Hermetia illucens meal as feed ingredient in Rainbow trout farm – preliminary data of a commercial scenario

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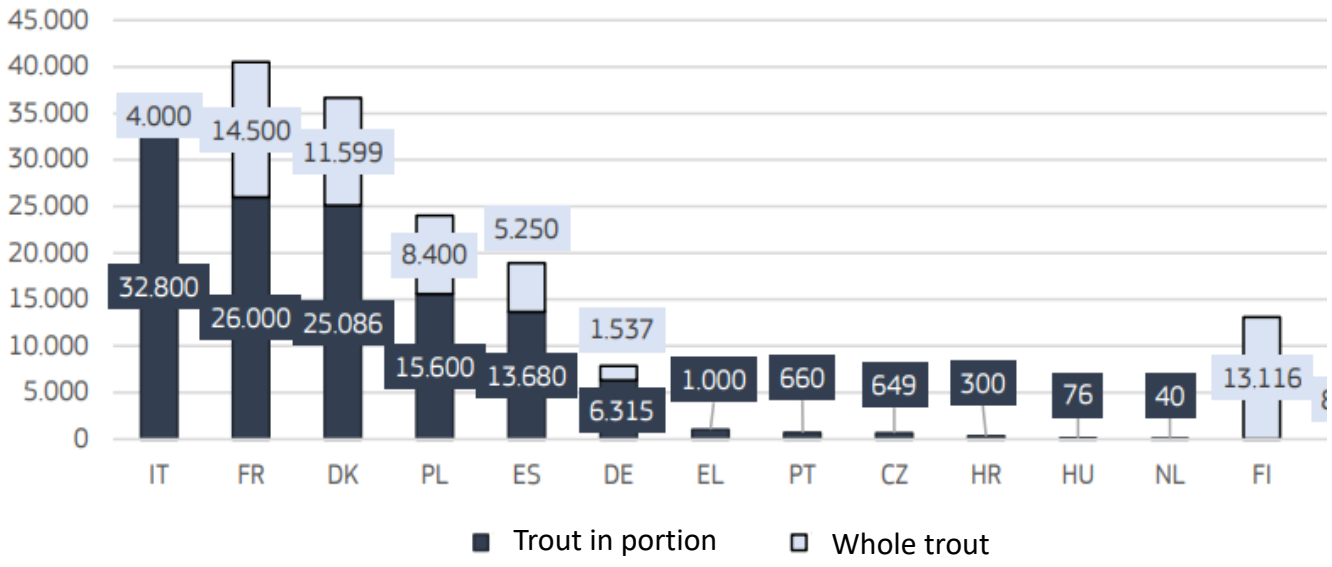
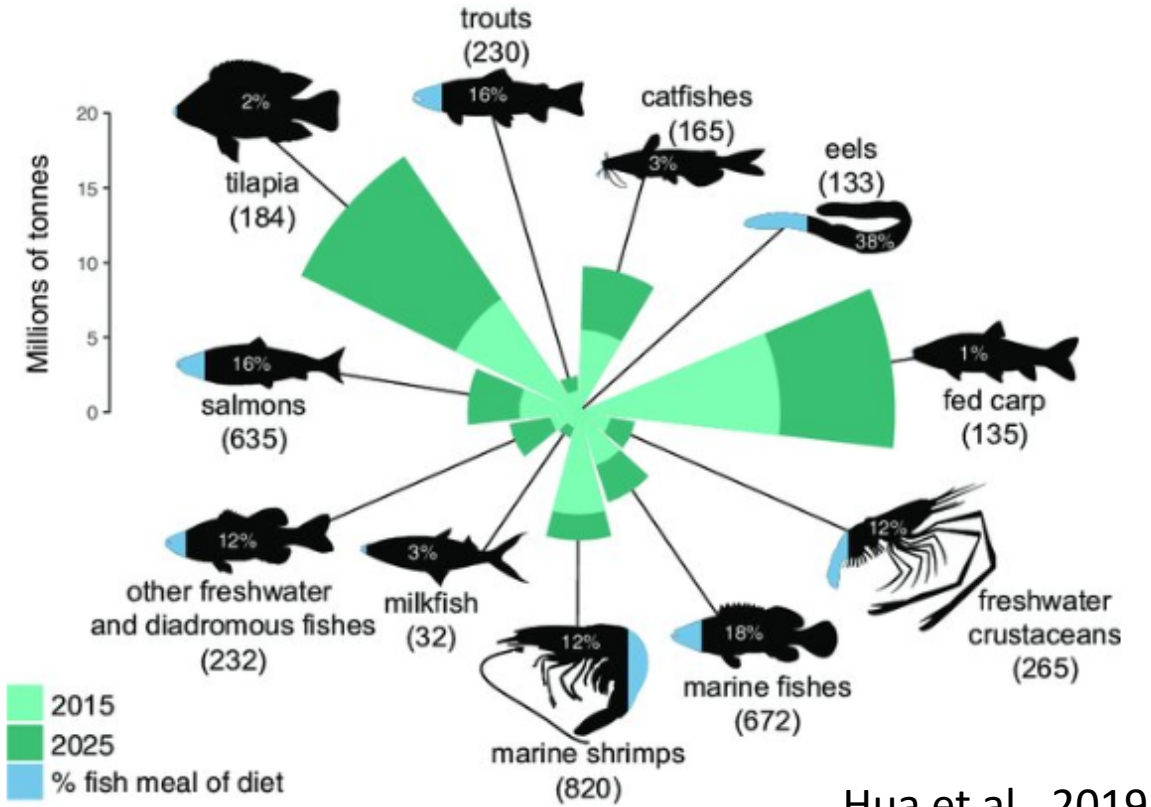
Why trout?



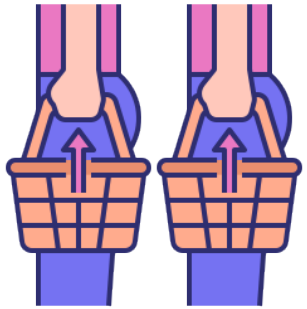
FEAP, 2018

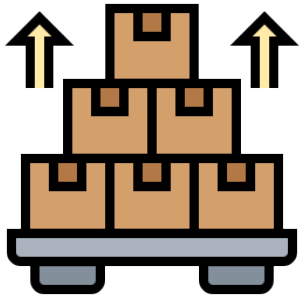


Hua et al., 2019

Why insects?

Protein shortage of the main sources





From 1960 to now

The soybean meal production

increased 300 million tonnes

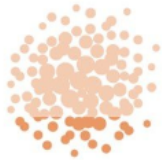
Main driver

Yields improvement

Extension of land use

The fish meal production

increased 7 million tonnes



30%

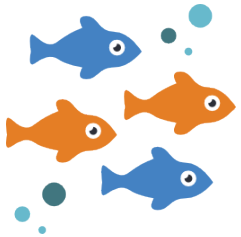
of the world's fishmeal production already comes from byproducts

51%

of the total fish oil production already comes from byproducts

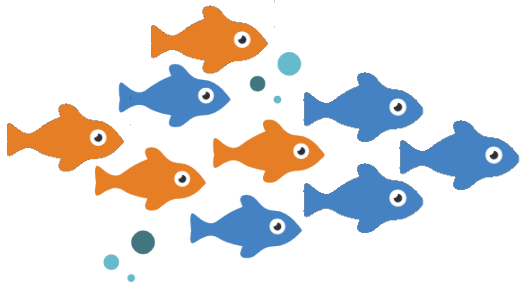
IFFO,2022

Literature



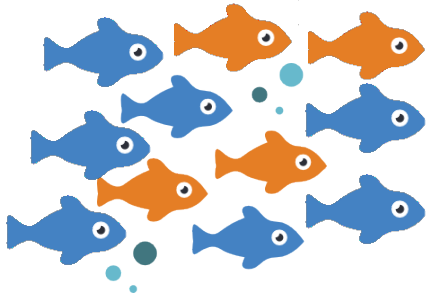
10/15 fish/tank

Dietz et al., 2023



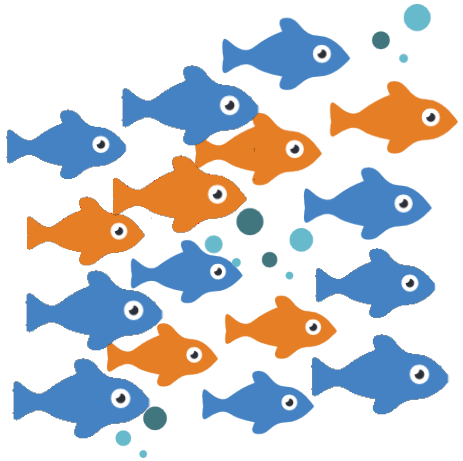
24 fish/tank

Caimi et al., 2021



30 fish/tank

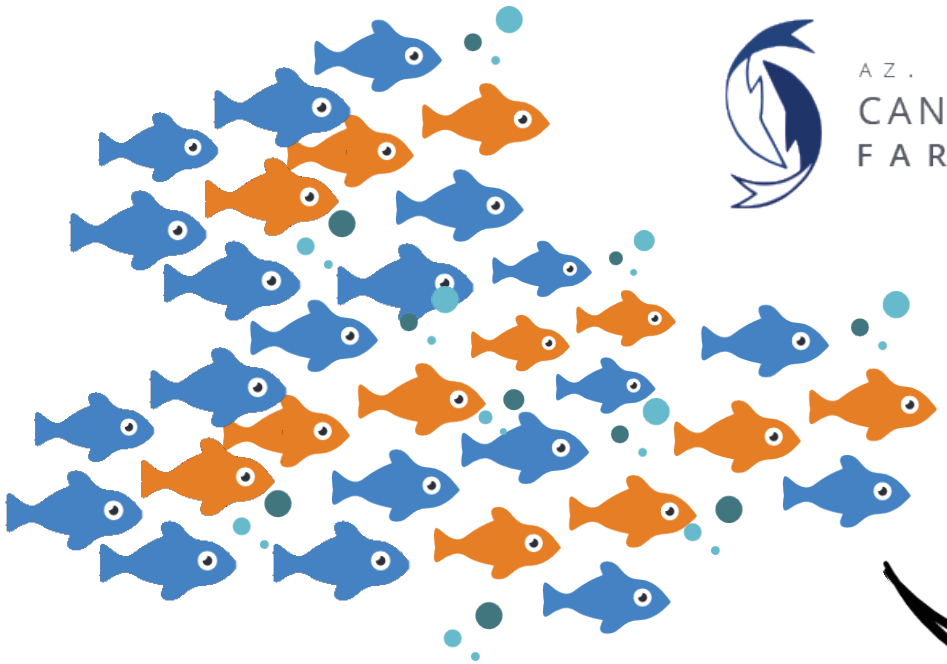
Melenchón et al., 2020



50 fish/tank

Biasato et al., 2022

Materials and Methods



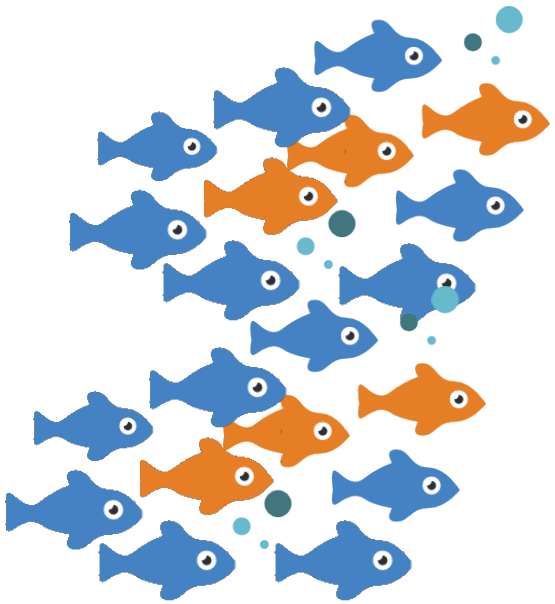
AZ. AGRICOLA CANALICAVOUR FARIANO

130 fish/tank
117.1 ± 6.4 g

replicates

Ingredients	HI0 (g/kg)
Wheat soft	15.3
Soy meal	18
Soya protein conc.	7.5
Fish meal	20.3
Feather meal	6.5
Poultry meal	8
Blood meal	6
Hermetia meal	0
Fish oil	15.7
Monocalcium Phospate	1
Vit/Min premix	1.7

Materials and Methods



130 fish/tank
117.1 ± 6.4 g

replicates

Ingredients (g/kg)	HI2.5	HI5	HI10
Wheat soft	15.3	15.3	14.6
Soy meal	18	18	18
Soya protein conc.	7.5	7.5	7.5
Fish meal	17.8	15.3	11
Feather meal	6.5	6.5	6.5
Poultry meal	8	8	8
Blood meal	6	6	6
Hermetia meal	2.5	5	10
Fish oil	15.7	15.7	15.7
Monocalcium Phospate	1	1	1
Vit/Min premix	1.7	1.7	1.7

Chemical composition

	DM%	Ash, %	CP, %	EE, %	Chitin, %	GE, MJ/kg
HI0	93.80	8.89	44,60	17.18	0.00	21,82
HI2.5	95.91	8.98	45,38	17.06	0.26	21,85
HI5	94.14	8.76	44,41	17.35	0.57	21,71
HI10	93.92	8.67	45,57	16.74	1.02	21,80

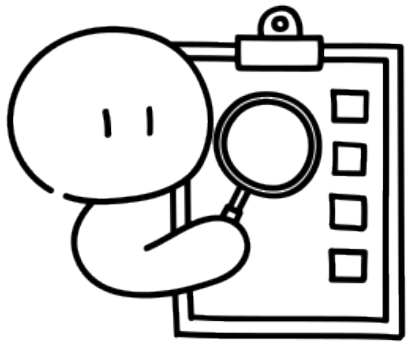
as it

	BSF meal
DM%	93,90
Ash %	10,48
CP %	44,05
EE%	7,77
Chitin %	11,10
GE MJ/kg	20,03

as it

Growth performance

Mortality
Individual weight gain
Specific growth rate
Feed conversion ratio



$$FCR = \frac{feed\ consumed}{\Delta\ weight}$$

$$SGR = \frac{\Delta\ weight}{days}$$

Slaughtering performance

Carcass yield
Fulton's condition factor (K)
Coefficient of fatness
Hepatosomatic index
Viscerosomatic index

$$CY = \frac{(fish\ weight - gut + gonad\ weights)}{fish\ weight} \times 100$$

$$K = \frac{fish\ weight}{body\ lenght} \times 100$$

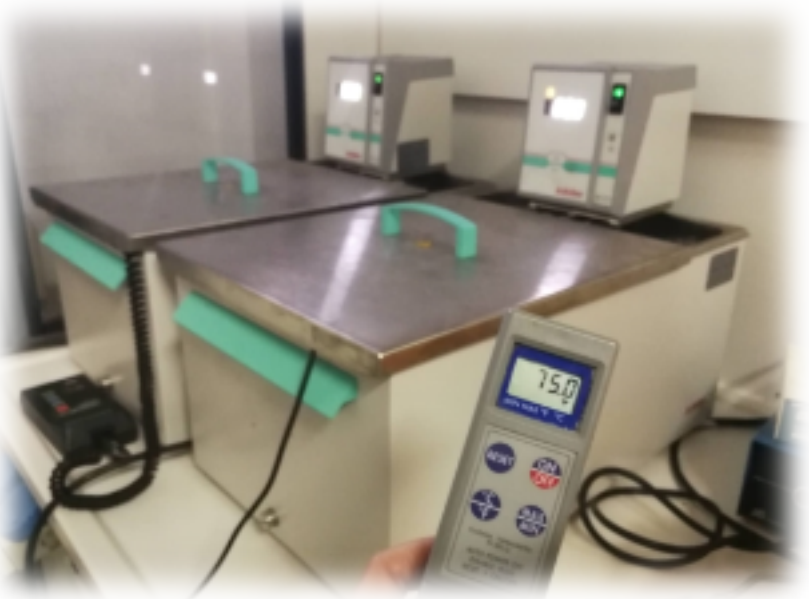
$$HSI = \frac{liver\ weight}{fish\ weight} \times 100$$

$$VSI = \frac{gut\ weight}{fish\ weight} \times 100$$

$$CF = \frac{previsceral\ fat\ weight}{fish\ weight} \times 100$$

Fillet physical quality

pH
Colour
Drip, thawing and cooking losses



Oxidative stress

And you thought there was stress in *your* life !

Oxidative stress biomarkers in serum
(dROM & OXY-Test)

Every 38 days

Free radicals

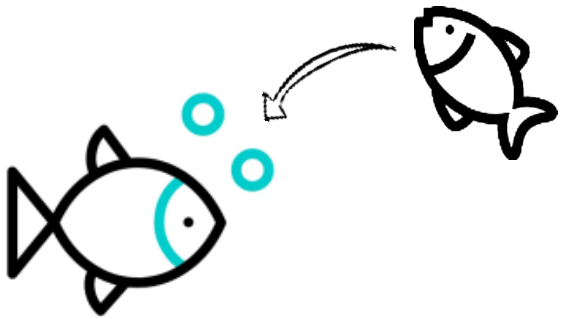
Products derived from physiological chemical reactions that use oxygen

They are reactive molecules that contain at least one unpaired electron

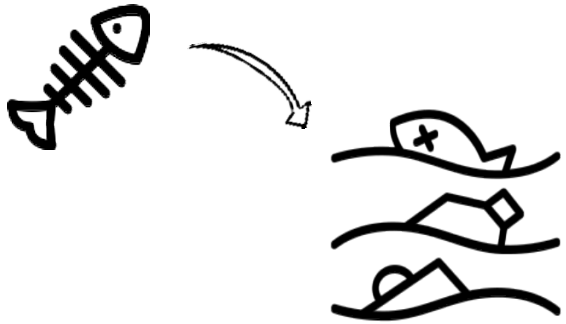
They are highly unstable and try to return to the equilibrium state by subtracting the electron from other atoms nearby.

When are they produced?

Cellular respiration



Muscular activity

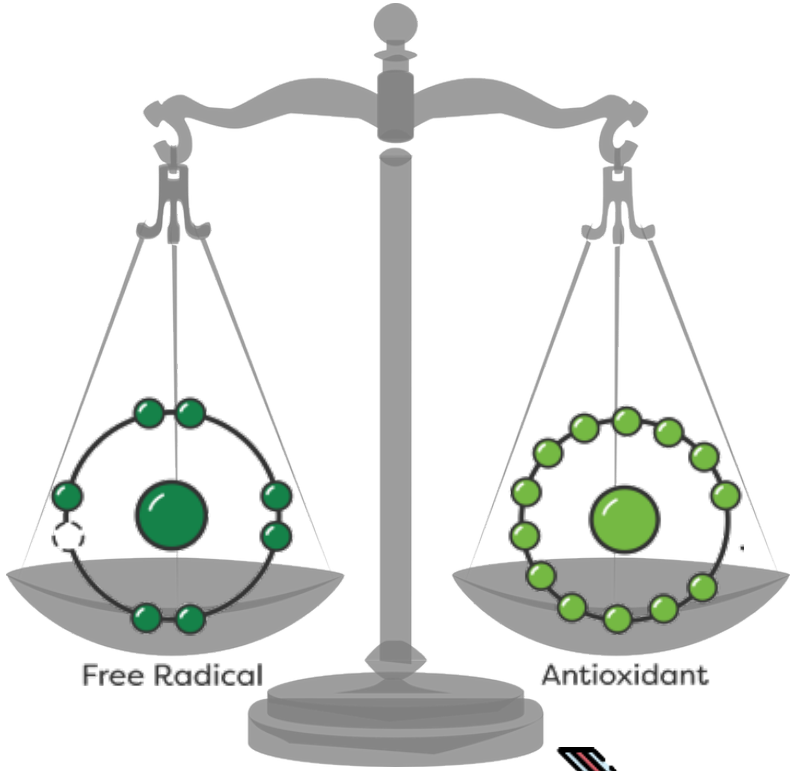


Environmental pollution

Heat stress

Oxidative stress

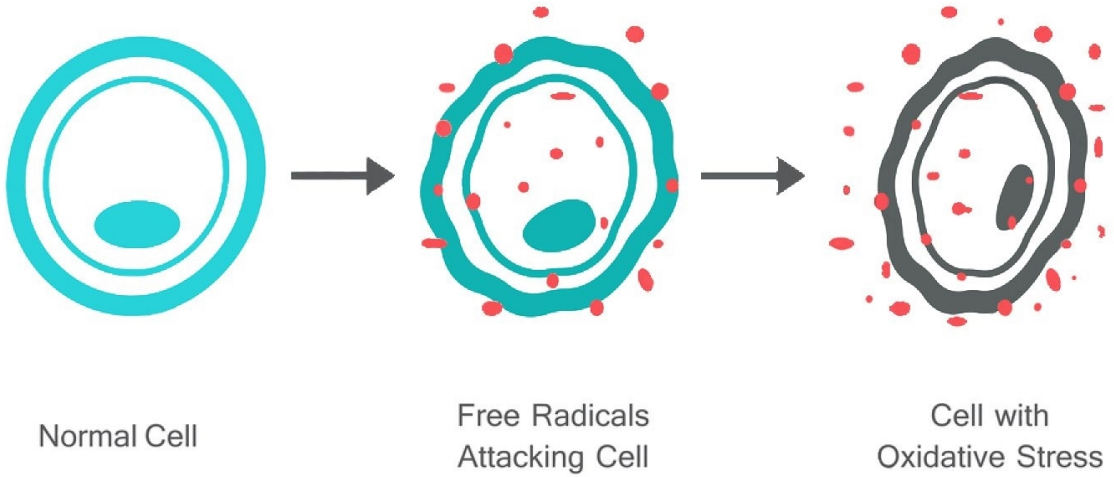
physiological situation




dROM test


OXY test

non-physiological situation



Results - Growth performance

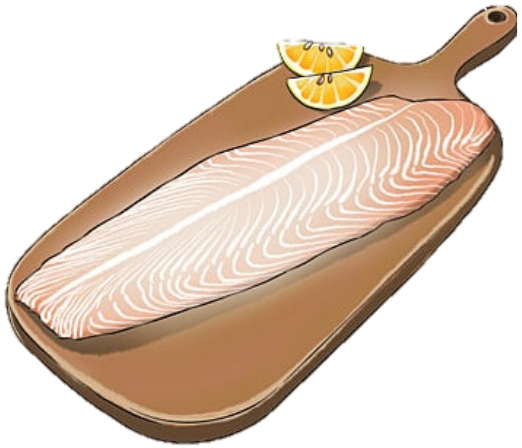
Items	HI0	HI2.5	HI5	HI10	SEM	p-value
Initial individual average weight	116.97	117.56	116.83	117.10	0.119	0.148
Final individual average weight	389.15	381.12	389.52	363.31	4.813	0.176
Mortality %	11.79	8.46	10.26	11.79	1.063	0.708
iWG	272.18	263.56	272.69	246.21	4.835	0.173
SGR	2.39	2.31	2.39	2.16	0.042	0.167
FCR	1.34^{ab}	1.31^{a}	1.32^{a}	1.42^{b}	0.056	0.020

Results - Slaughtering performance

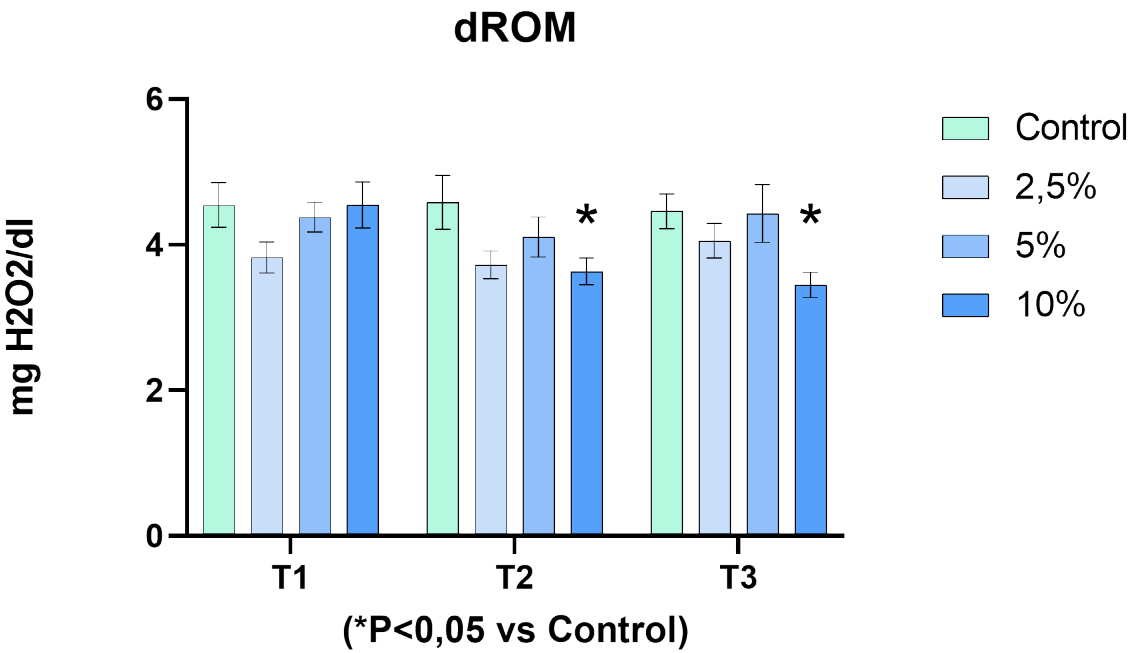
	HI0	HI2.5	HI5	HI10	SEM	p-value
K	1.32	1.37	1.33	1.35	0.009	0.345
CY	81.94	82.77	82.94	82.56	0.383	0.810
HSI	1.48	1.50	1.49	1.52	0.021	0.929
VSI	13.05	13.27	13.41	13.64	0.187	0.728
CF	7.59	6.24	6.54	7.30	0.246	0.232

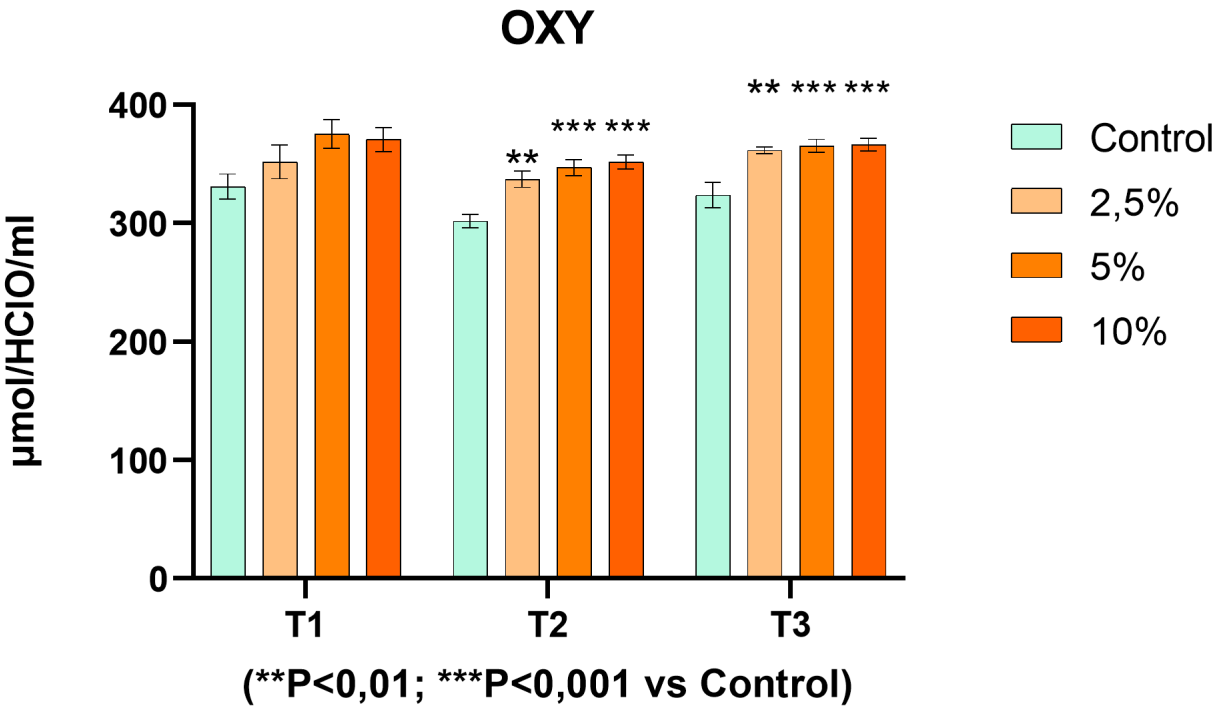
Results - Physical quality

	HI0	HI2.5	HI5	HI10	SEM	p-value
L	48.93	46.77	48.76	49.95	0.873	0.638
a	0.15	1.01	0.92	0.68	0.165	0.263
b	6.10	7.21	6.02	6.57	0.321	0.548
pH24	6.01	6.01	6.01	6.00	0.009	0.997
DL24, %	2.49	2.81	2.89	2.81	0.110	0.610
TL, %	7.25	8.49	8.71	8.71	0.327	0.341
CL, %	12.48	13.98	15.43	14.50	0.466	0.147

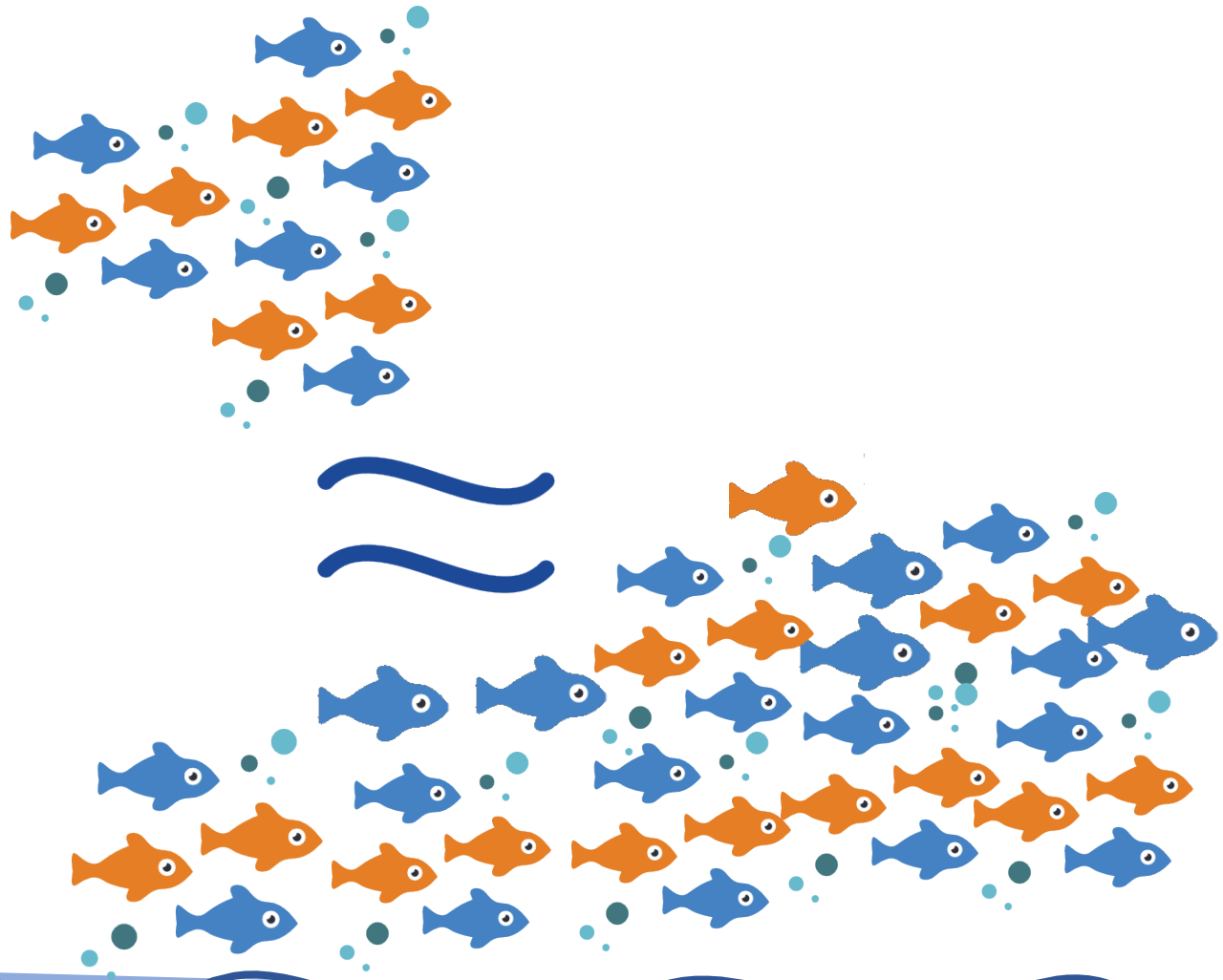


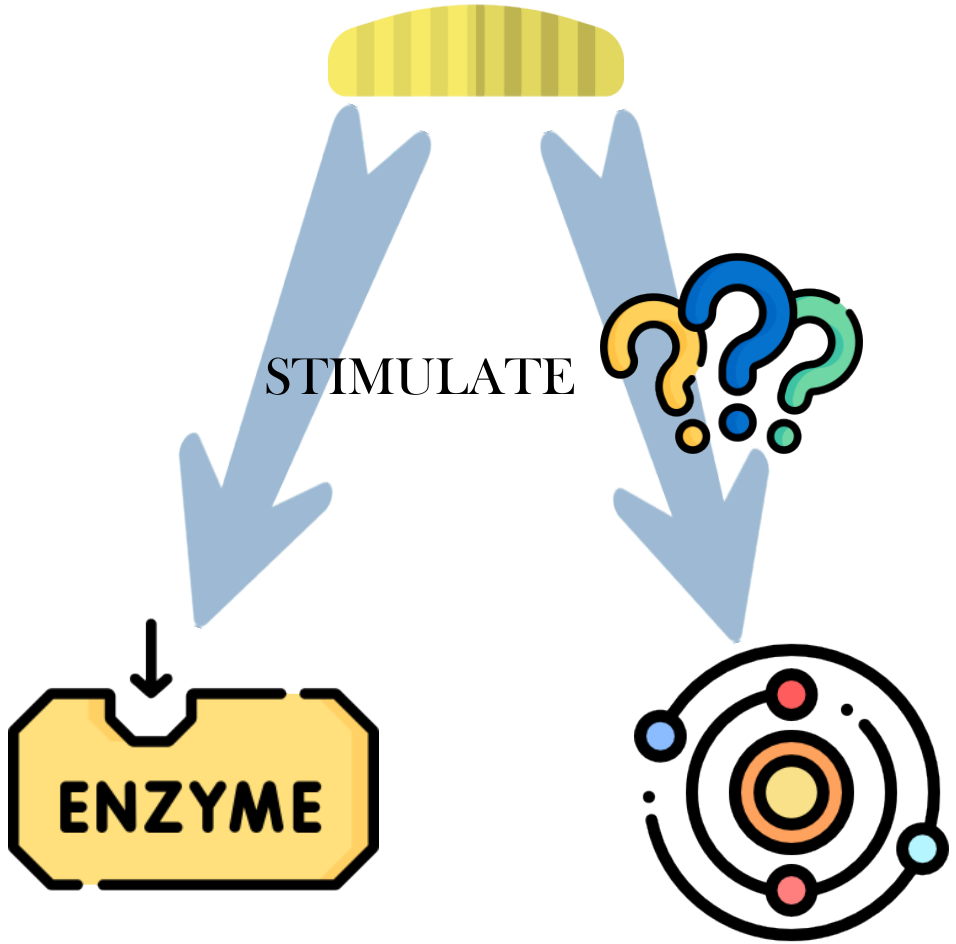
Results - Oxidative stress





Conclusion





SUSINCHAIN
SUSTAINABLE INSECT CHAIN

AZ. AGRICOLA
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THANK YOU

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