

## Fly Lifecycle

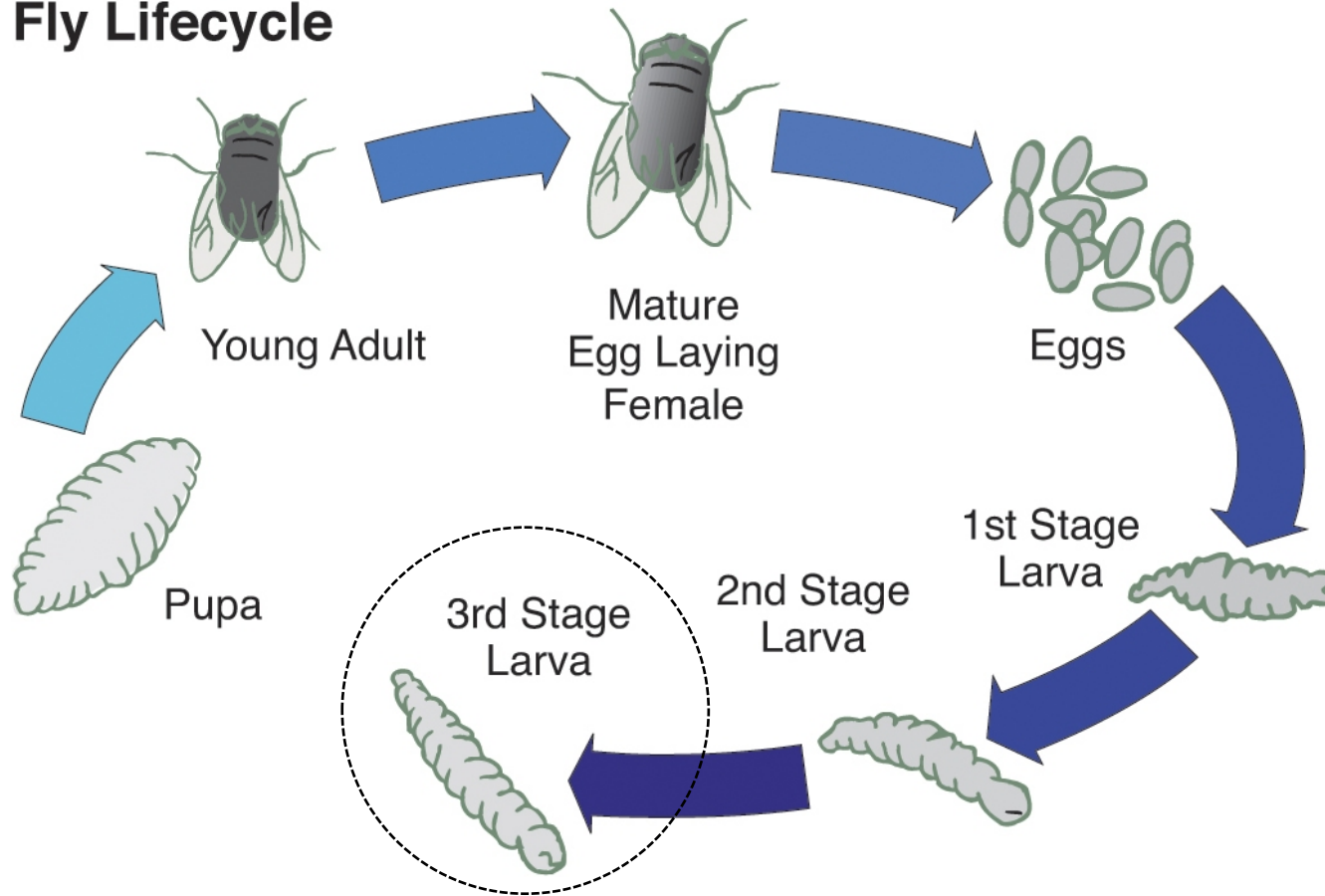


Figure 1: Life cycle of the Housefly (*Musca domestica*). LM for this study was produced from 3<sup>rd</sup> stage larvae (circled).

Table 1: Nutritional comparison of Housefly Larva Meal with common aquaculture feed ingredients.

	Larva Meal <sup>a</sup>	Soy Protein Concentrate <sup>b</sup>	Fishmeal <sup>b</sup>
Dry Matter (%)	91.5	94.3	93.7
Crude Protein (%)	56.39	67.4	67.8
Fat (%)	16.78	2.1	9.0
Digestible Energy (Mcal/lb)	1.66	2.23	2.27
Calcium (%)	0.68	0.4	5.4
Phosphorus (%)	1.08	0.8	1.5
<sup>a</sup> This study: analysis performed by Brookside Labs (New Bremen, OH), <sup>b</sup> (Barrows et. al 2015)			

Table 2: Diet Design for this study

Ingredients	Control Diet	5% Larva Meal	30% Larva Meal
Fish meal	10	10	10
Larva meal	<b>0</b>	<b>5</b>	<b>30</b>
Soy protein concentrate	20.7	<b>15.8</b>	<b>0</b>
Corn gluten meal	20.7	20.7	<b>12.29</b>
Wheat gluten	5	5	5
Wheat flour	25.4	26.1	29.7
Fish oil	11	11	11
Soybean Oil	5.8	<b>4.9</b>	<b>0.5</b>
Mineral/Vitamin Mix	1.5	1.5	1.5
<b>*Formulated using WinFeed 2.8 software</b>			

Table 3: Proximate Analysis of Experimental Diets

Diet	Fat (%)	Crude Protein (%)	Calcium (%)	Phosphorous (%)	Potassium (%)	Magnesium (%)	Sodium (%)	Iron (ppm)	Manganese (ppm)	Copper (ppm)	Zinc (ppm)
<b>Control</b>	21.03 ± 0.77	41.2 ± 0.60	0.589 ± 0.021	0.705 ± 0.025	0.753 ± 0.023	0.145 ± 0.0035	0.101 ± 0.0038	169.7 ± 8.33	91.6 ± 2.45	61.9 ± 0.92	96.1 ± 8.60
<b>5% LM</b>	19.5 ± 0.70	42.1 ± 1.20	0.734 ± 0.071	0.796 ± 0.030	0.745 ± 0.025	0.139 ± 0.0031	0.136 ± 0.0050	222.0 ± 8.66	100.8 ± 6.37	63.1 ± 1.44	98.0 ± 1.76
<b>30% LM</b>	19.4 ± 0.15	41.1 ± 0.86	0.743 ± 0.054	0.871 ± 0.020	0.776 ± 0.015	0.136 ± 0.0026	0.278 ± 0.0036	515.7 ± 20.55	166.3 ± 4.73	69.6 ± 0.67	147.7 ± 3.79

Figure 2: Schematic depiction of treatment groups

	Week							
	1	2	3	4	5	6	7	8
<b>Group 1</b>	Standard diet							
<b>Group 2</b>	5% LM diet							
<b>Group 3</b>	30% LM diet							
<b>Group 4</b>	Standard diet						5% LM diet	
<b>Group 5</b>	Standard diet						30% LM diet	
<b>n</b>	6 aquaria per group, 14 fish per aquaria, 84 fish per group							

Figure 3: Survival curve for the growth trial phase of the experiment. Higher mortality was observed in the 5% LM diet group, particularly during the first two weeks of feeding.

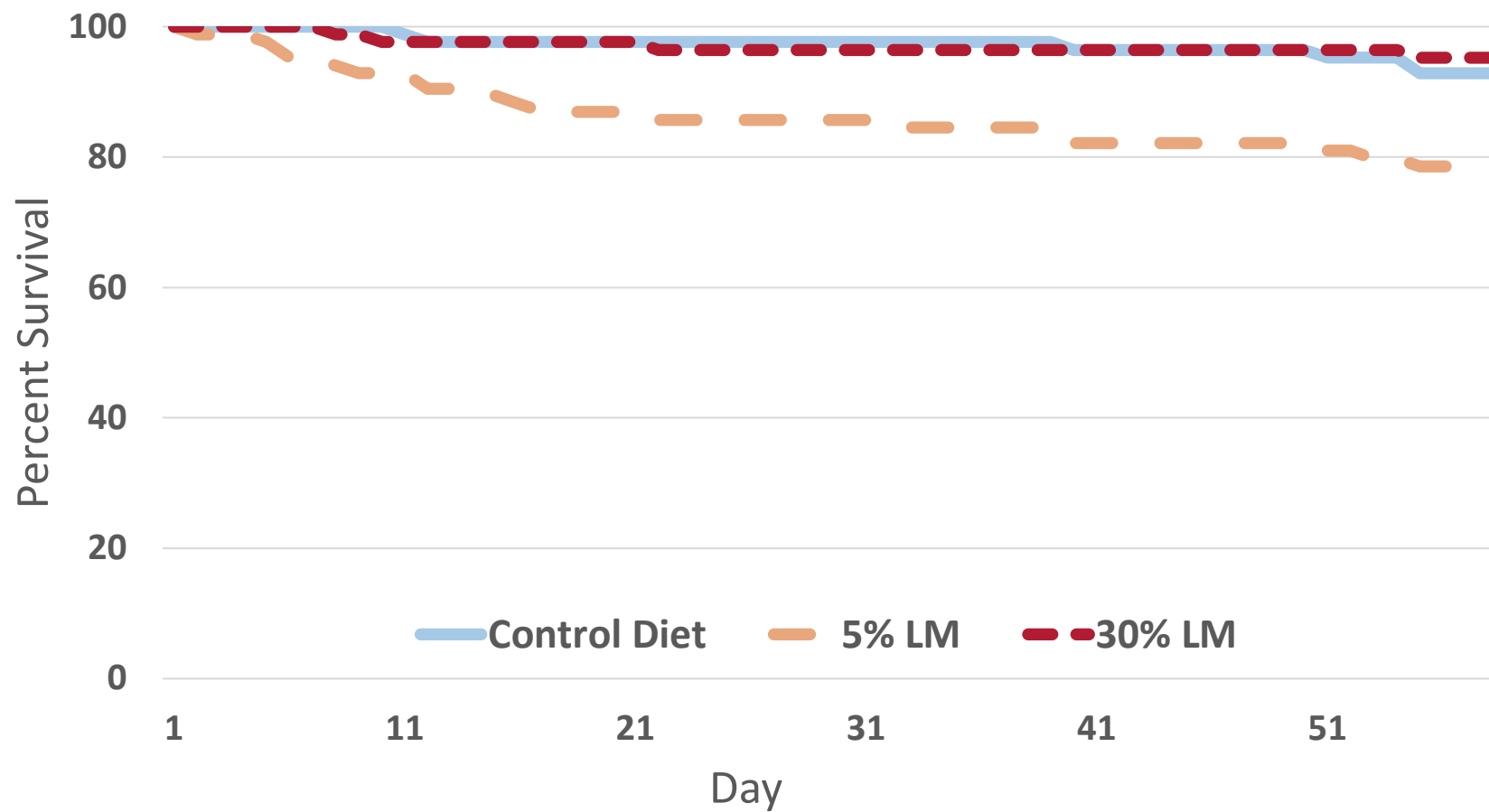


Figure 4: Average growth over the course of the feeding trial. The 30% LM diet performed best, followed by the 5% diet. However, due to high mortality in the 5% diet group, care should be taken in interpreting growth results, as these represent only surviving fish.

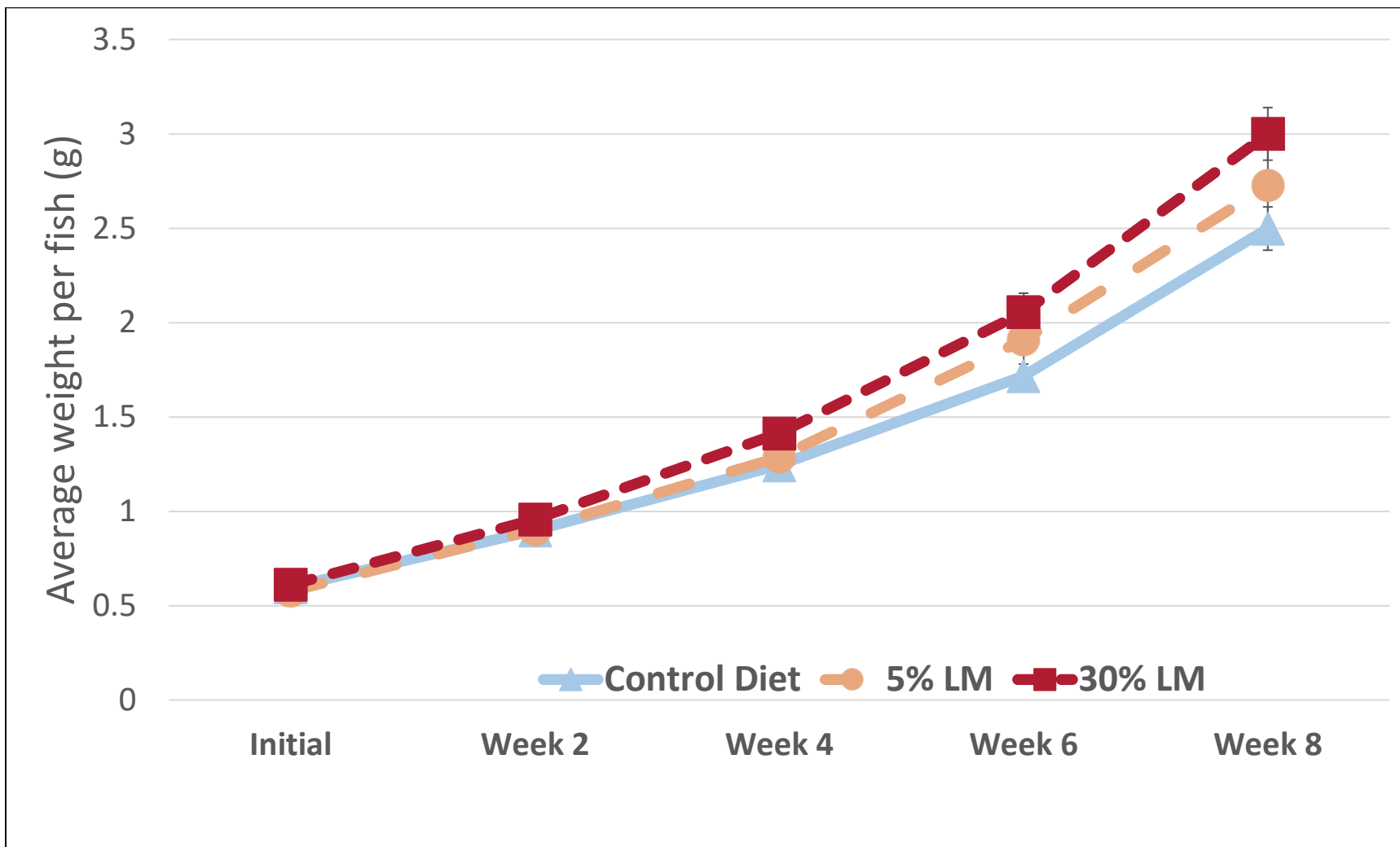


Table 4: Feed Conversion ratio over the course of the feeding trial. High mortality in the 5% LM diet group reduced FCR.

Diet Group	Feed Intake per tank (g)	Total Weight Gain per tank (g)	Feed Conversion Ratio (FCR)
Control	36.12	23.28	<b>1.55</b>
5% LM	36.12	21.32	<b>1.69</b>
30% LM	36.12	31.32	<b>1.15</b>



Figure 5: Serum lysozyme activity. Activity was elevated in fish fed LM diets for 2 weeks.

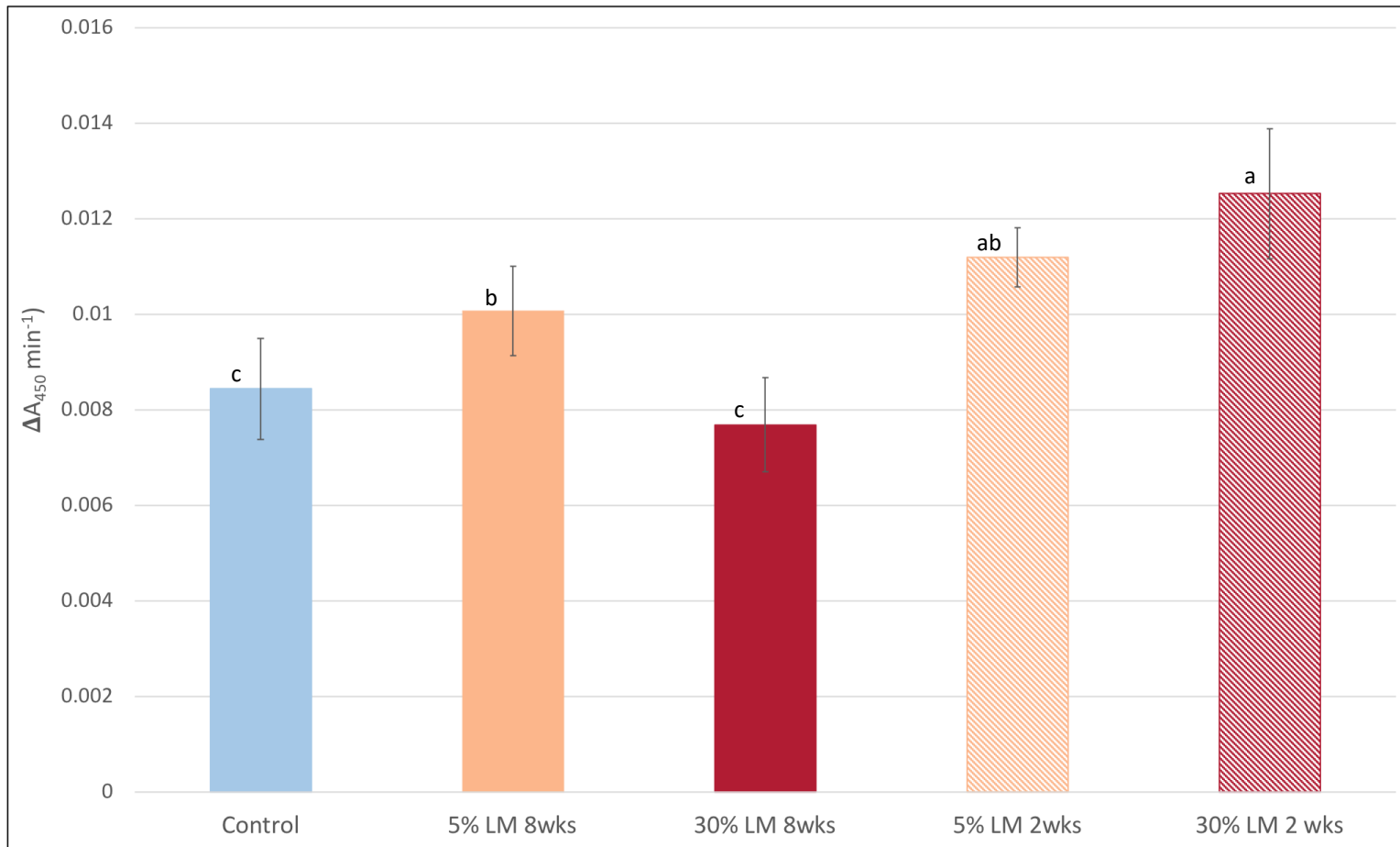


Figure 6: Survival curve for the infection challenge. Low mortality across all treatments was observed, making it impossible to draw conclusions about the presence of absence of a protective effect of LM.

