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Unlocking the Potential of *Zophobas morio*: Nutritional and Reproductive Insights

- Soulioti P.*, Adamaki-Sotiraki C., Rumbos C.I., Athanassiou C.G.

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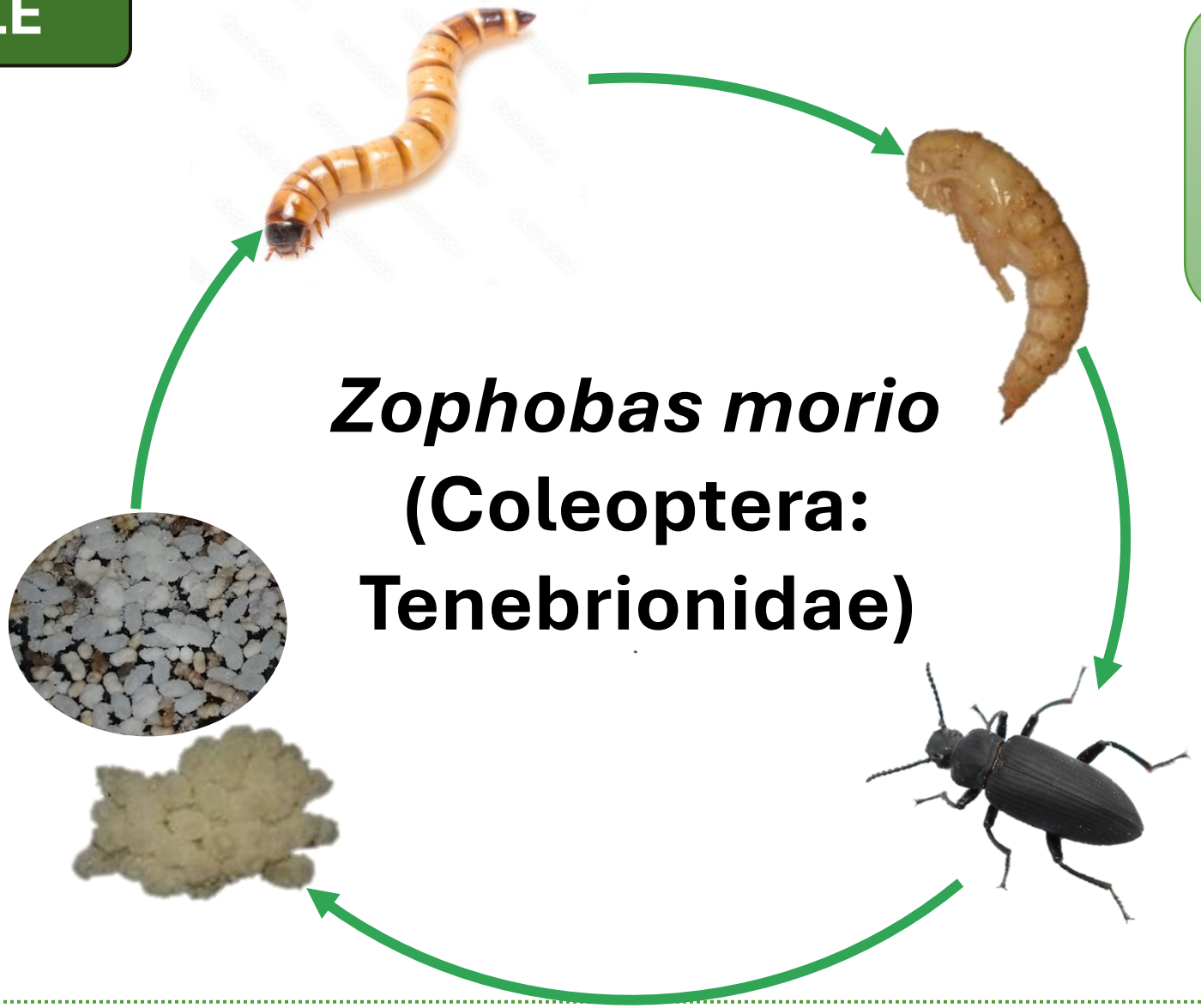
Zophobas morio (Coleoptera: Tenebrionidae)

- Central and South America
- The Superworm
- 50-60 mm

- Protein: 45.3 – 68.05 g/100g (DM)

LIFE CYCLE



Zophobas morio (Coleoptera: Tenebrionidae)

Pupation inhibition induced by crowded conditions

BIOASSAY I

BIOASSAY II

BIOASSAY III

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BIOASSAY I

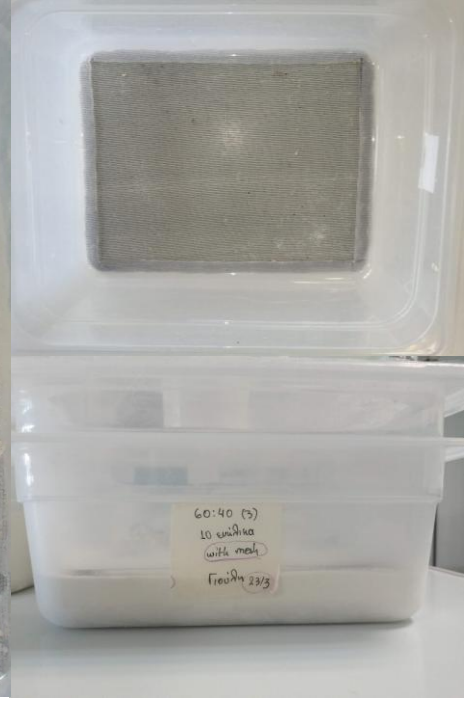
BIOASSAY I: MATERIALS & METHODS

♀ ♂

50:50

60:40

80:20



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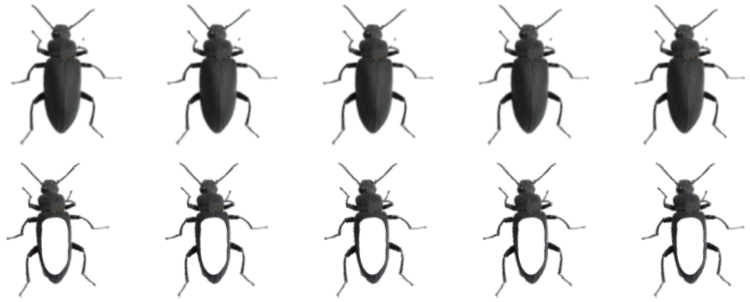
BIOASSAY I: MATERIALS & METHODS

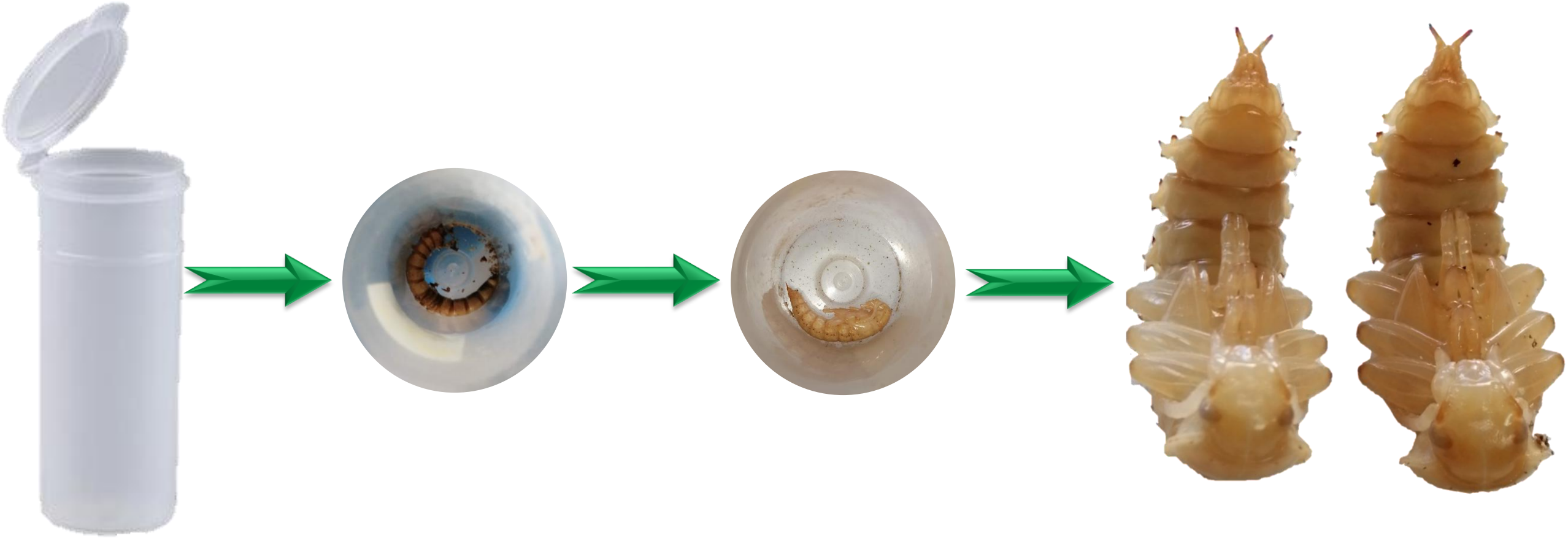
50:50

CONTROL



Moisture source: Agar gel

BIOASSAY I: MATERIALS & METHODS



BIOASSAY I: MATERIALS & METHODS

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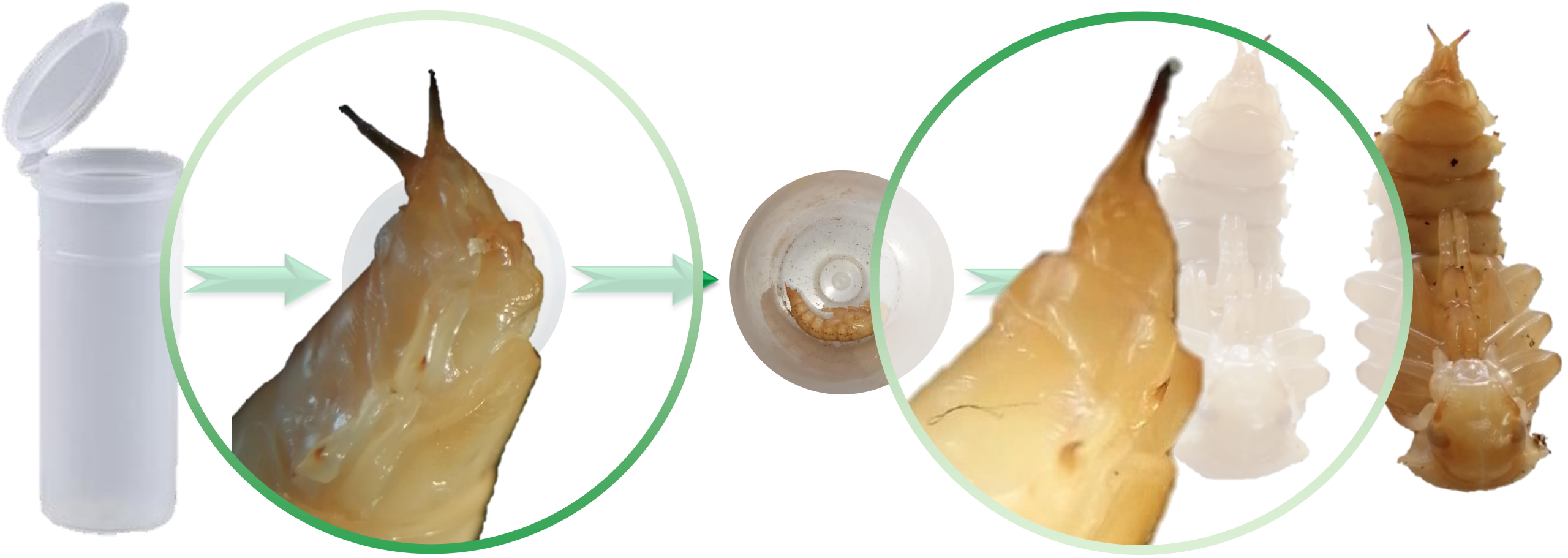
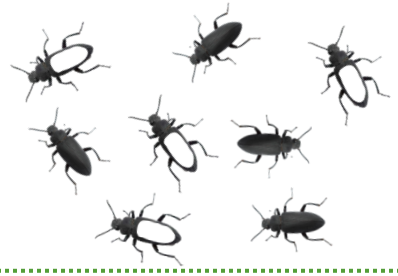


BIOASSAY I: MATERIALS & METHODS

BIOASSAY I: MATERIALS & METHODS

Egg counting

Alive adults counting



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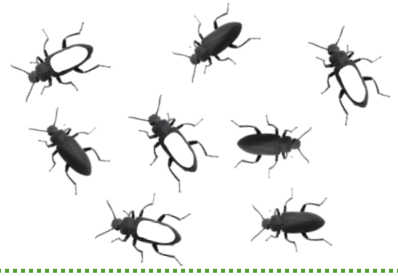

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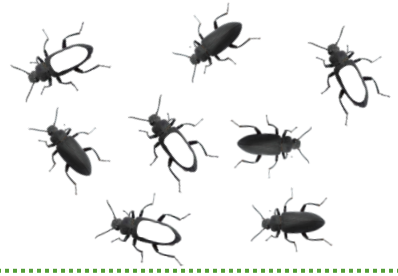
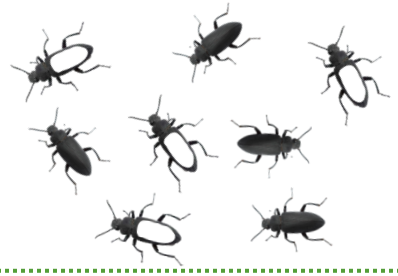


Egg Placement in New Flour-Supplemented Vials

BIOASSAY I: MATERIALS & METHODS

Egg counting

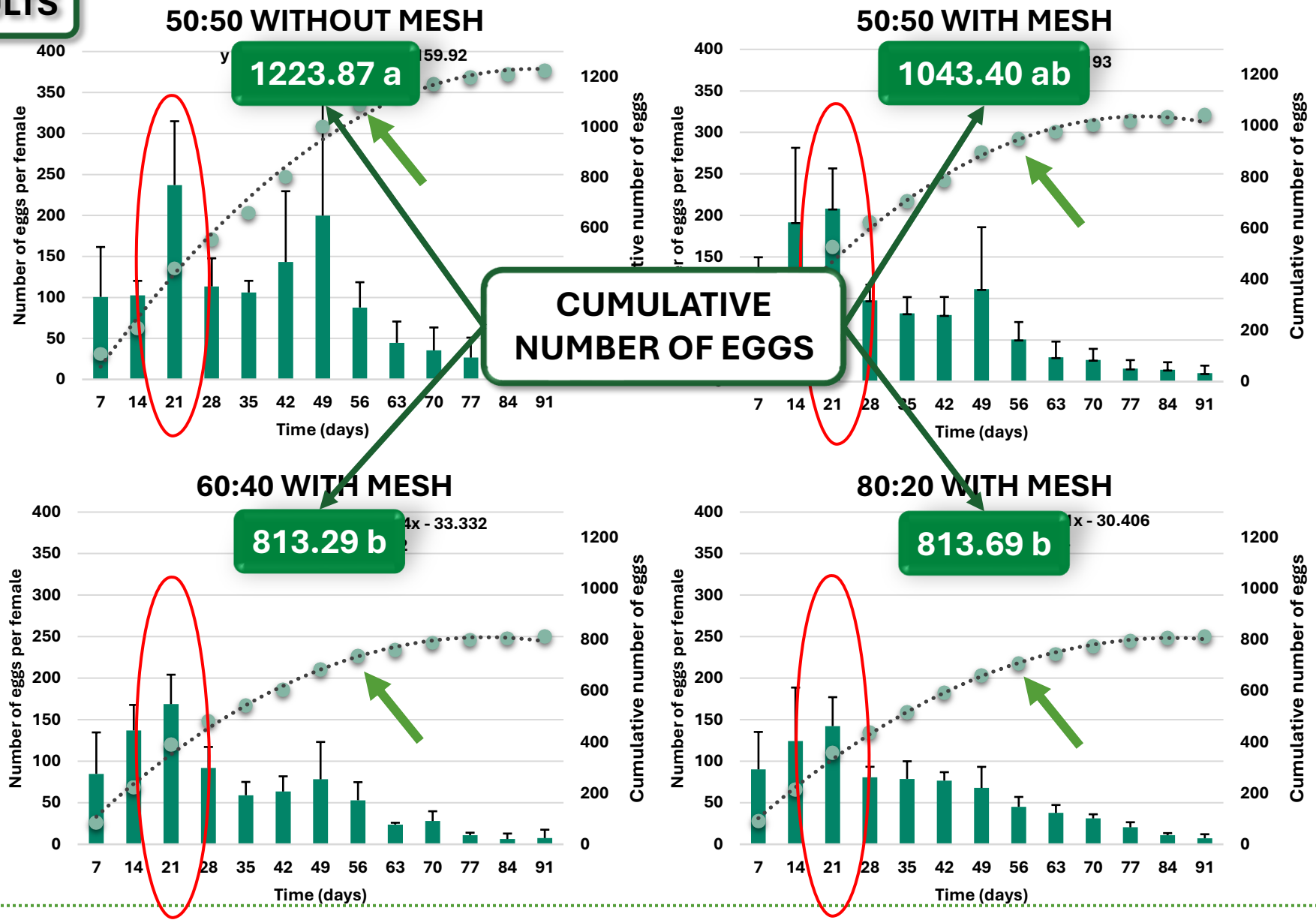
Alive adults counting



Egg Placement in New Flour-Supplemented Vials

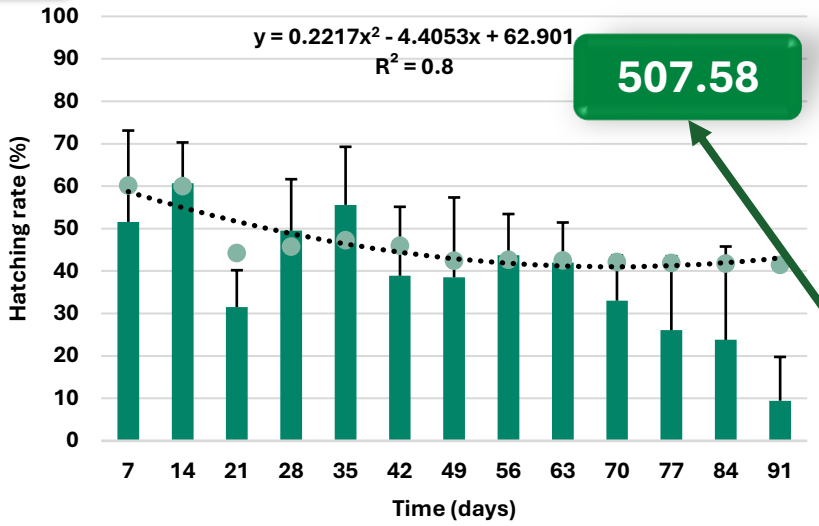
Hatched Larvae Counting

BIOASSAY I: RESULTS



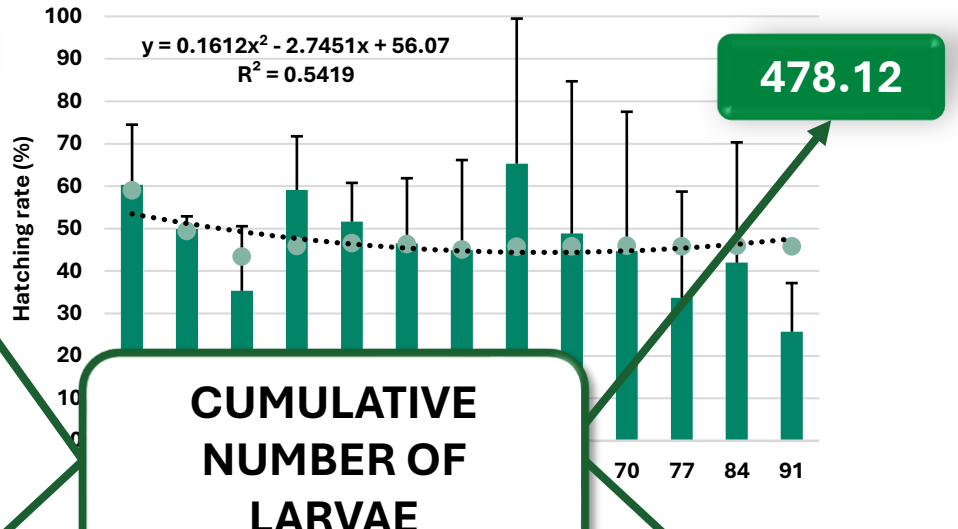
BIOASSAY I: RESULTS

50:50 WITHOUT MESH



507.58

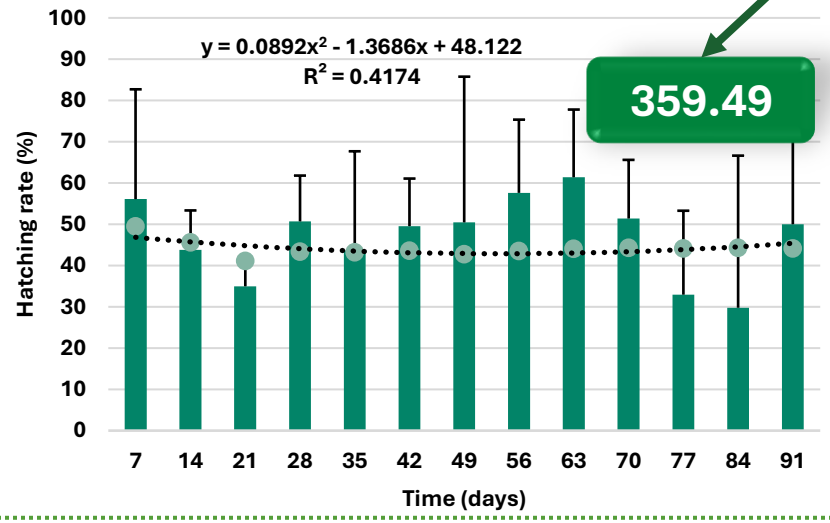
50:50 WITH MESH



478.12

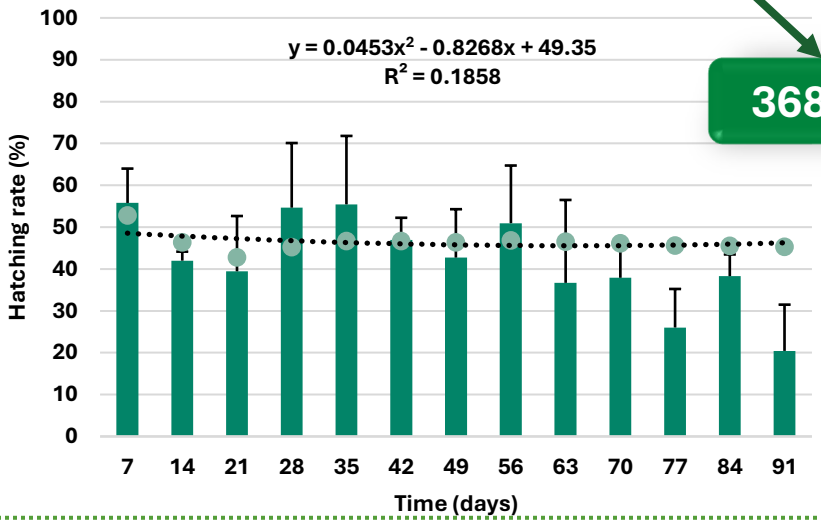
CUMULATIVE NUMBER OF LARVAE

60:40 WITH MESH



359.49

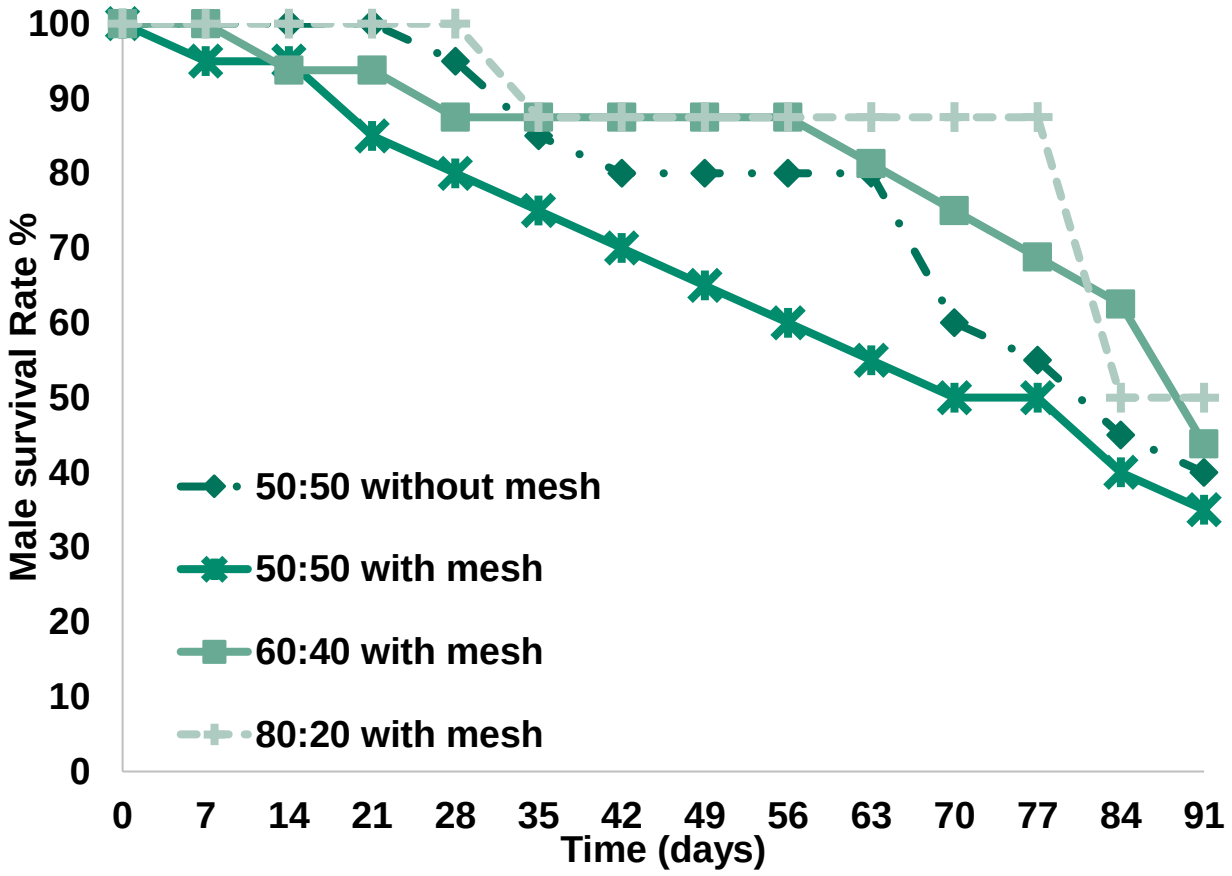
80:20 WITH MESH



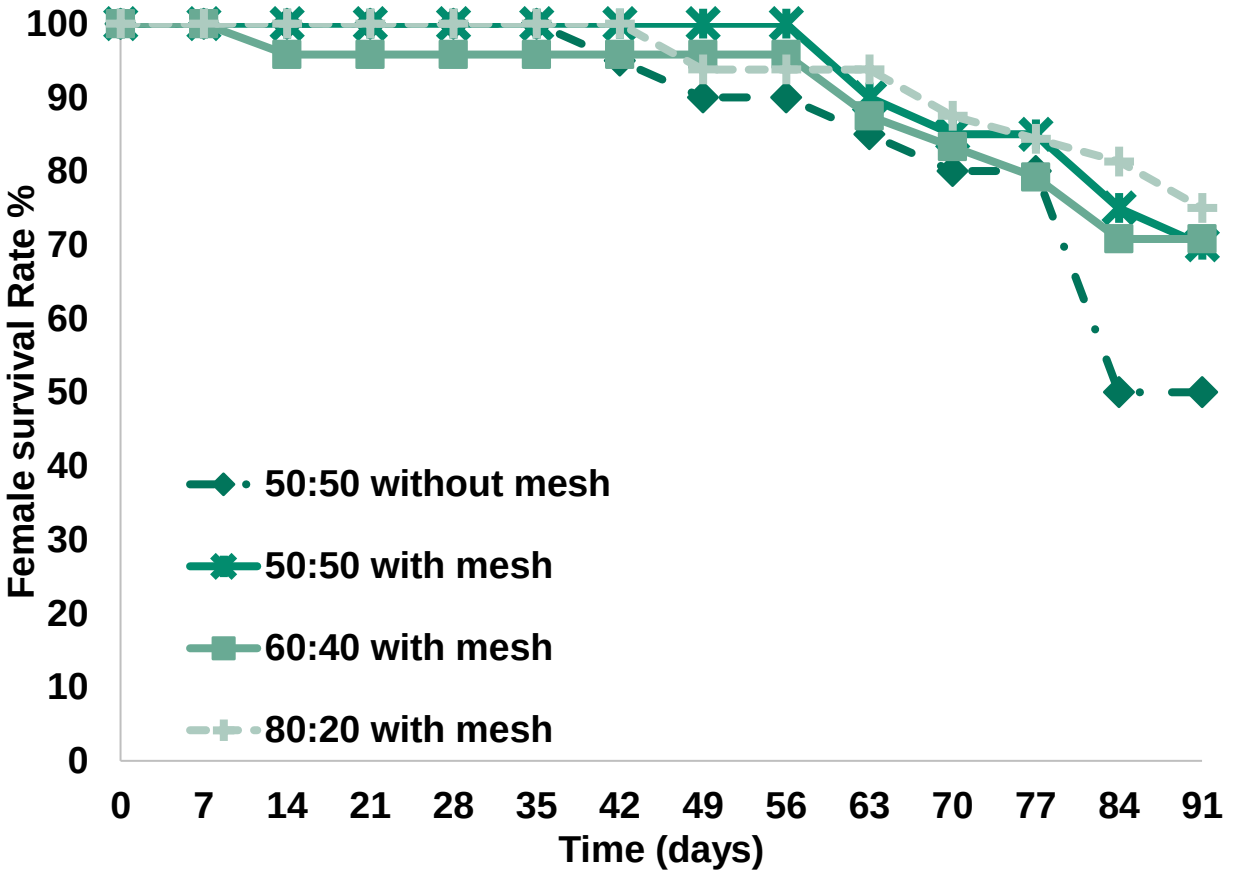
368.88

BIOASSAY I: RESULTS

Final Survival Rate Range: 35 – 50%



Final Survival Rate Range: 50 – 75%



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BIOASSAY I

BIOASSAY II

BIOASSAY III

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BIOASSAY II

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BIOASSAY II: MATERIALS & METHODS

Wheat bran

+

Dry instant yeast

PROTEIN

15.2%

20%

22.5%

25%

27.5%

30%

Larvae Weighing

Larvae Counting

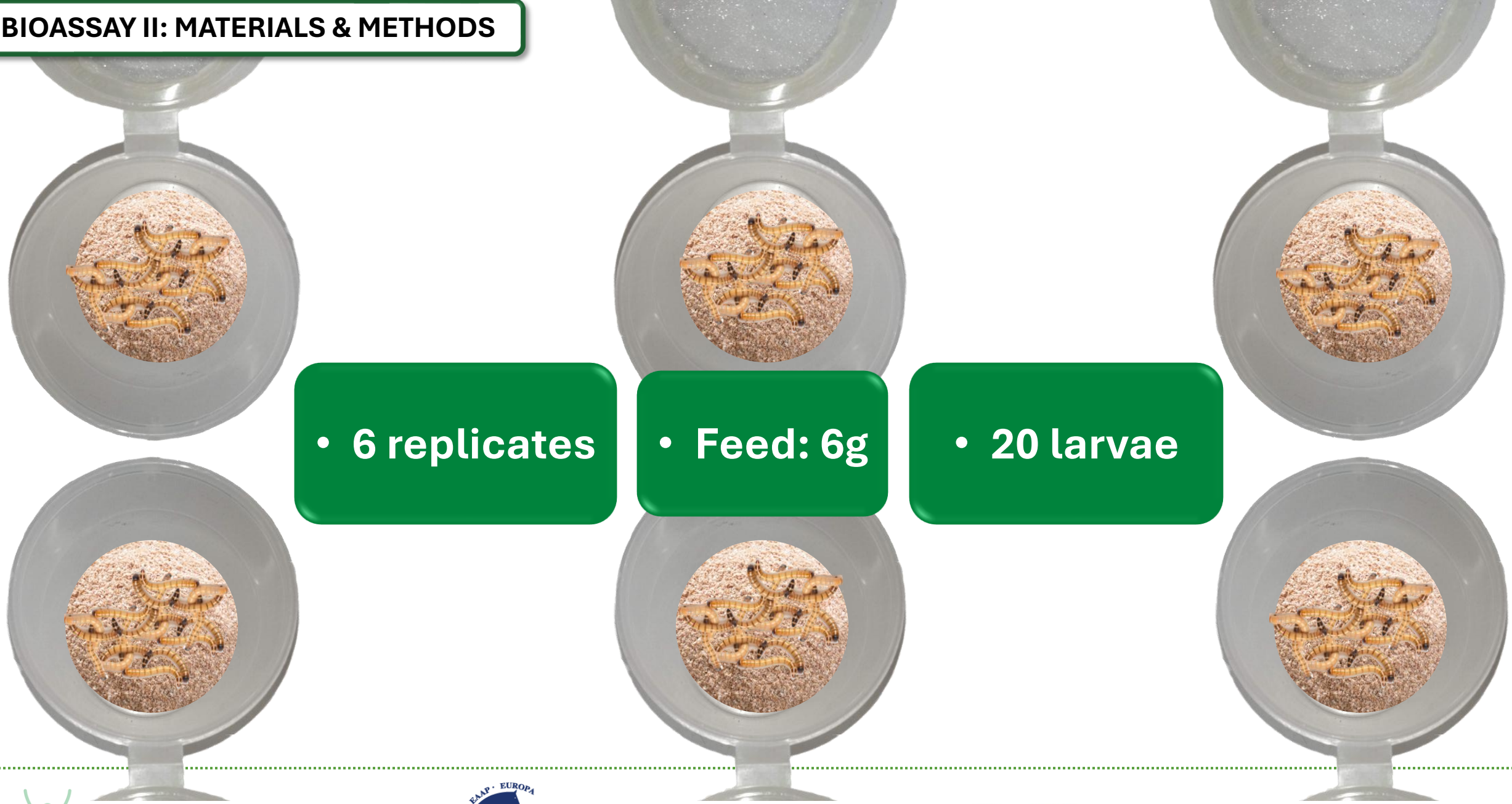
BIOASSAY II: MATERIALS & METHODS

- 6 replicates

BIOASSAY II: MATERIALS & METHODS

- 6 replicates
- Feed: 6g

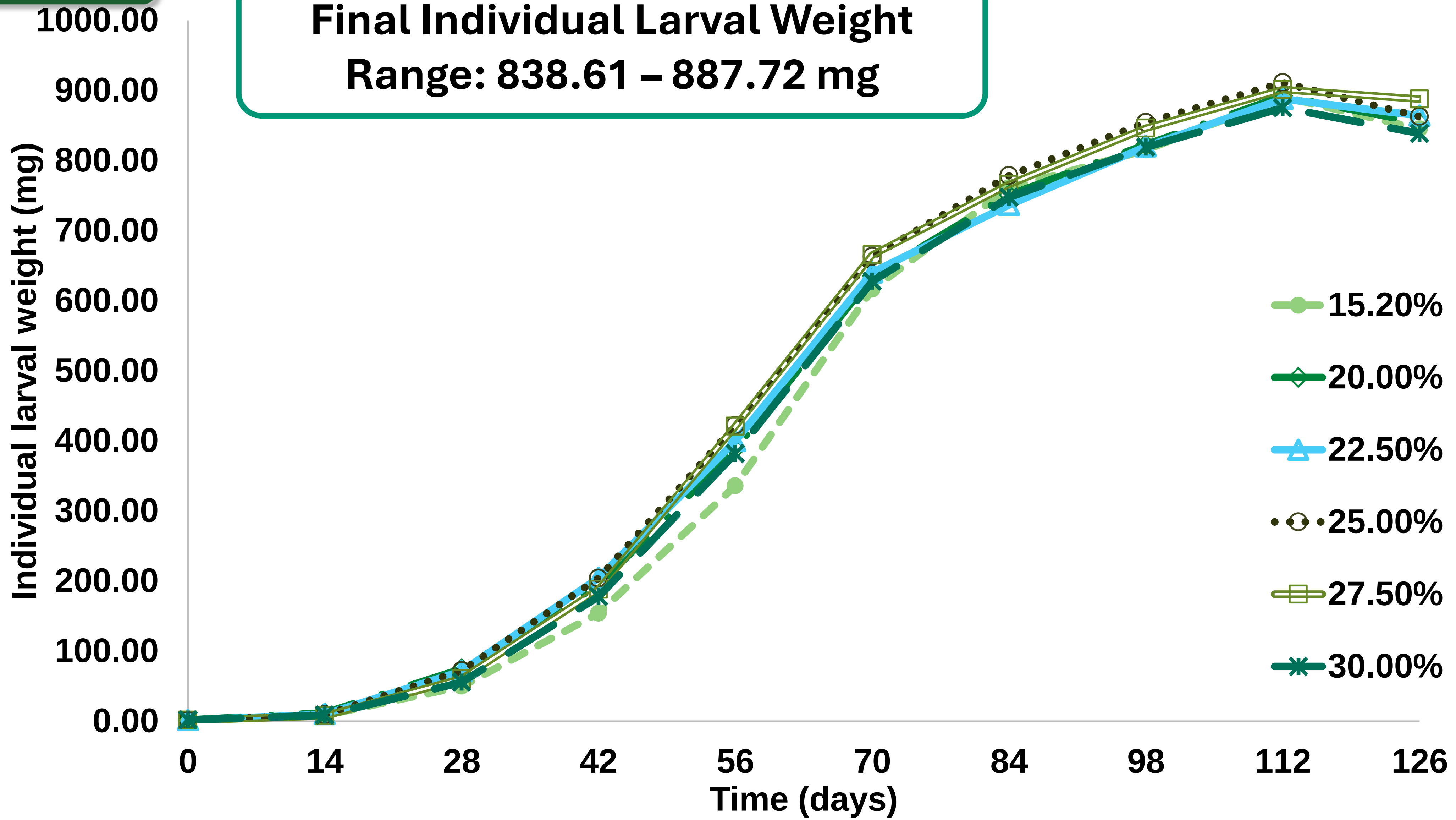
BIOASSAY II: MATERIALS & METHODS



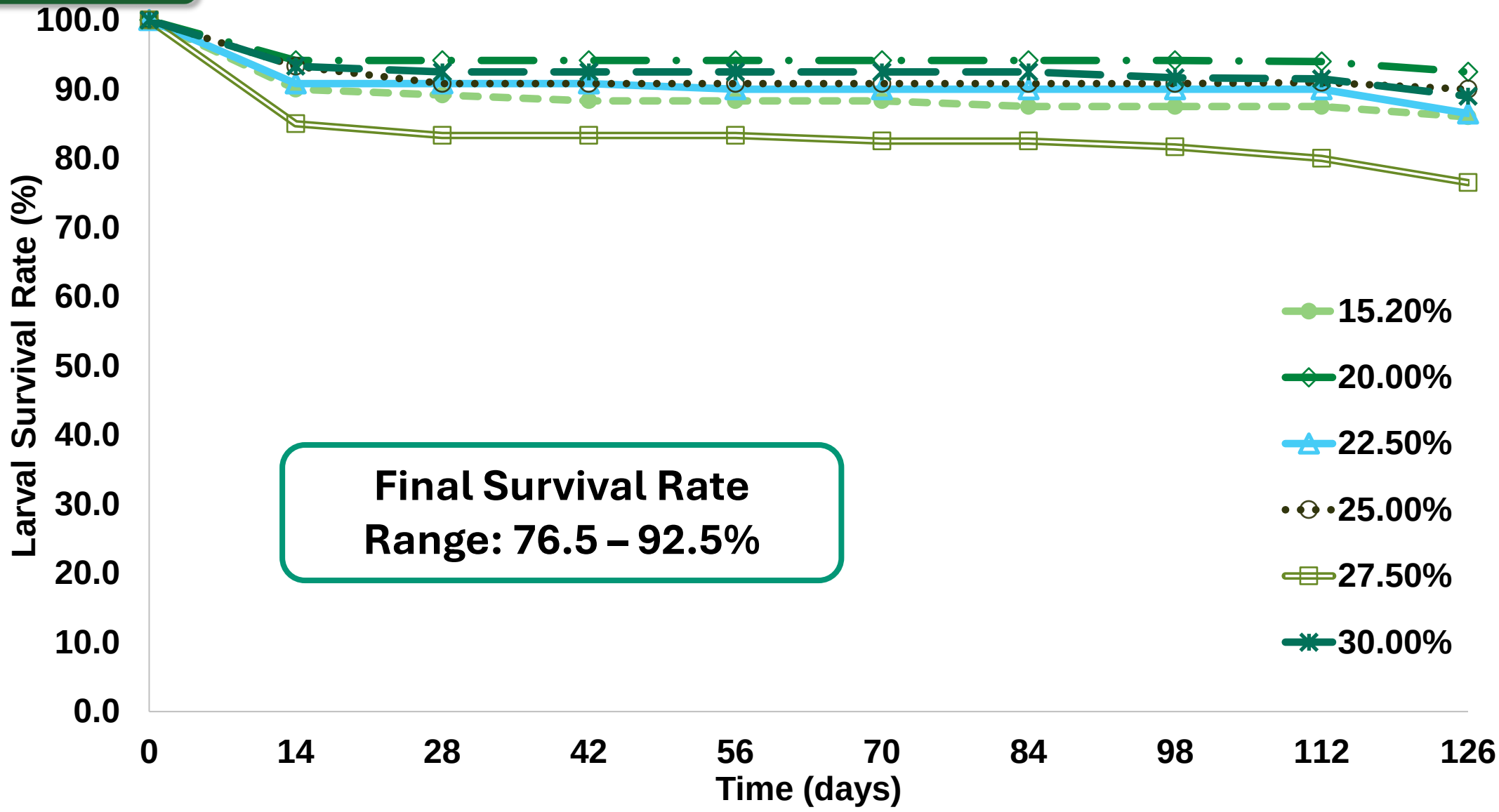
- 6 replicates
- Feed: 6g
- 20 larvae

BIOASSAY II: RESULTS

Final Individual Larval Weight Range: 838.61 – 887.72 mg



BIOASSAY II: RESULTS



BIOASSAY II: RESULTS

EFFICIENCY INDICATORS				
PROTEIN CONTENT	FCR	ECI (%)	SGR (%)	ECD (%)
15.2%	3.6 ± 0.14 a	27.9 ± 0.01 b	11.6 ± 0 b	46.6 ± 0.03 ab
20.0%	3.3 ± 0.18 b	30.4 ± 0.02 a	12.6 ± 0.01 a	49.1 ± 0.04 a
22.5%	3.5 ± 0.15 ab	28.8 ± 0.01 ab	11.9 ± 0.01 ab	46.3 ± 0.02 ab
25%	3.4 ± 0.14 b	29.9 ± 0.01 a	12.4 ± 0.01 a	49.3 ± 0.02 ab
27.5%	3.9 ± 0.36 a	26.1 ± 0.03 b	10.9 ± 0.01 b	39.8 ± 0.05 b
30.0%	3.4 ± 0.24 ab	29.2 ± 0.02 ab	12.1 ± 0.01 ab	45.4 ± 0.04 ab

Efficiency indicators: Feed Conversion Ratio (FCR), Efficiency of conversion of Ingested Food (ECI), Specific Growth Rate (SGR), Efficiency of Digested Food Conversion

BIOASSAY I

BIOASSAY II

BIOASSAY III

BIOASSAY III

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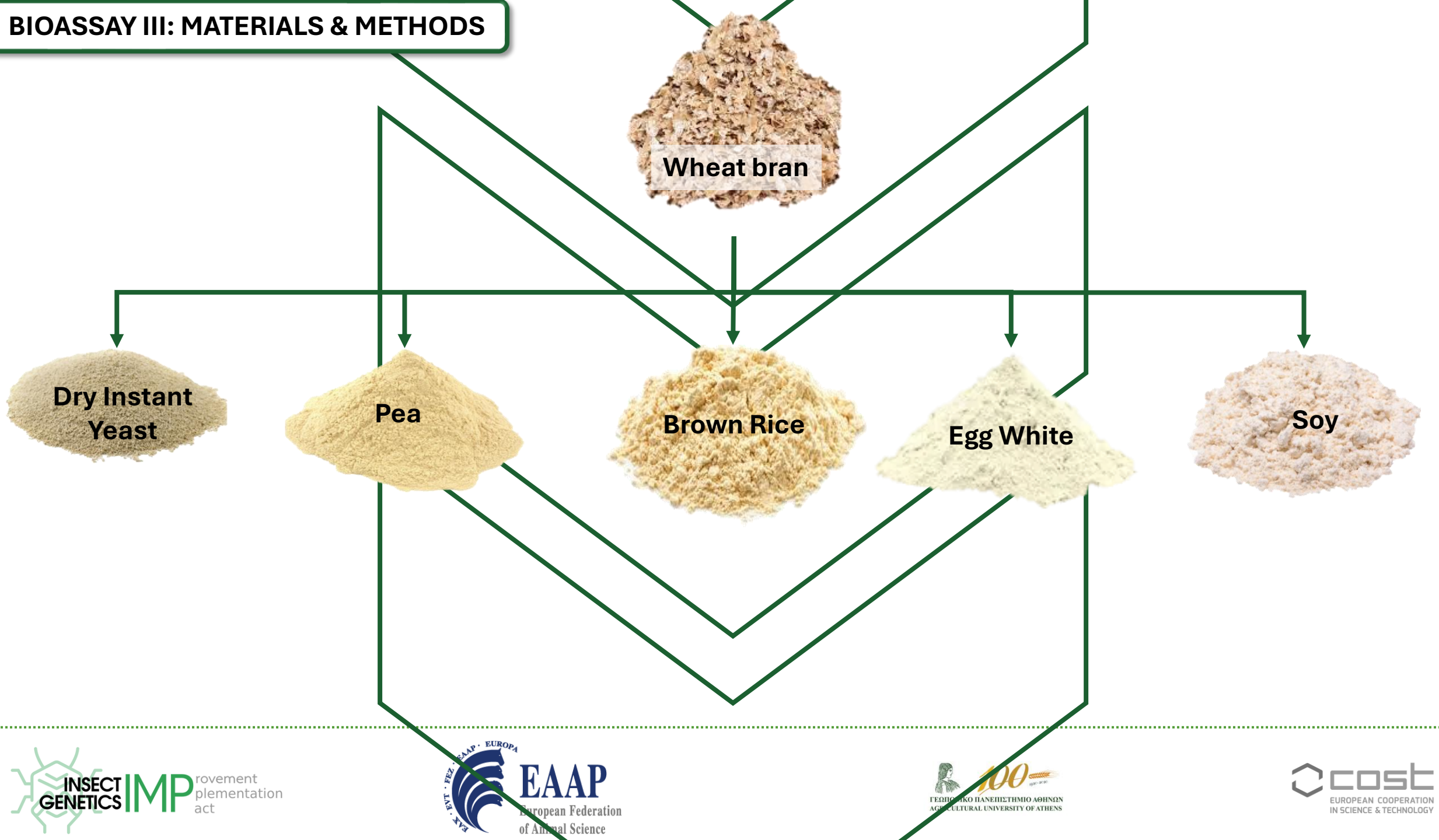
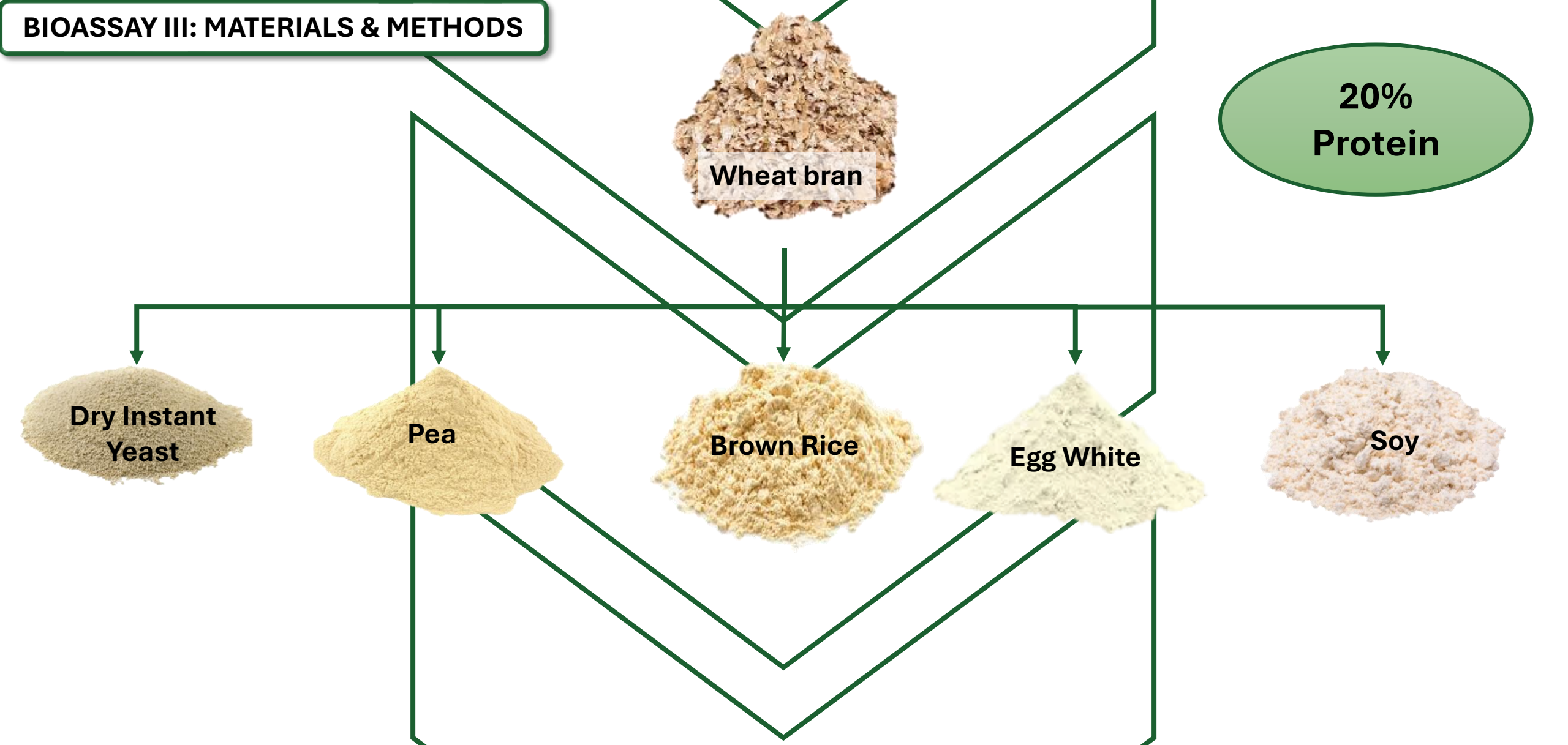
BIOASSAY III: MATERIALS & METHODS



BIOASSAY III: MATERIALS & METHODS



BIOASSAY III: MATERIALS & METHODS

Wheat bran

20% Protein

Dry Instant Yeast

Pea

Brown Rice

Egg White

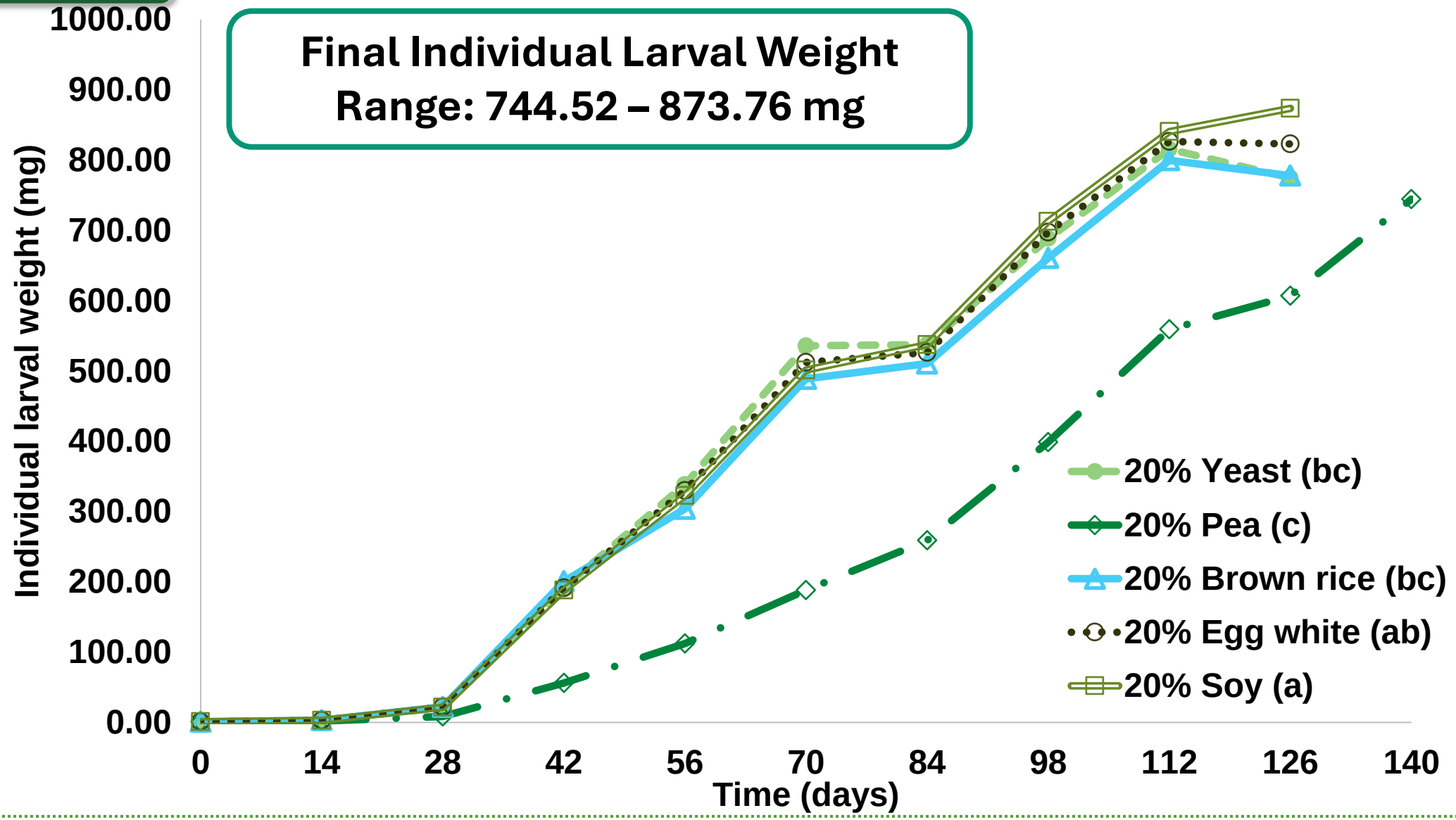
Soy

Larvae Weighing

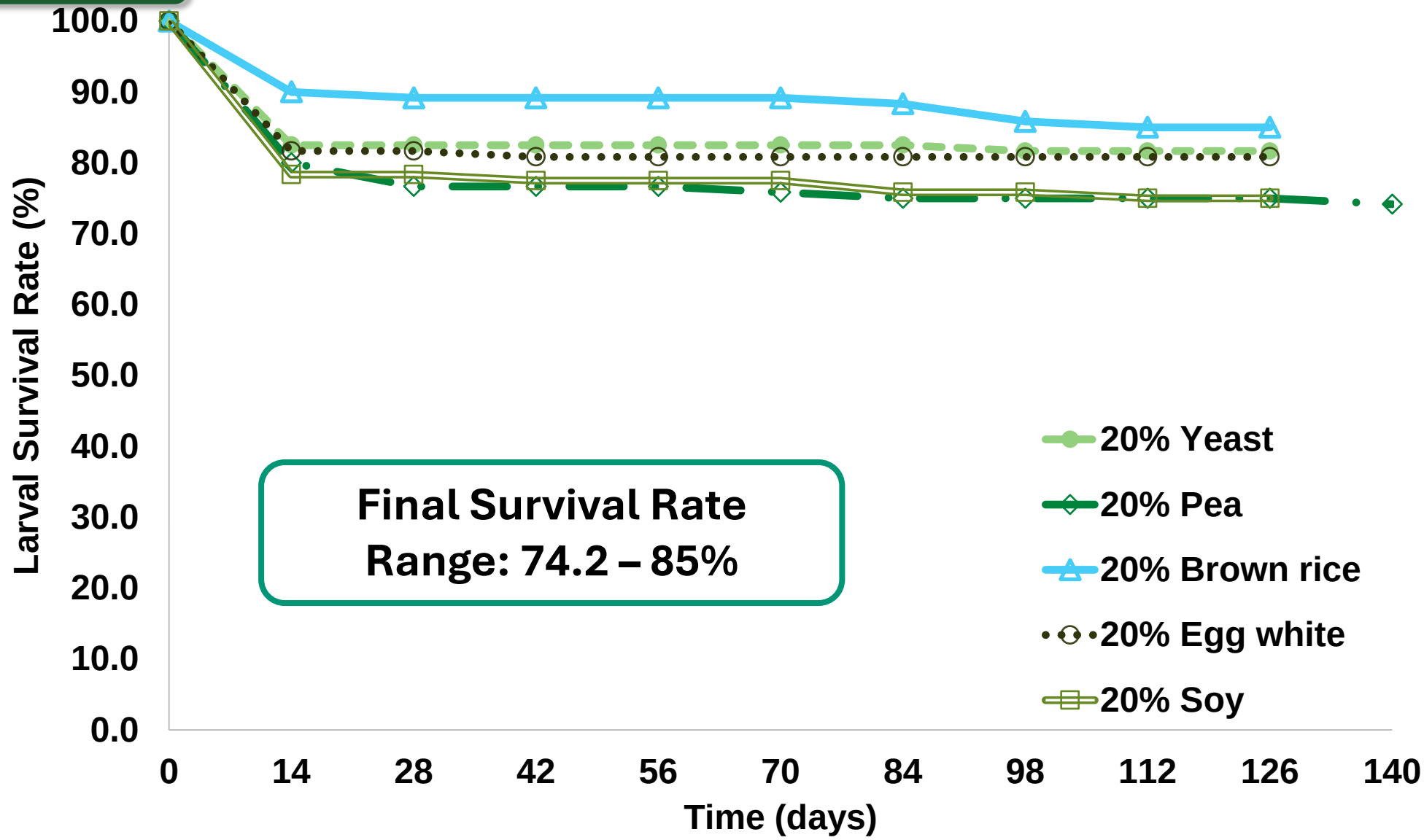
Larvae Counting

BIOASSAY III: RESULTS

Final Individual Larval Weight
Range: 744.52 – 873.76 mg



BIOASSAY III: RESULTS



Final Survival Rate
Range: 74.2 – 85%

BIOASSAY III: RESULTS

EFFICIENCY INDICATORS				
DIETS	**FCR**	**ECI (%)**	**SGR (%)**	**ECD (%)**
DRY INSTANT YEAST	3.7 ± 0.9 a	28.2 ± 0.05	10.4 ± 0.01 a	52.4 ± 0.06 c
PEA	3.6 ± 0.3 a	28.2 ± 0.03	7.9 ± 0.01 b	95.1 ± 0.13 a
BROWN RICE	3.0 ± 0.2 b	33.9 ± 0.03	10.5 ± 0.01 a	63.6 ± 0.05 bc
EGG WHITE	3.0 ± 0.3 b	34.0 ± 0.03	10.5 ± 0.01 a	71.4 ± 0.04 ab
SOY	3.0 ± 0.4 b	33.4 ± 0.04	10.3 ± 0.01 a	68.3 ± 0.06 ab

Efficiency indicators: Feed Conversion Ratio (FCR), Efficiency of conversion of Ingested Food (ECI), Specific Growth Rate (SGR), Efficiency of Digested Food Conversion

Key Insights

Key Insights

Bioassay I

FECUNDITY TRAITS: Sex ratio affects egg production

BUT NOT hatchability

Key Insights

Bioassay I — **FECUNDITY TRAITS: Sex ratio affects egg production BUT NOT hatchability**

Bioassay I — **Adult replacement** ⇨ **56th day**

Key Insights

Bioassay I — **FECUNDITY TRAITS: Sex ratio affects egg production BUT NOT hatchability**

Bioassay I — **Adult replacement** ⇨ **56th day**

Bioassay II — **Larval growth: Protein quantity** ⇨ **20%** **27.5%**

Key Insights

Bioassay I

FECUNDITY TRAITS: Sex ratio affects egg production
BUT NOT hatchability

Bioassay I

Adult replacement ⇨ **56th day**

Bioassay II

Larval growth: Protein quantity ⇨ **20%**
27.5%

Bioassay III

Larval growth: Protein quality ⇨
- **Soy**
- **Egg white**
- **Pea**

THANK YOU

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