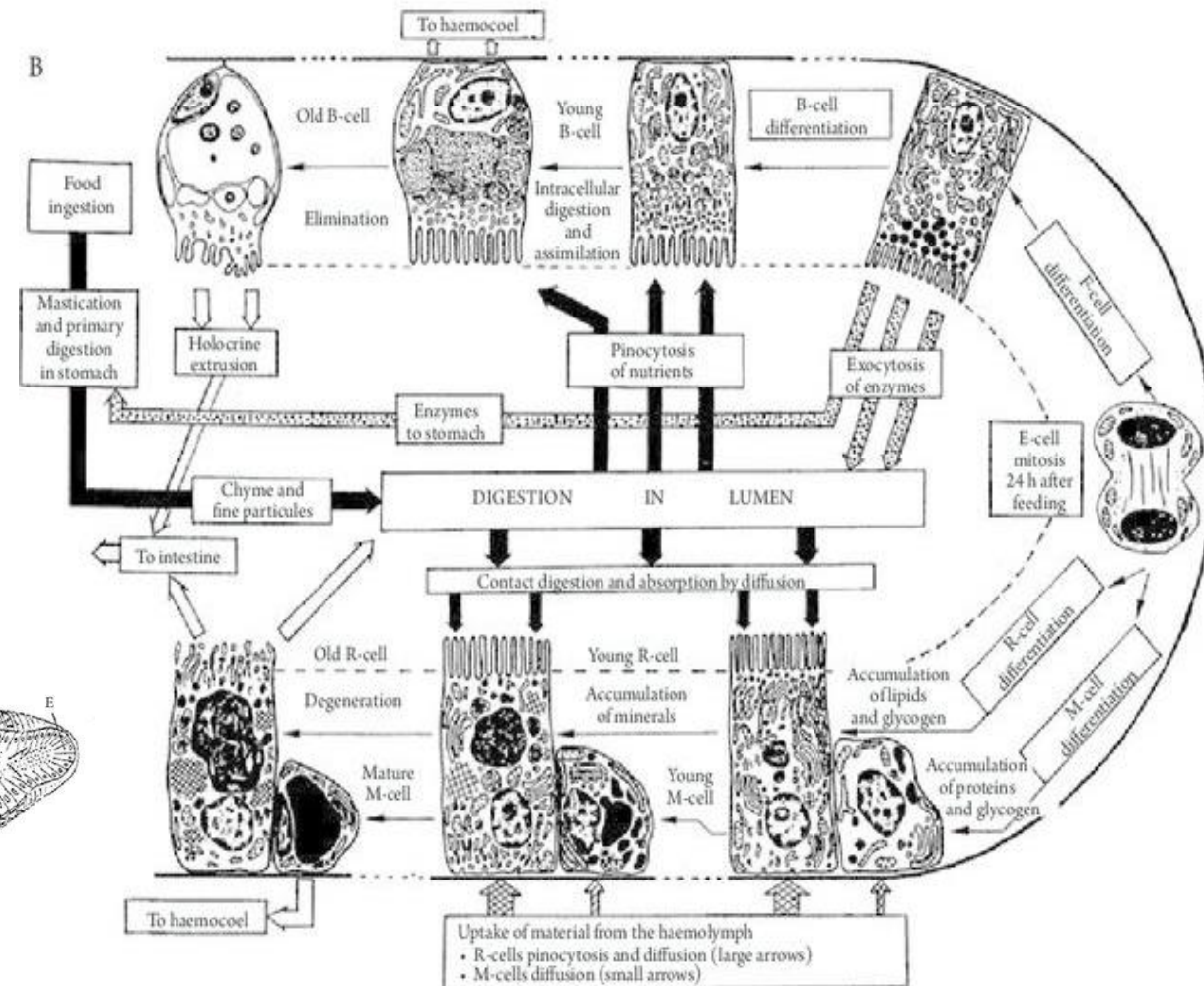
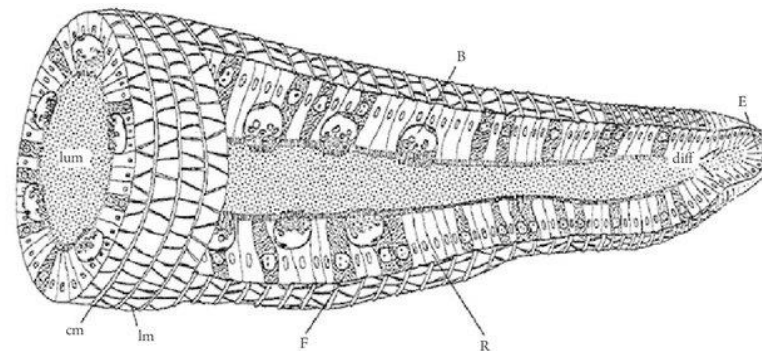
The **hepatopancreas** (also known as the digestive gland) is a large organ occupying most of the dorsal region of the cephalothorax and may extend backwards into the abdomen. It is here that enzymatic digestion continues, and absorption of food occurs.



McGraw, I.J. & Curtis, D.L., 2013. A review of gastric processing in decapod crustaceans. *Journal of comparative Physiology B* 183, 443-465.
Vogt, G., 2019. Functional cytology of the hepatopancreas of decapod crustaceans. *Journals of morphology* 280, 1405-1444.

ANALISI ISTOLOGICHE – *M. rosenbergii*

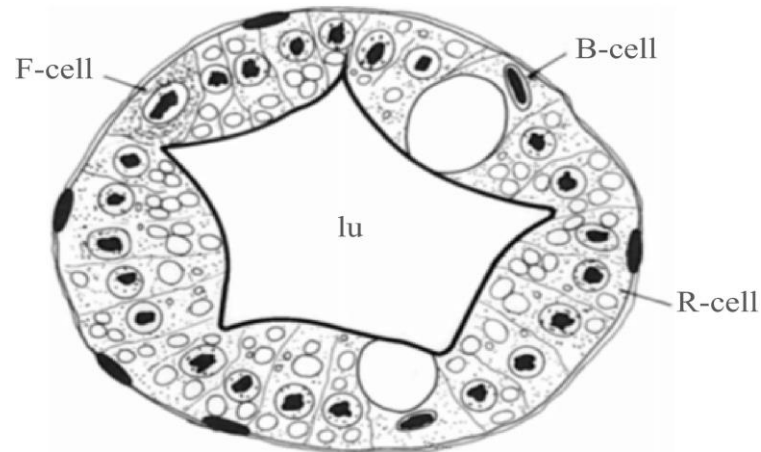
Hepatopancreatic tubules are made up of a digestive epithelium adhered to a basement membrane. The inner wall of the tubule is similar to the **brush border** of the gut, and the interior of the tubules consists of the lumen. The digestive epithelium consists of several cell types, embryonic cells (**E-cells**), blister-like cells (**B-cells**), fibrillar cells (**F-cells**), and resorptive cells (**R-cells**). E-cells are immature cells of the hepatopancreas, whereas B-cells, F-cells and R-cells are mature cells.



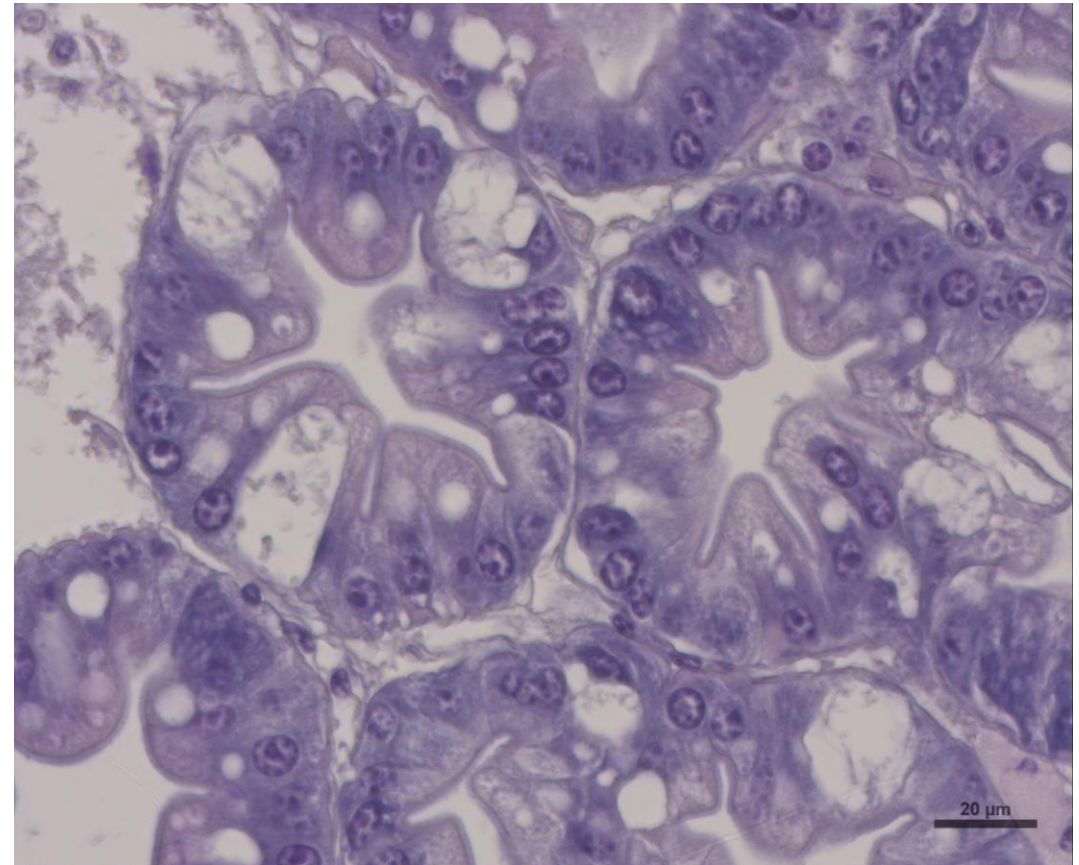
ANALISI ISTOLOGICHE – *M. rosenbergii*

Parametri isto-morfologici valutabili:

- Area o altezza epitelio
- Diametro del tubulo
- Forma e area del lume
- Area dei vacuoli delle cellule B
- Abbondanza relativa di cellule B e R
- Stima del grado di accumulo di grasso nelle cellule R.



Cervellione, F, McGurk, C., Eriksen, T.B. & Van den Broeck, W., 2017. Use of computer-assisted image analysis for semi-quantitative histology of hepatopancreas in whiteleg shrimp *Penaeus vannamei* (Boone). *Journal of fish diseases* 40, 1223-1234



Esempio di istomorfologia di epatopancreas di *M. rosenbergii* in campione di prova. Scale bar: 20 µm

ANALISI MOLECOLARI – *M. rosenbergii*

Gene	References	
<i>jheh</i>	(Gao et al., 2021)	Crescita
<i>chit3</i>	(Gao et al., 2021)	
<i>catL</i>	(Gao et al., 2021)	Digestione
<i>hsp70</i>	(Gao et al., 2020)	
<i>hsp90</i>	(Ding et al., 2015)	Stress
$\alpha 2m$	(Feng et al., 2019)	
<i>18s</i>	(Kaleo et al., 2019)	Risposta immunitaria
β -actin	(Gao et al., 2021)	
		Housekeeping genes

