

Ontogeny and characterization of some intestinal enzymes in cobia *Rachycentron canadum* larvae



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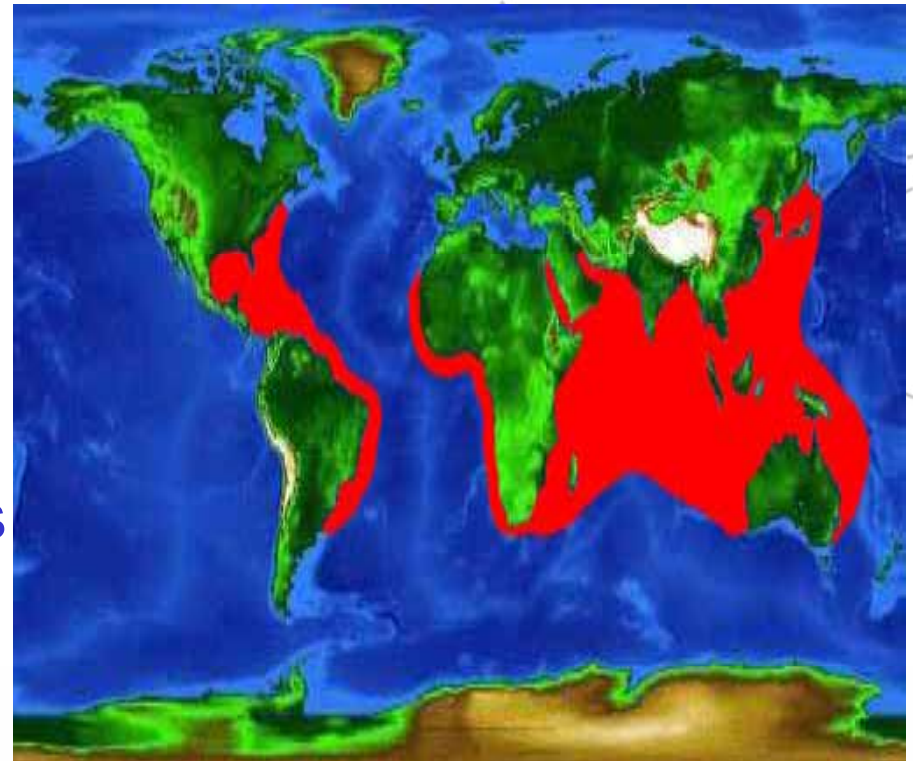


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About cobia

- Cobia is a pelagic, migratory marine fish
- Widely distributed
 - Tropical waters
 - Subtropical waters
 - Warm temperate waters apart from the Eastern Pacific Ocean



Cobia is a good candidate for marine farming

- Fast growth rate: 4-6 kg with in one year
- Good meat quality: high n-3 HUFA content

Widely farmed:

- Asia
- Americas and Caribbean regions



- Juvenile production of cobia is the main bottleneck
- Stomach of cobia larvae become functional during 12-20 dph, and pancreatic enzymes increased during this period (Faulk et al. 2007)
- Attempts to early weaning of cobia larvae (from 16 dph) with limited success
- No study on intestinal enzymes of cobia so far
- Better understanding digestive capacity is needed

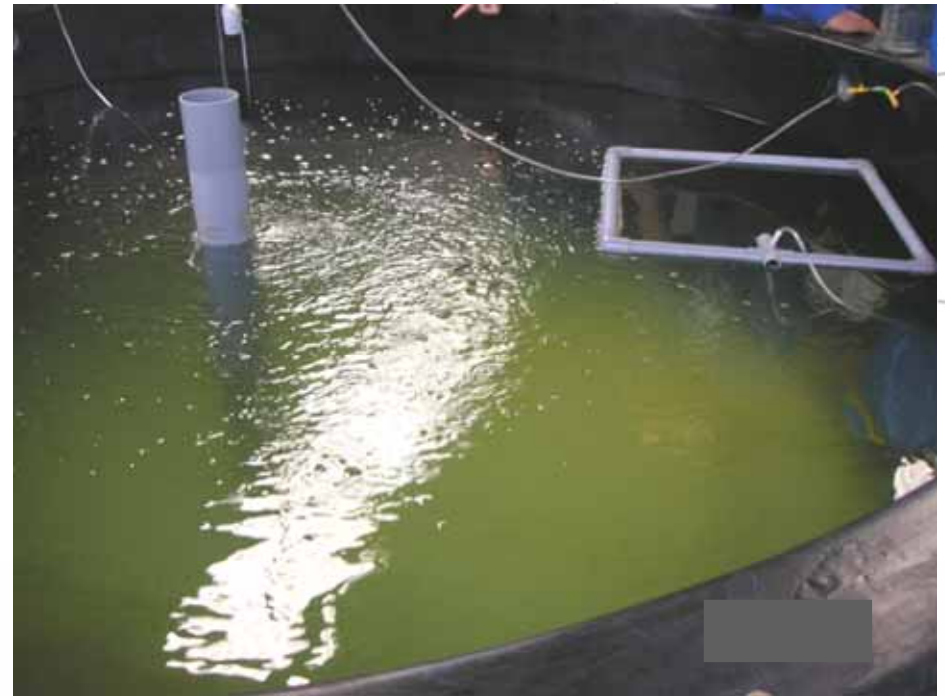
Objectives

- Ontogeny of the three intestinal enzymes alkaline phosphatase (AP), leucine aminopeptidase (LAP) and leucine-alanine peptidase (leu-ala) in cobia larvae fed live feed
- Whether early weaning of larvae to a microdiet from 17 dph affects the gut maturation process ?

Materials and Methods

Larvae rearing and diets

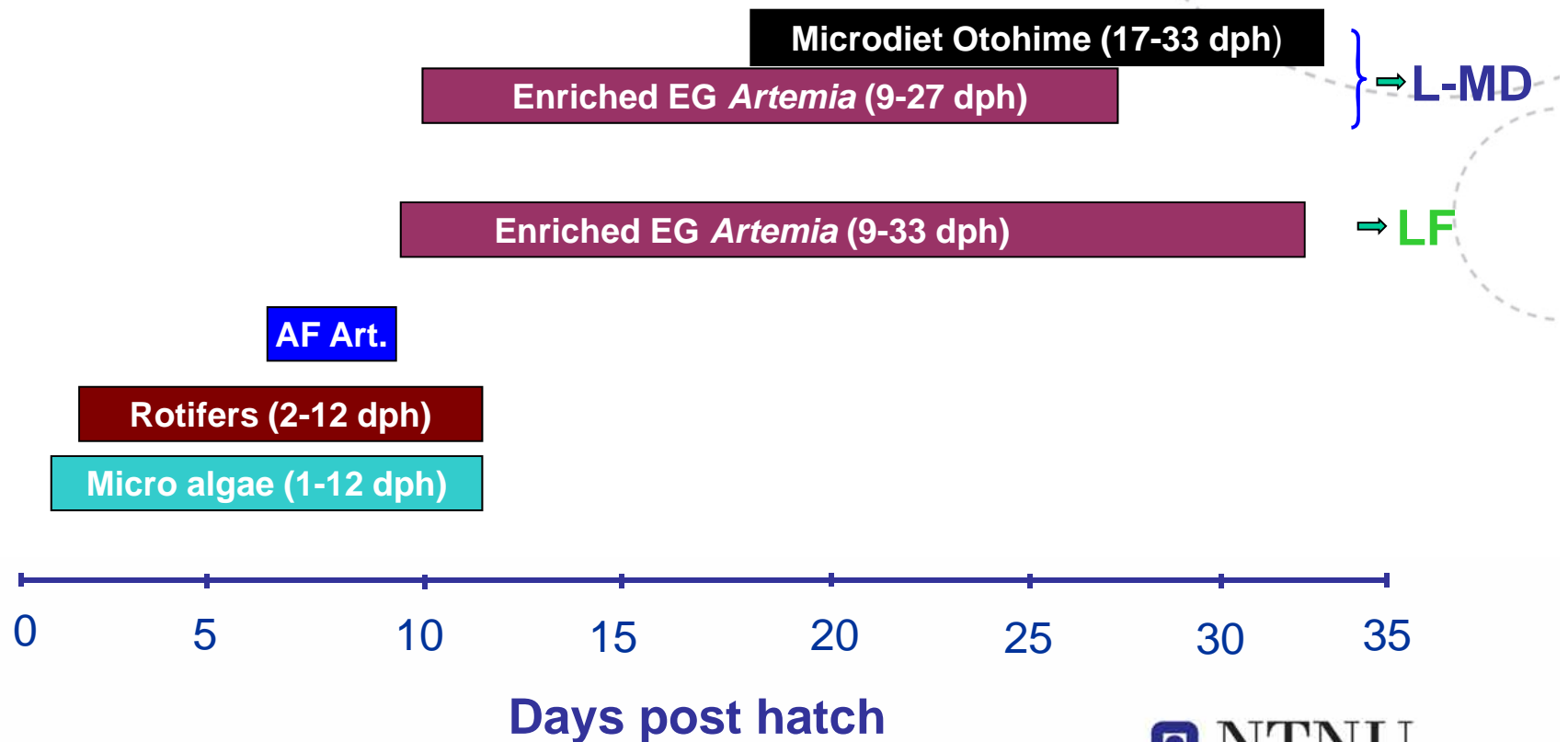
- Exp took place at RIA1 facility, at Cua Lo town, Vietnam
- Larvae were reared in two 500 L-cylindrical composite tanks
- Initial stocking density was 45 newly hatch larvae/L



Water quality

Parameters	Values
Ambient water temperatures (°C)	26.3 ± 0.2 (23.5-30.0)
Salinity (ppt)	31.0 ± 0.3 (28-33)
Dissolved oxygen (mg/L)	5.4 ± 0.3
pH values	7.6- 8.0
Total ammonia-nitrogen (mg/ L)	< 0.1
Photoperiod	14h light: 10h dark

Larval rearing and diets



Sampling and dissection for enzyme analysis

- LF treatment:
 - on 2, 4, 7, 10, 13, 17, 23, 26, 30, 33 dph
- L-MD treatment:
 - From 23 dph
- Frozen in liquid nitrogen then stored at -80°C .
- Thawed on ice, dissected for digestive tract

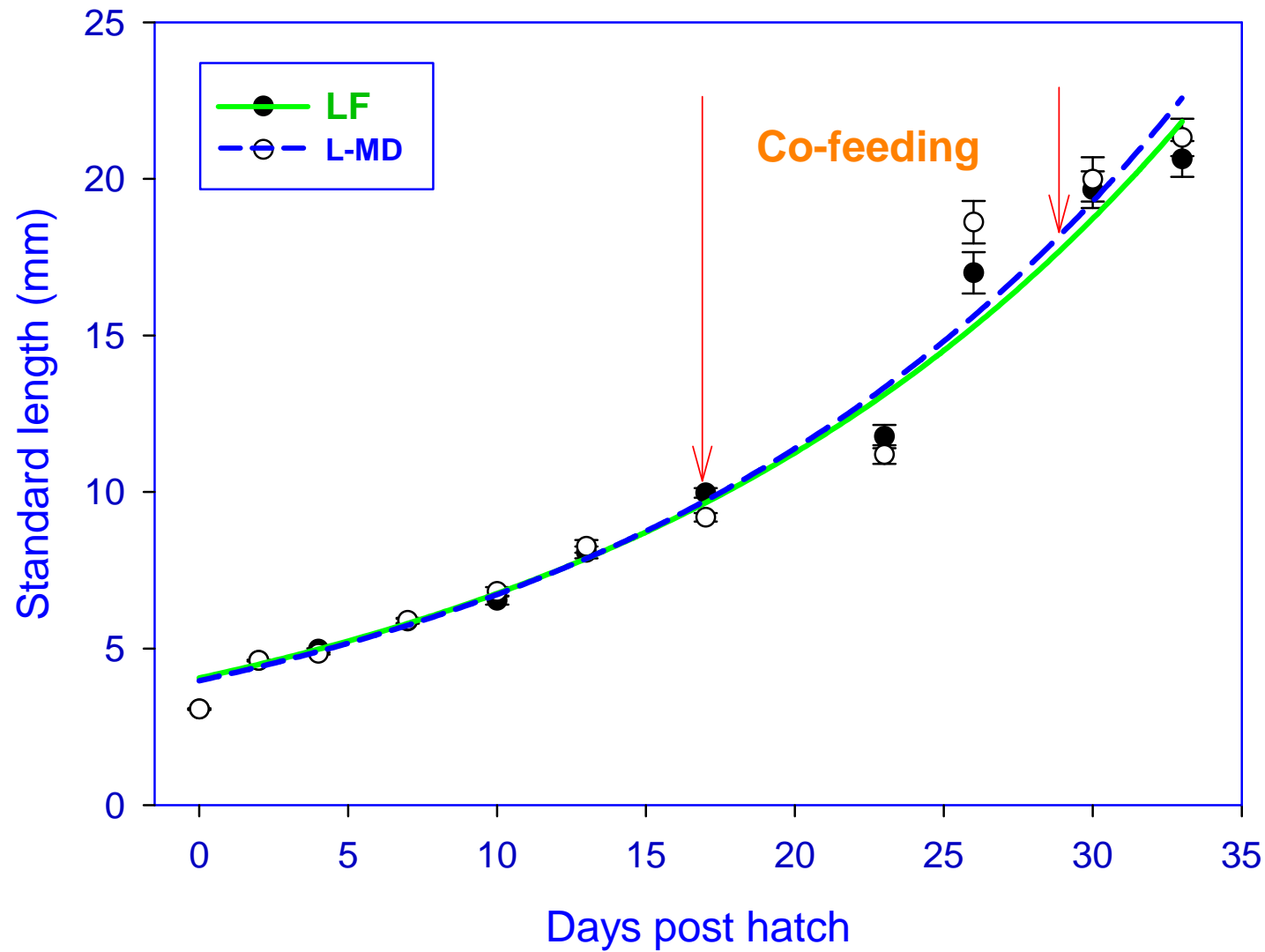


Sampling and dissection for enzyme analysis

- 2-4 dph larvae
 - 20 larvae/sample
 - Digestive tract was removed by cutting away the head and tail
- Larvae > 4 dph
 - 5-15 larvae/sample
 - Only digestive tract was dissected out
- 3 samples of larvae/sampling day



Results: Growth



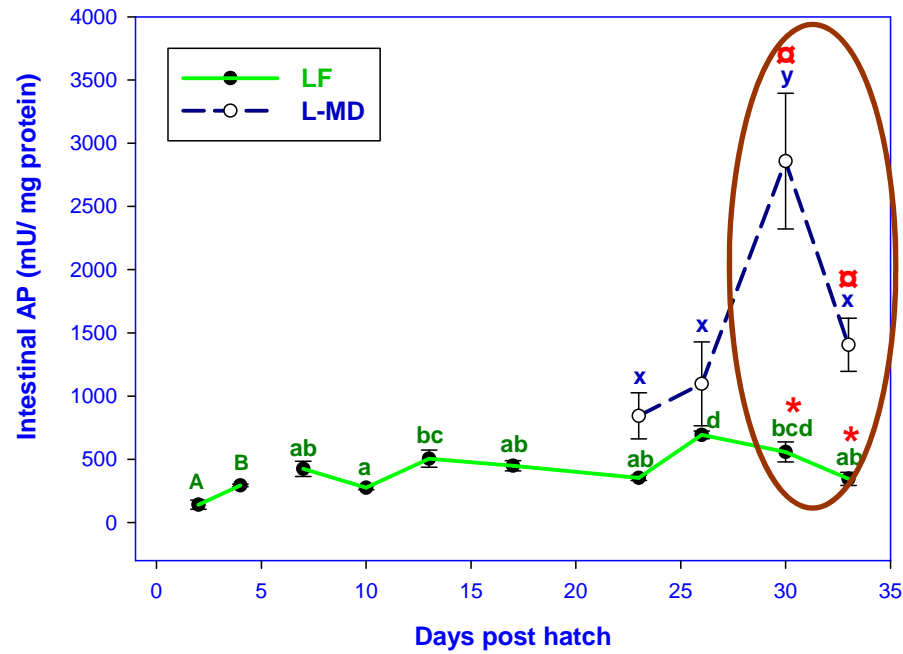
Survival

Age (dph)	Survival rate (%)	
	LF	L-MD
10 ¹	67.7 ± 6.7	72.1 ± 6.1
20 ¹	36.1 ± 10.6	41.4 ± 8.1
30 ²	19.8	9.6

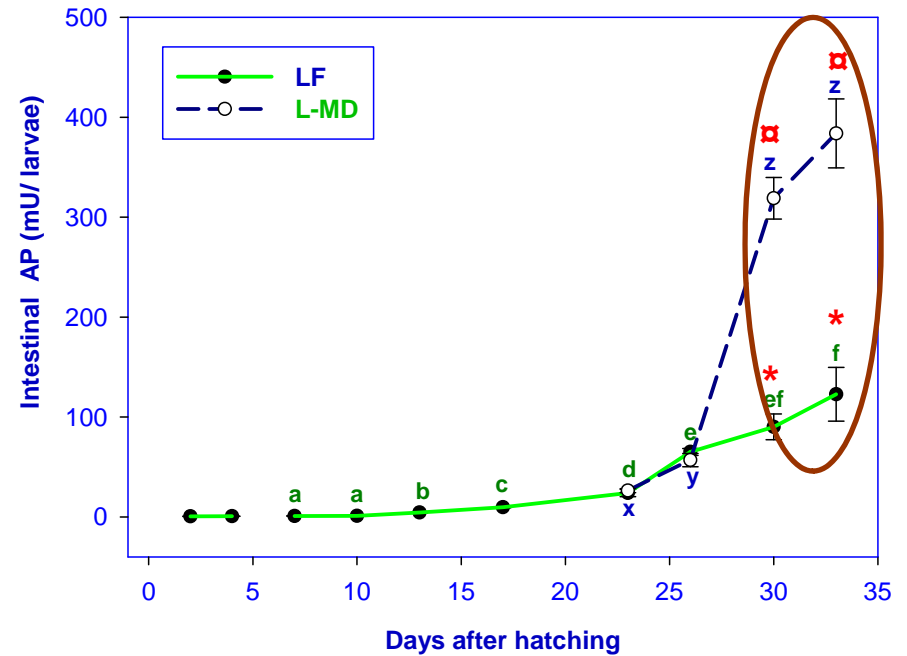
¹ The survival rates were measured by volumetric method (n =5)

² Counting remaining larvae at 30 dph.

Activity of intestinal Alkaline Phosphatase

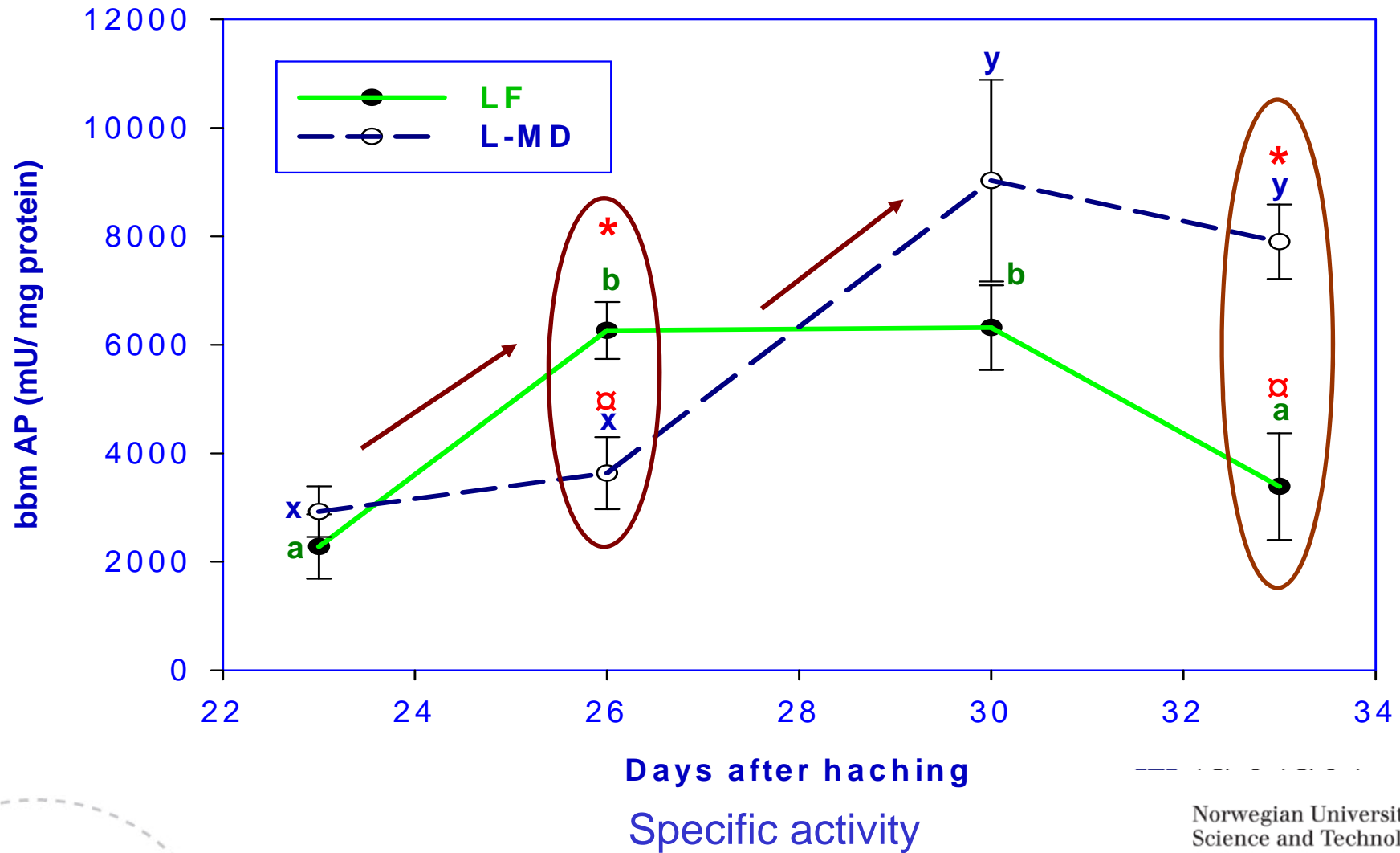


Specific activity

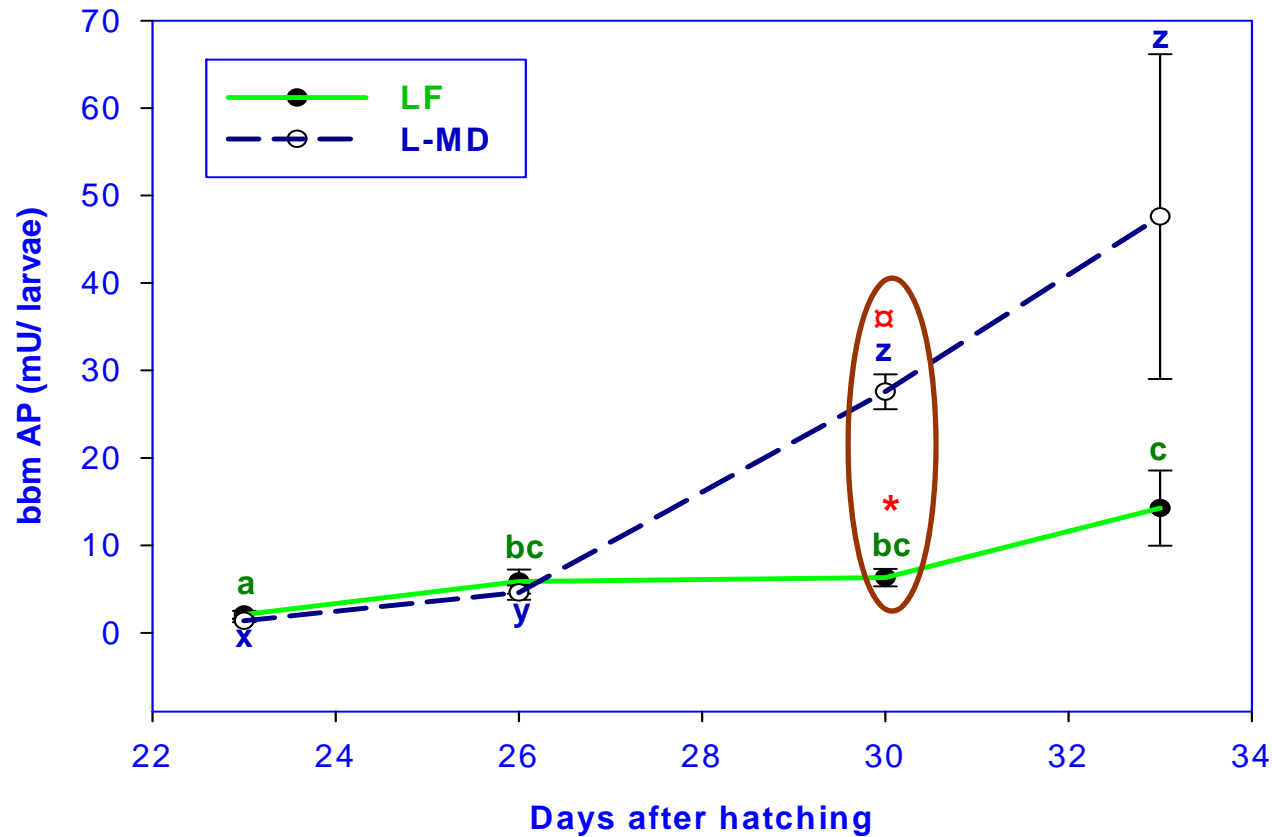


Individual activity

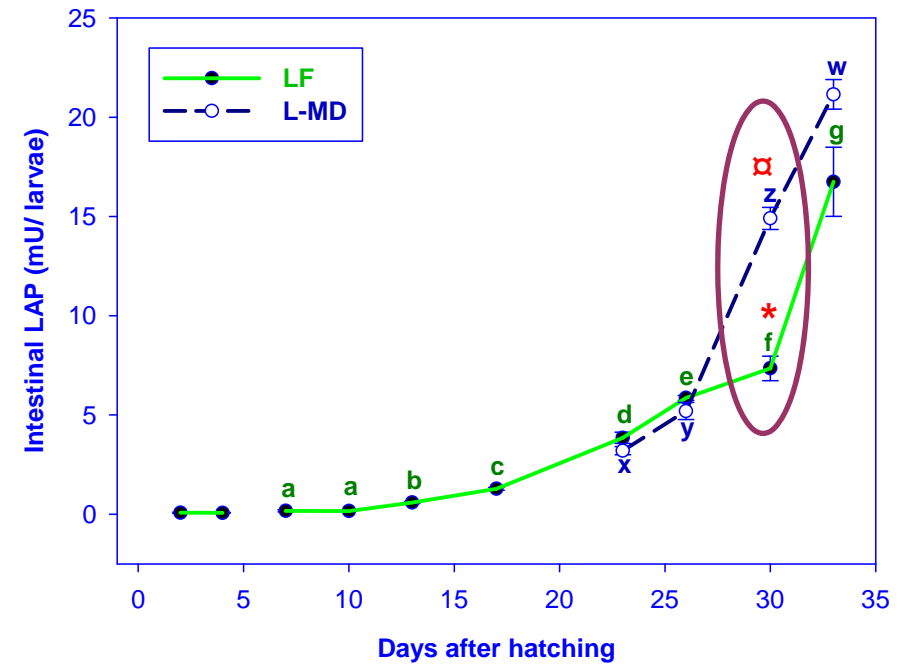
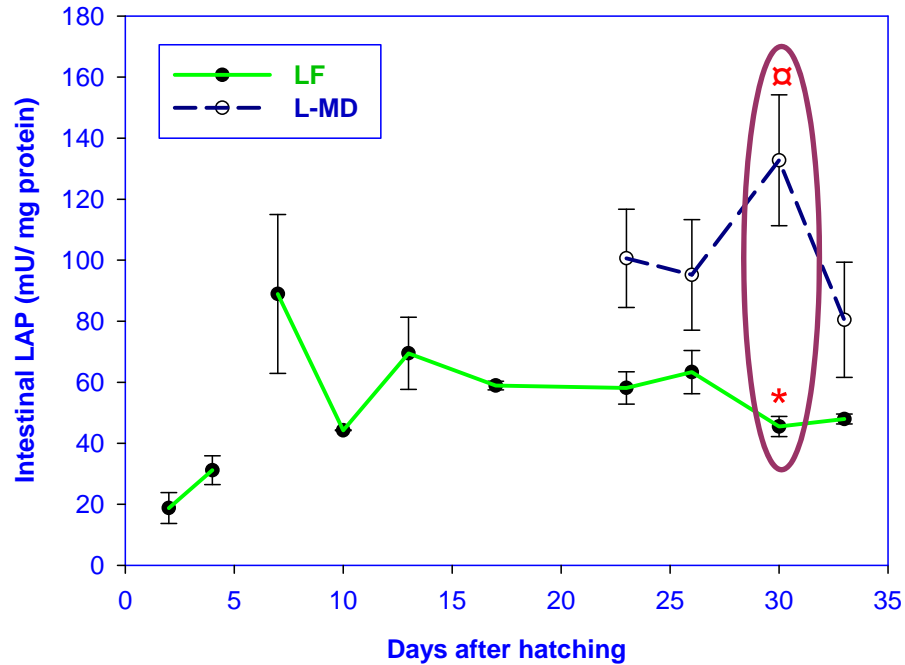
Specific activity of bbm Alkaline Phosphatase



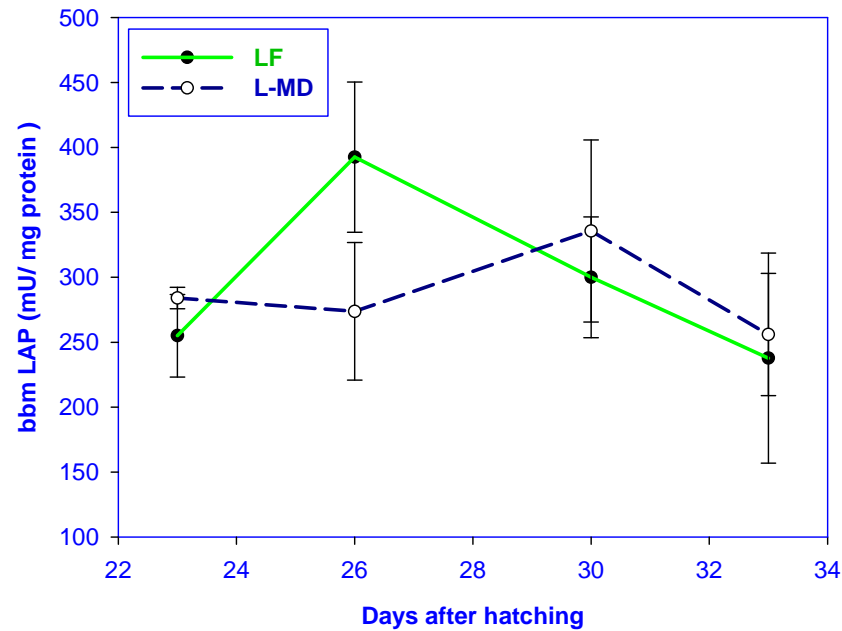
Individual activity of bbm Alkaline Phosphatase



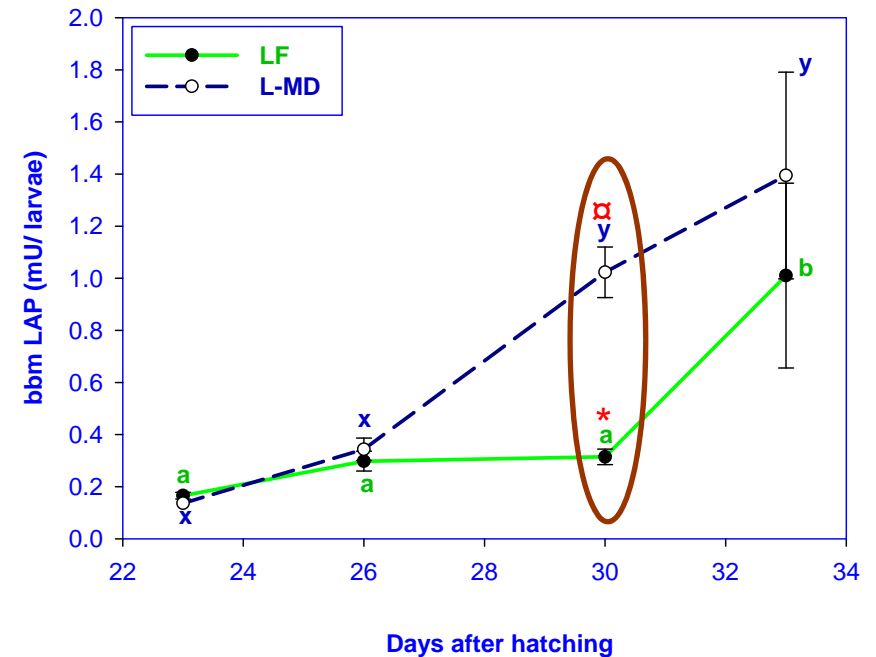
Activity of intestinal Leucine Aminopeptidase



Activity of bbm Leucine Aminopeptidase

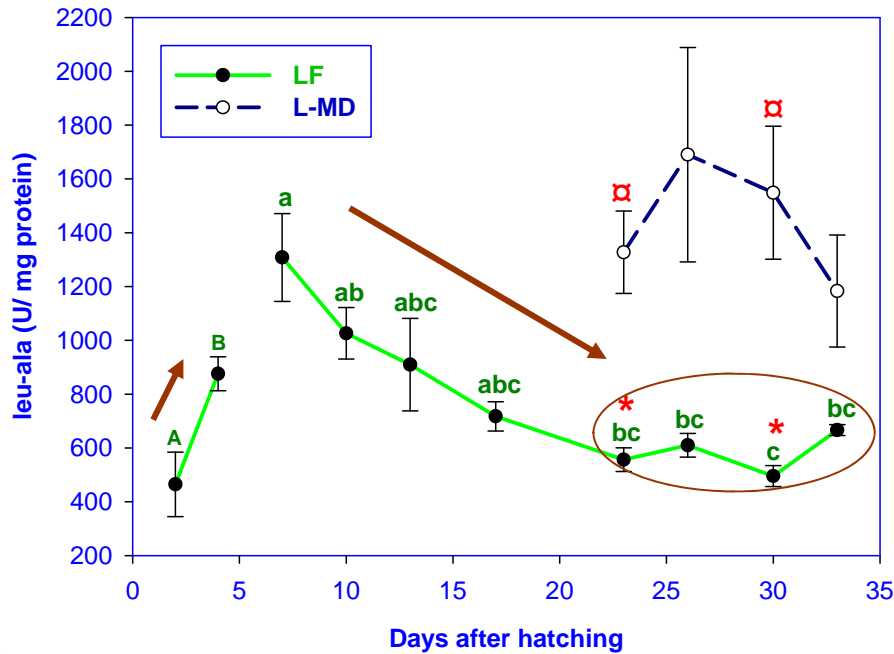


Specific activity

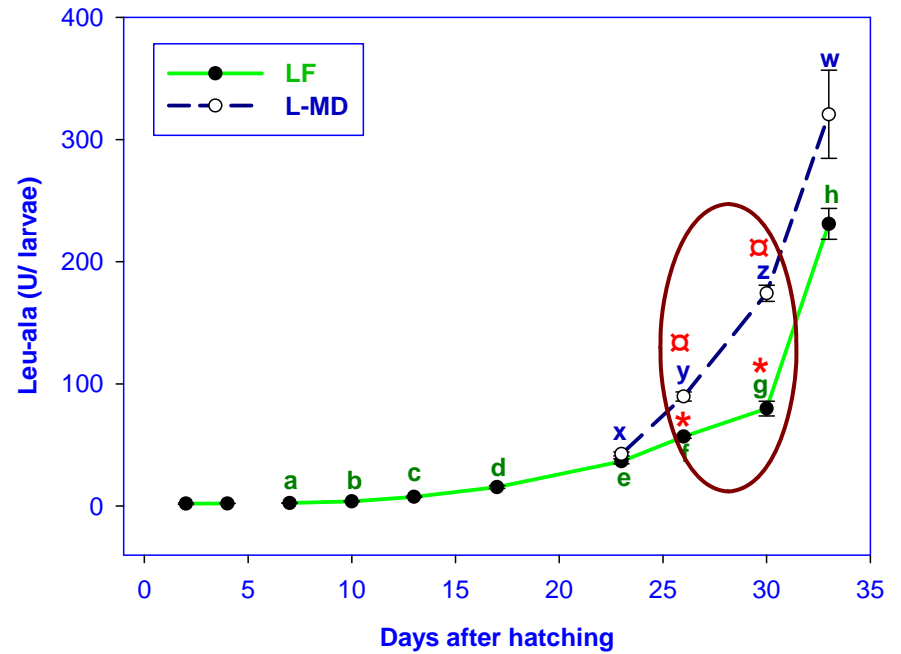


Individual activity

Activity of Leucine-alanine

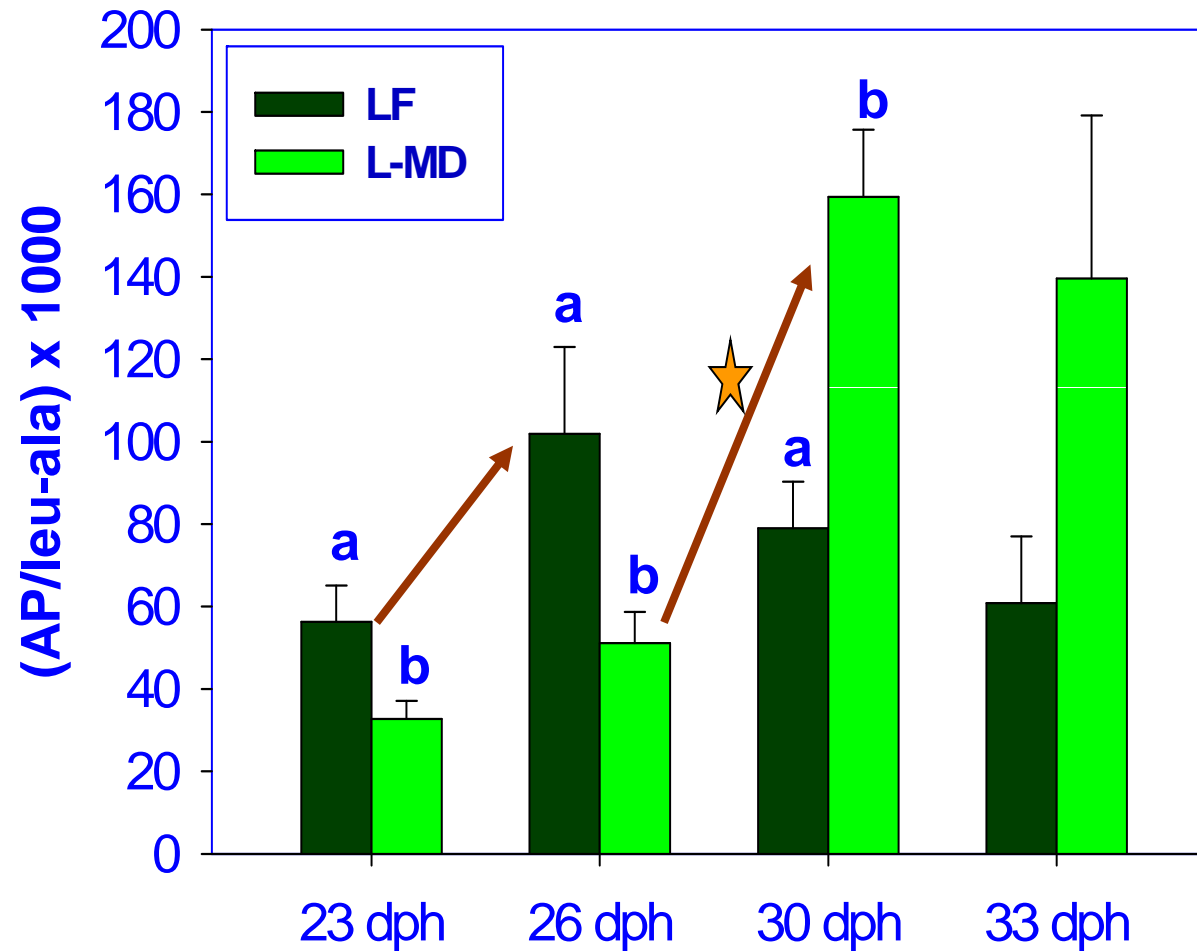


Specific activity



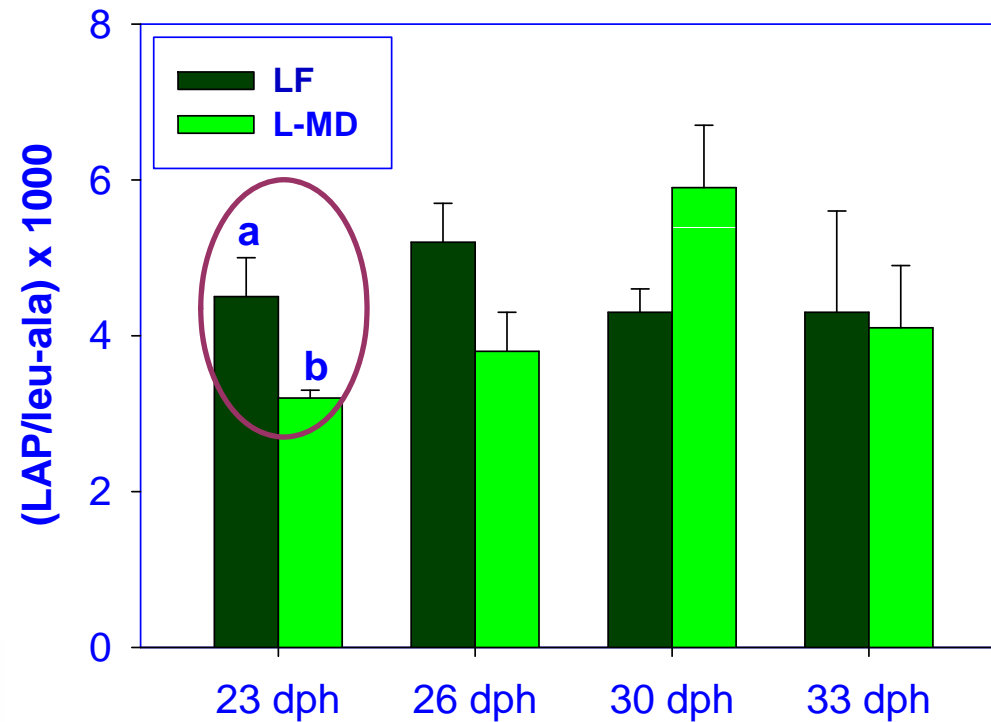
Individual activity

Gut maturation index



bbm AP/leu-ala

Gut maturation index



bbm LAP/leu-ala

Conclusions

- All the studied intestinal enzymes in cobia larvae were detected before onset of first feeding and their individual activity increased as larval growth
- LF larvae attained intestinal maturation on 26 dph (SL 17.0 ± 0.6 mm, 699 degree days), L-MD larvae delayed until 30 dph (SL of 20.0 ± 0.7 mm, 814 degree days), associated with lower survival rate
- Prolonged feeding of cobia post-larvae with *Artemia* after 28 dph reduced digestive capacity compared to those fed the microdiet

Acknowledgements

- The project “Building Advanced Research, Education and Extension Capacity for RIA-1” (Project No.SRV0033).
- Quota Scheme at Norwegian University of Science and Technology (NTNU), Trondheim
- Colleagues at RIA1, Cua Lo, Vietnam
- T. Bardal and P.-A Wold at Department of Biology (NTNU)

Thank you for your attention



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