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Iso waste-based diets as substrate for yellow mealworm larvae

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Waste collection



1

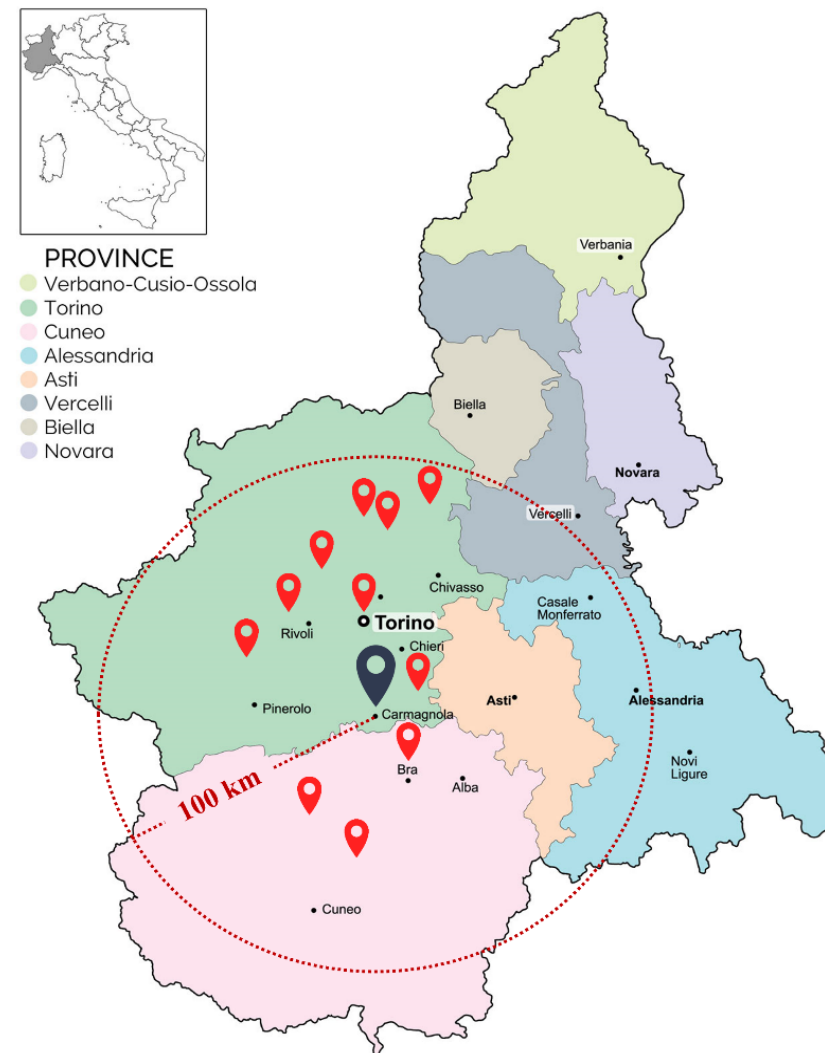
Distance

2

DM content

3

Cost





Waste & by-products



Panettone



Wheat groats



Hazelnut film



16 waste
or
by-products



Colomba



Silvery film



Feed waste



Rice husk



Cookies



Wafer



Rice creckers
waste



Wafer dough



Breading waste



Rice middling



Rice chaff



Filtering waste



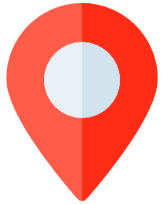
Dry distillery
stillage





How to formulate substrate?

Absence of literature about nutritional requirements



Starting point: wheat bran composition



CP: 18% on DM

EE: 3% on DM

GE: 15 MJ/kg



Diets

7 diets formulated

Theoretical formulation

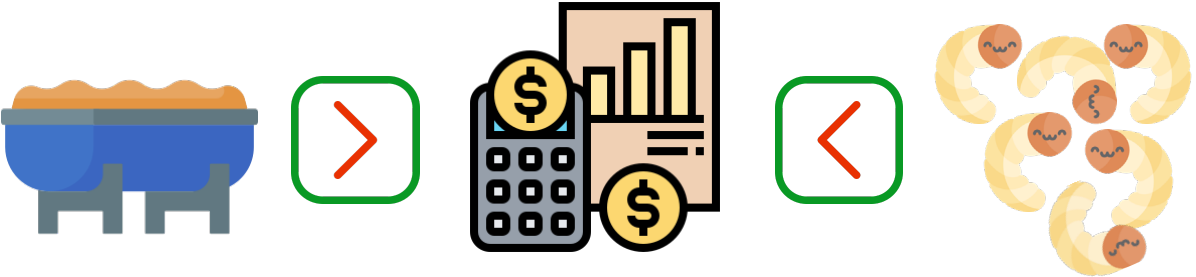


Practical formulation

ITEMS	TM2	TM3	TM6
Wheat groats	5,0	-	-
Wafer dough	5,0	2,3	-
Dry distillery stillage	6,3	-	-
Silvery film	7,5	-	-
Breeding waste	36,5	17,6	11,8
Feed waste	39,7	78,1	81,2
Panettone	-	2,0	-
Rice husk	-	-	3,0
Rice chaff	-	-	2,0
Rice middlings	-	-	2,0

Diets

ITEMS	TM2	TM3	TM6
Wheat groats	5,0	-	-
Wafer dough	5,0	2,3	-
Dry vinasse	6,3	-	-
Silvery film	7,5	-	-
Breeding waste	36,5	17,6	11,8
Feed waste	39,7	78,1	81,2
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Rice husk	-	-	3,0
Rice chaff	-	-	2,0
Rice middlings	-	-	2,0



TM2	87,8 €/ton	 
TM3	83,3 €/ton	
TM6	95,5 €/ton	  

Chemical composition

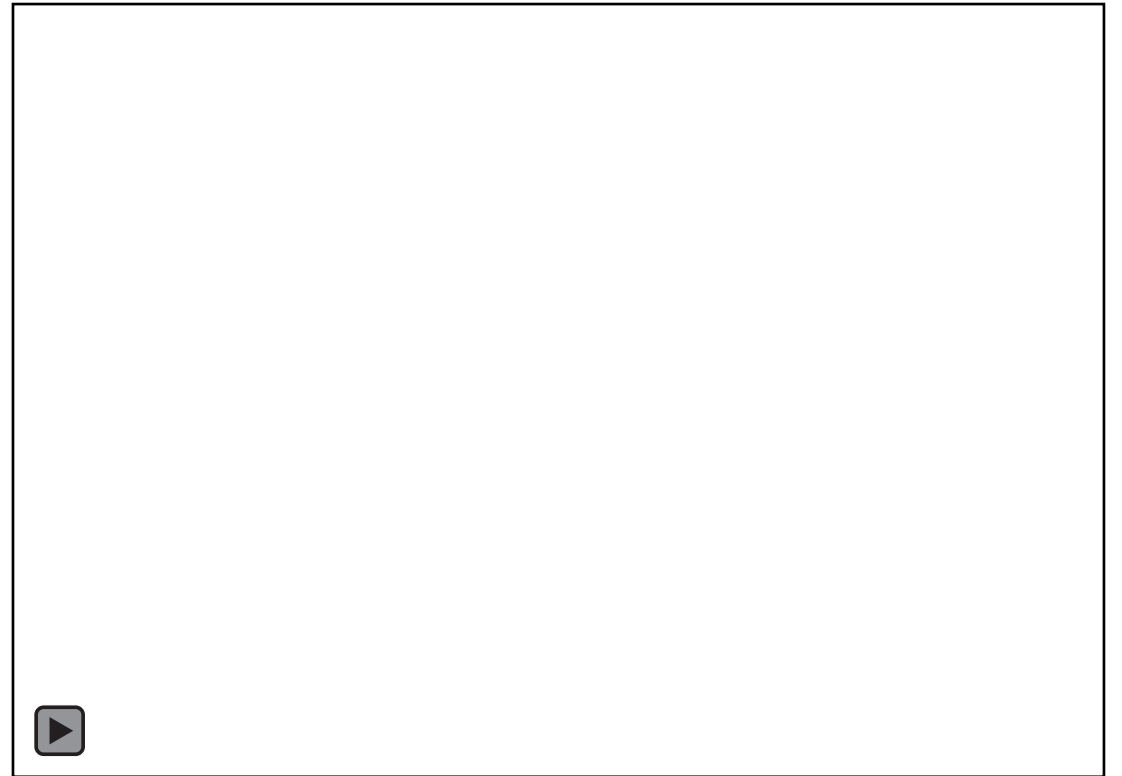


Items	TM2	TM3	TM6
DM	86,15	86,68	86,65
CP	17,98	18,42	18,66
EE	2,91	3,00	2,89
GE	16,46	16,28	16,06
NDF	16,06	16,24	10,54
Ash	5,33	7,48	7,82

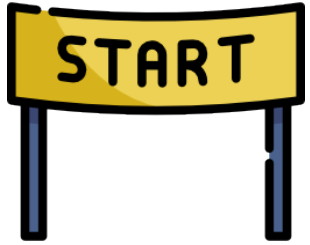


Materials and Methods

- 3 diets + control
- 5 replicates/treatment
- 10000 larvae/replicate
- Feeding rate: 0,3g/larva
- Water source: agar – daily provision



Materials and Methods

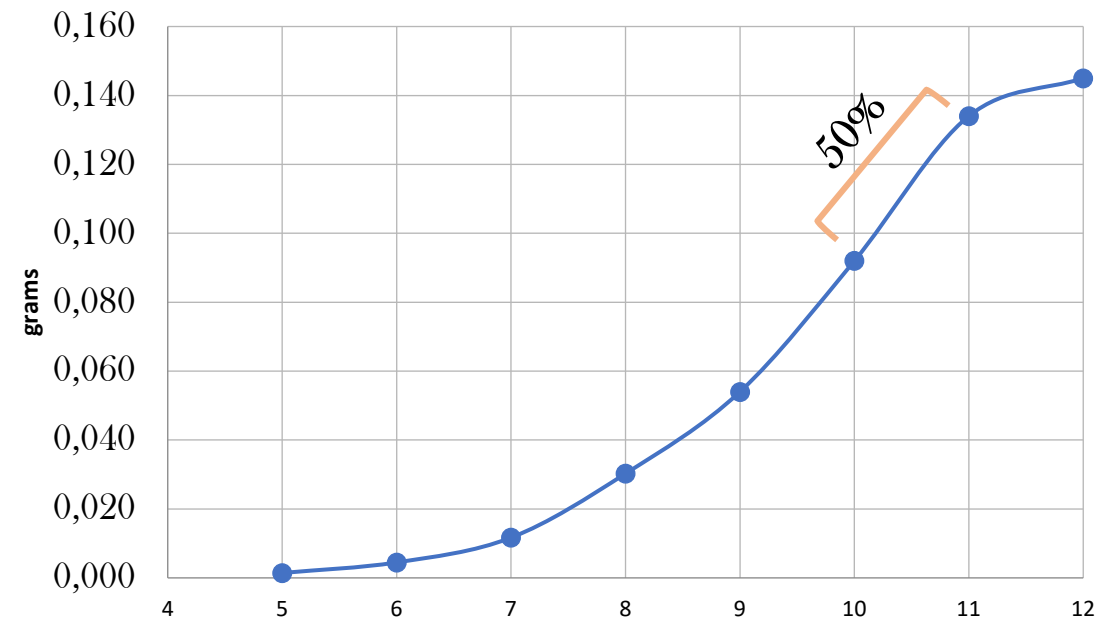


3 weeks old

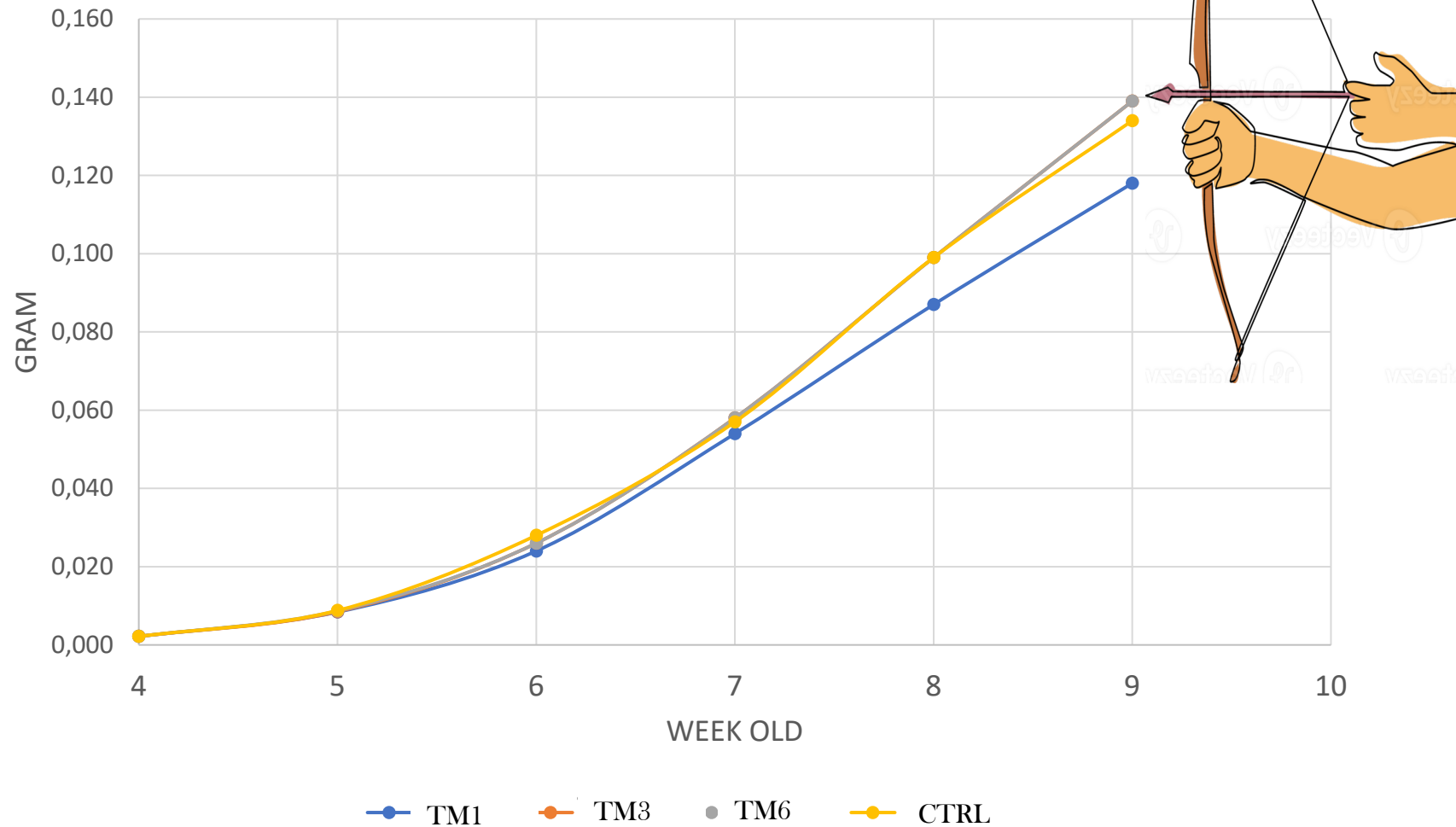


Before the plateau phase

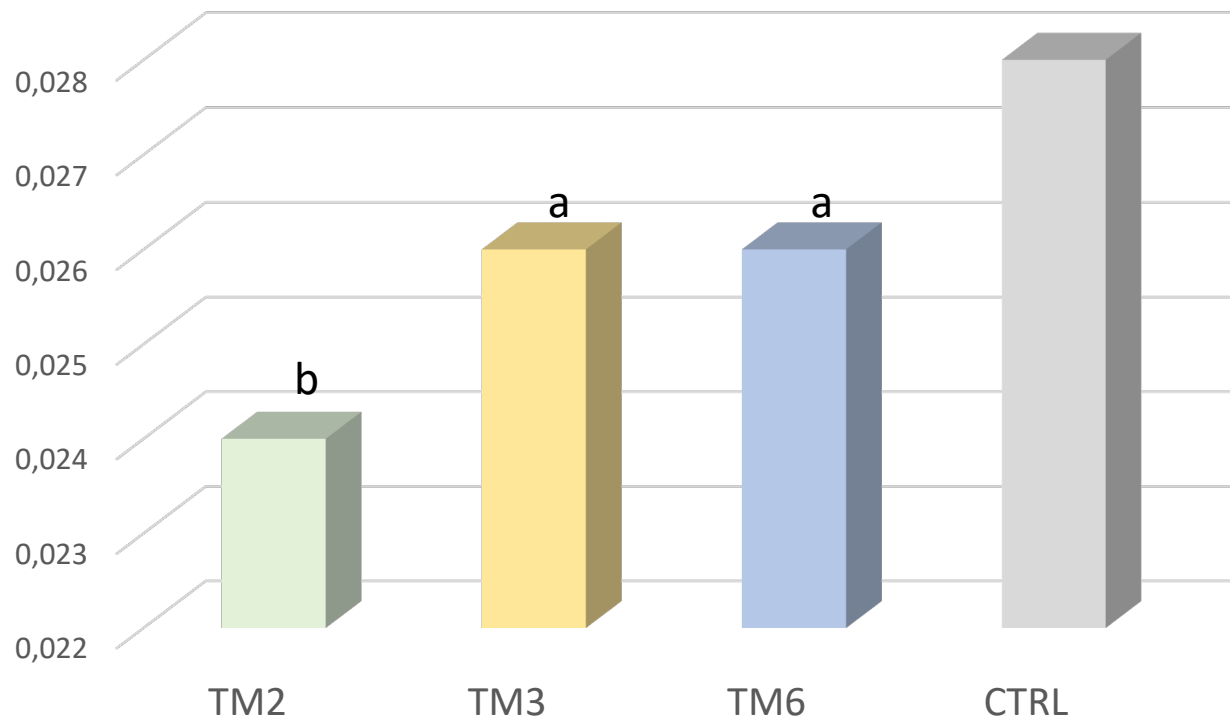
Growth curve



Results – growth curve



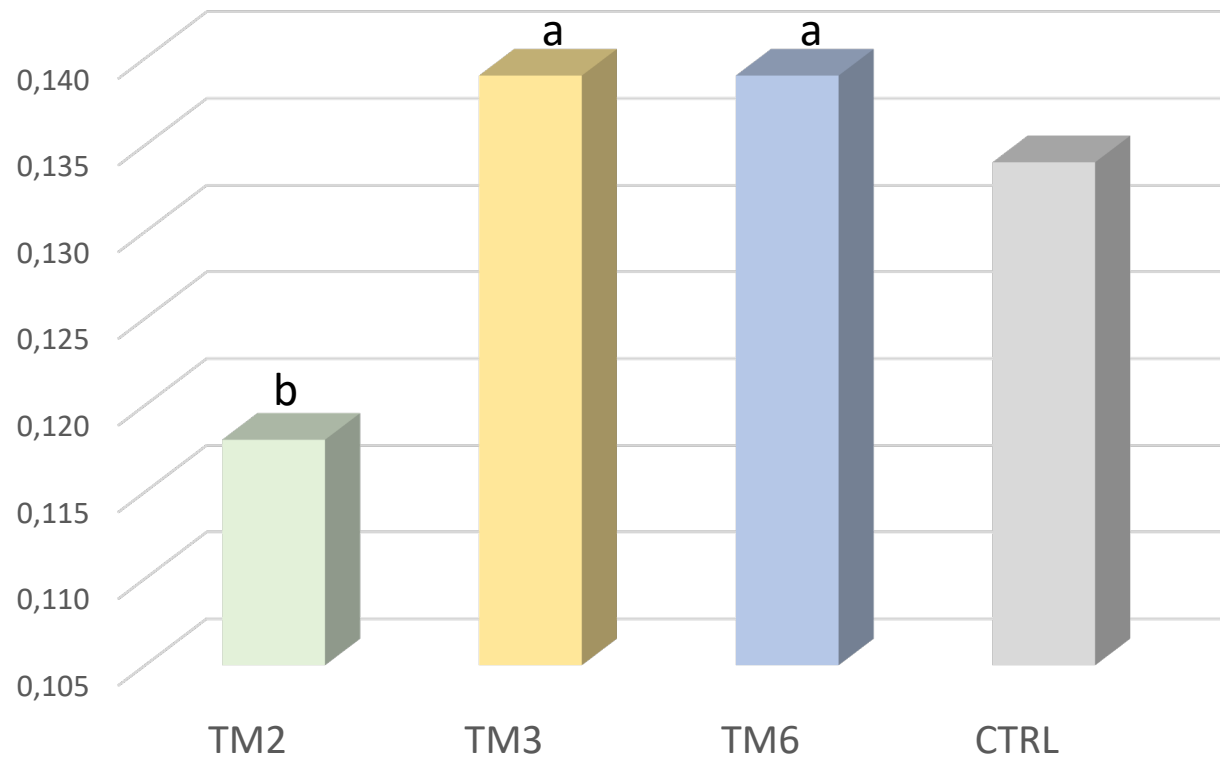
Results - 5 WO



TM3 and TM6



Results - 9 WO



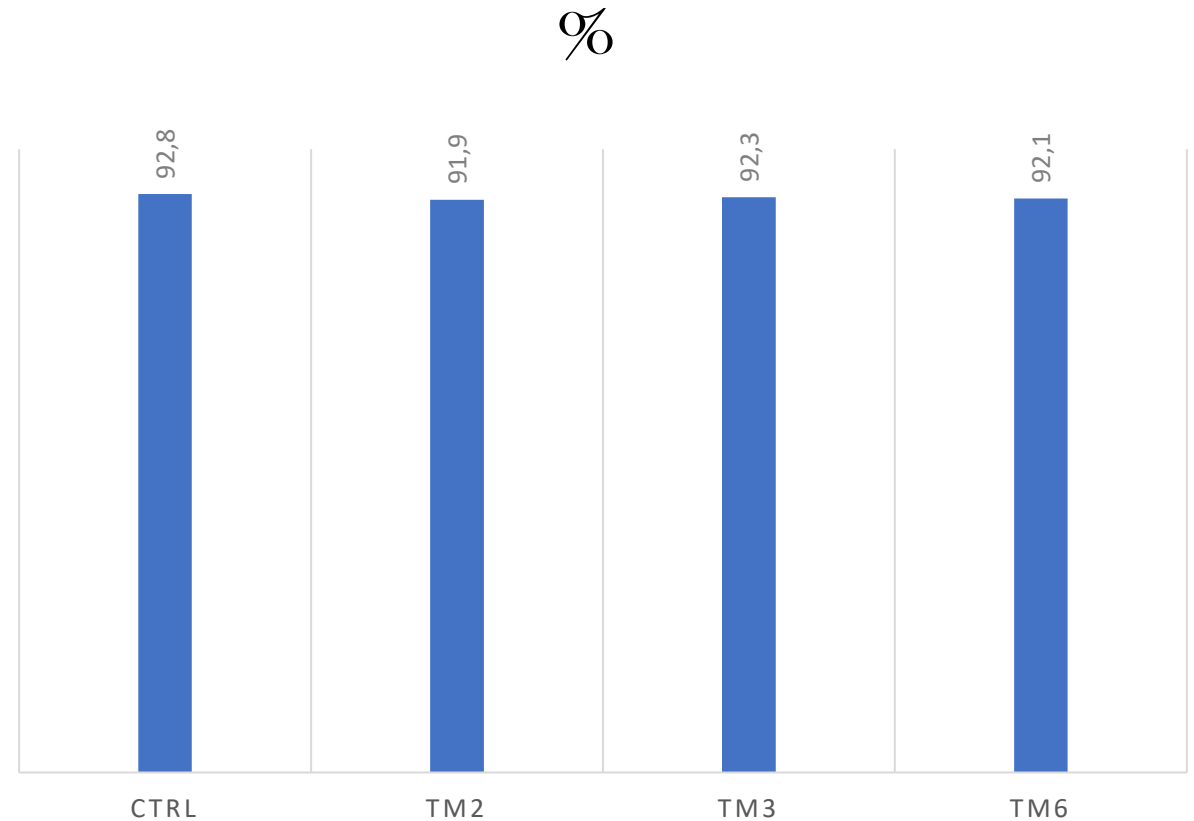
TM3 and TM6



Results – water source consumption

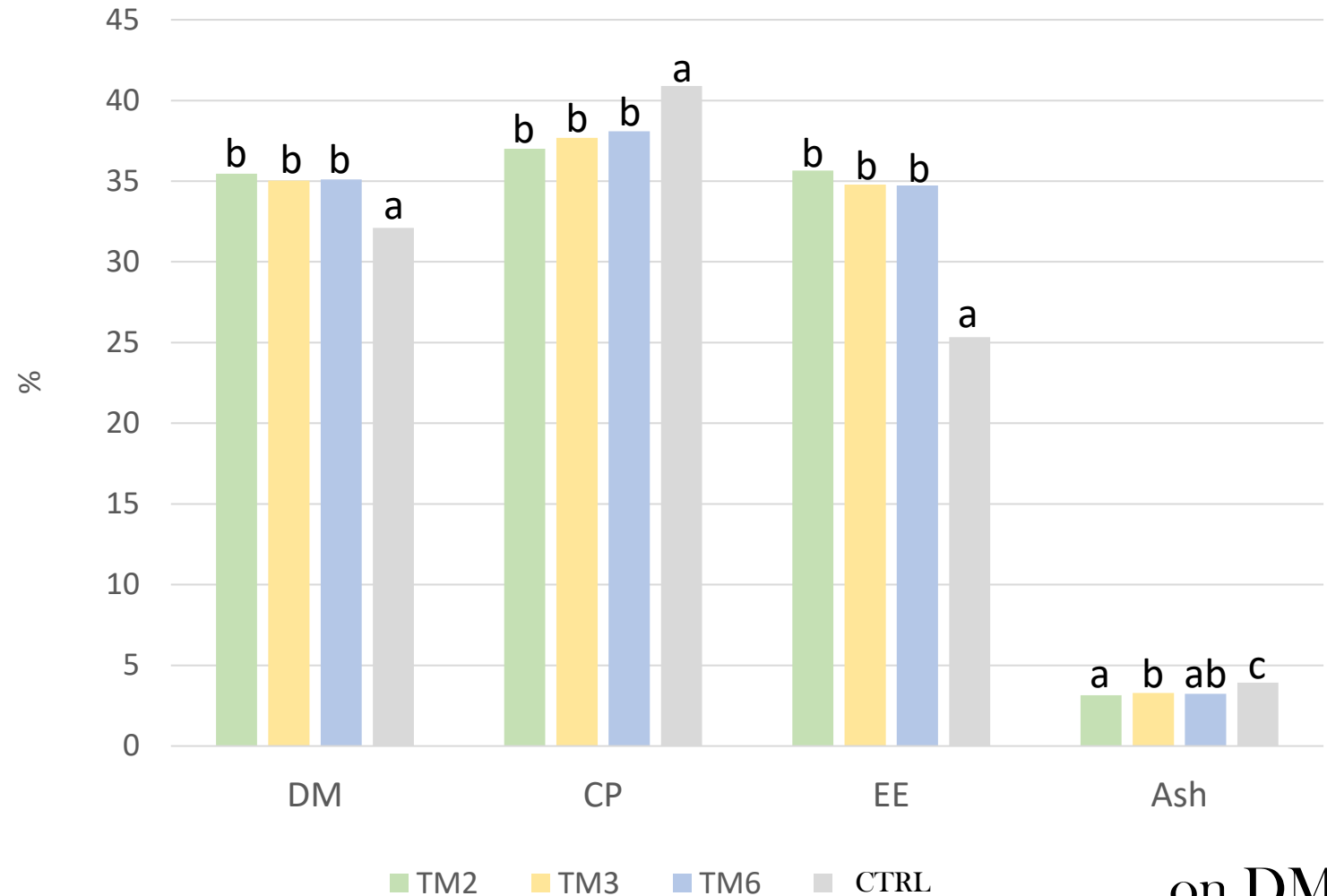
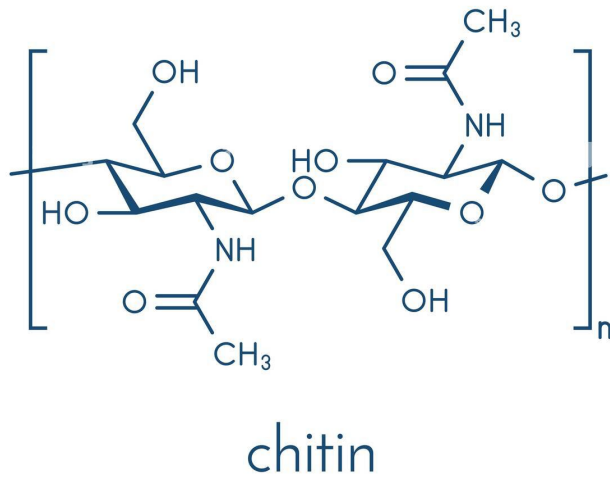


No differences!!



Results – chemical composition

Chitin → no difference
About 5% on DM



What is the best diet??



TM2

10000 x 0,113 = 1130g of fresh larvae
35,46% of DM = 400,7g of dry larvae

Protein: 148,3 g



TM3

10000 x 0,119 = 1190g of fresh larvae
35,04% of DM = 417,0g of dry larvae

Protein: 157,2 g



TM6

10000 x 0,130 = 1300g of fresh larvae
35,10% of DM = 456,3 of dry larvae

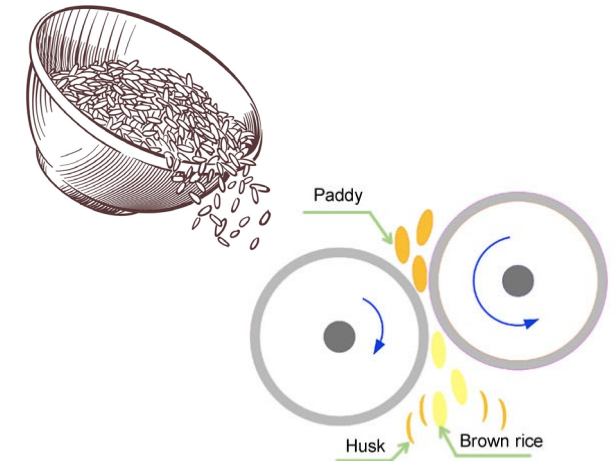
Protein: 173,8 g



CTRL

10000 x 0,088 = 880g of fresh larvae
32,10% of DM = 282,5g of dry larvae

Protein: 115,6 g



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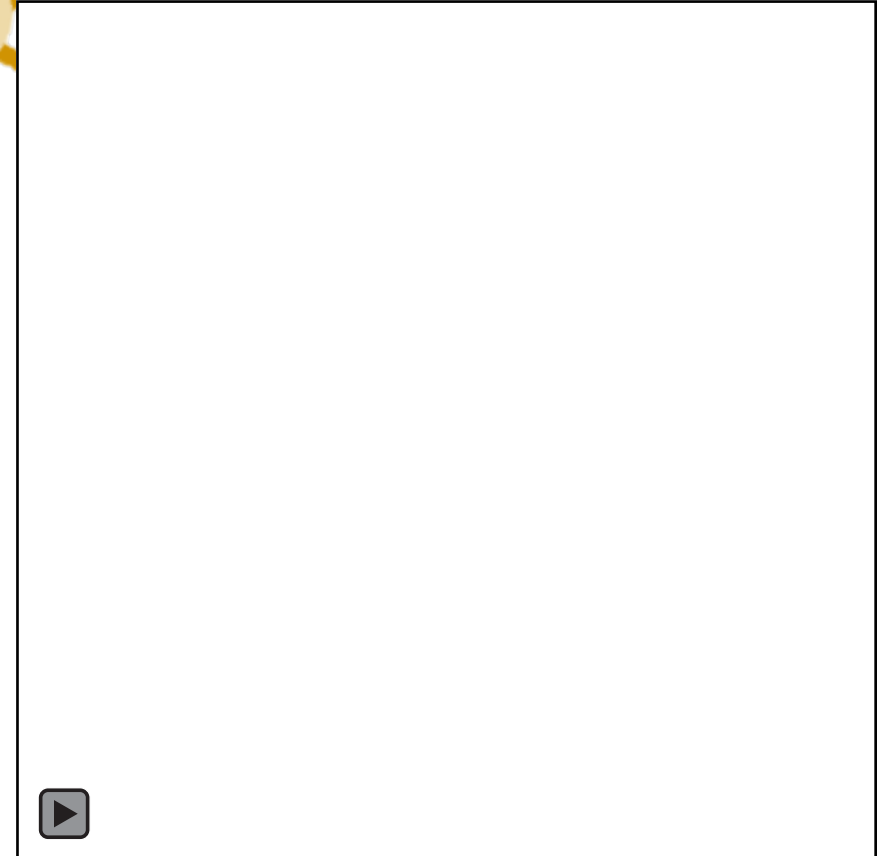
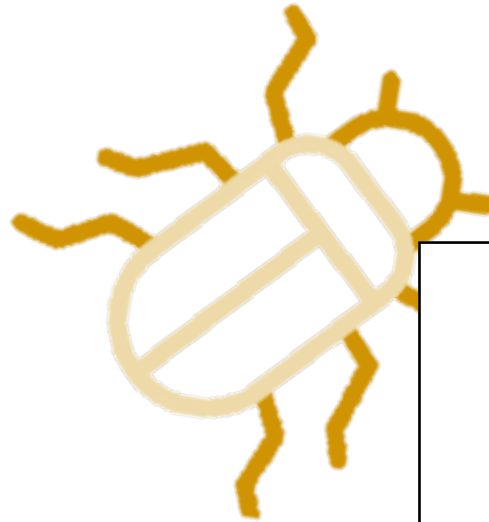


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