



A Plant- and Larva-based Fishmeal Substitute

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Why Clean Label Solution

We are expert in customizing **natural ingredients** using innovative and **clean technologies** to deliver **non-commodity livestock feed**

**COST
EFFECTIVE**

to reduce
production cost

**HIGHLY
DIGESTIBLE**

comparable to the
commodity feed

**REDUCE CO₂
EMISSIONS**

to lower energy
consumption



What is the challenge



Fishmeal is an EXPENSIVE protein source and its price can be VOLATILE, which make it difficult for fish farmers to budget and plan.



The nutrient content of fishmeal can vary depending on the type of fish used and the processing methods used to make it.



Production of fishmeal from both environmentally and ecologically unsustainable and there are societal and economic pressures on the aquaculture industry to find alternative proteins



CLS's Innovation ...

A **proprietary technology** has been developed to produce soy-based fish feed as a non-commodity product to

**SUBSTITUTE
FISHMEAL**

high performance
and consistency

**SAVE
RATION COST**

20% production
cost reduced

**SUSTAINABLE
DIET**

plant-based
protein source



What is CLS's solution

A **fermented non-commodity** soy-based fish feed developed with the following features:

**100%
NATURAL**

natural and feed
grade ingredients

**HIGHLY
DIGESTIBLE**

protein, amino
acids and fat

**PLANT-BASED
PROTEIN**

fermented with
high-palatability





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VictoryTM fish feed



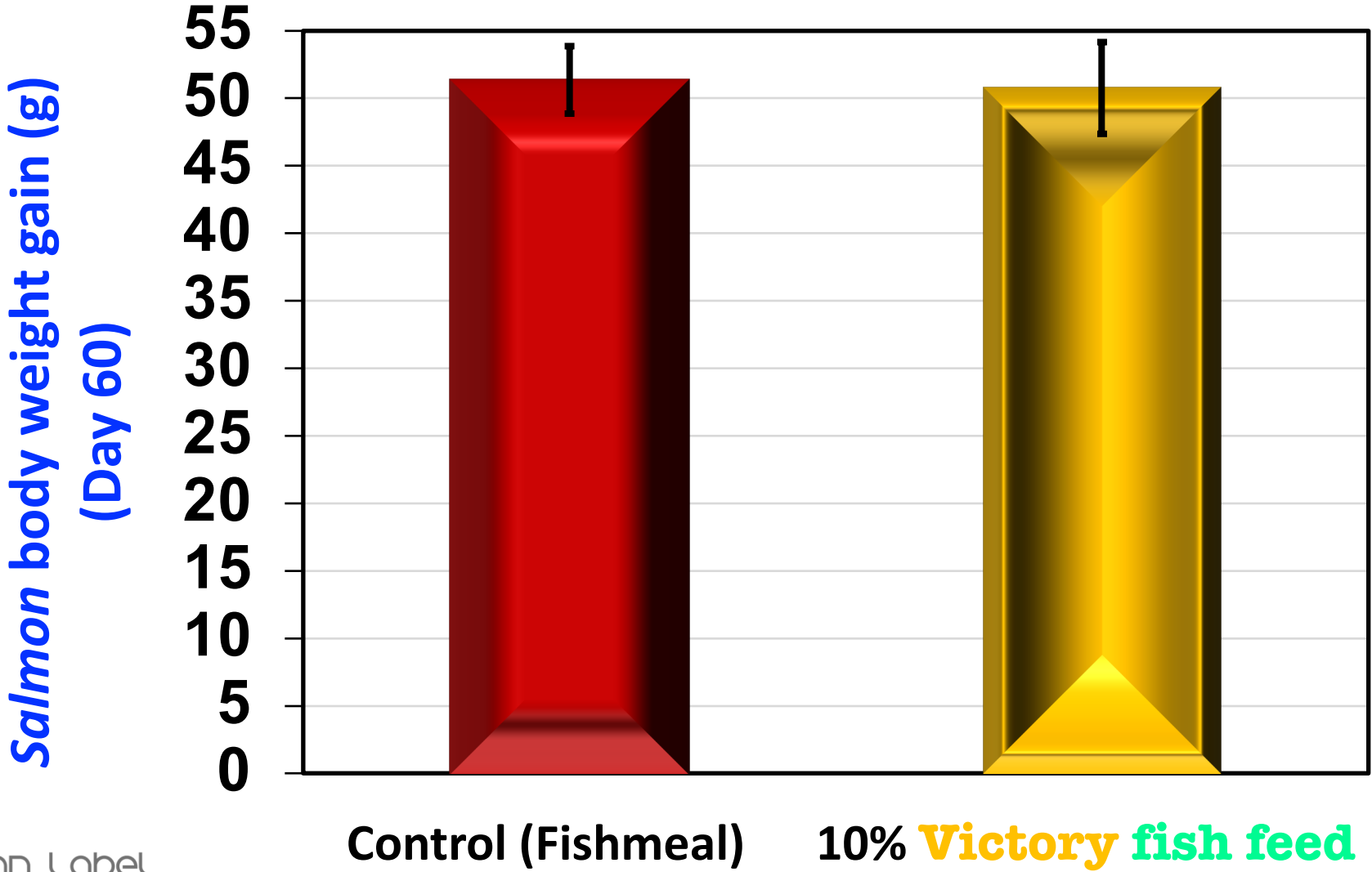
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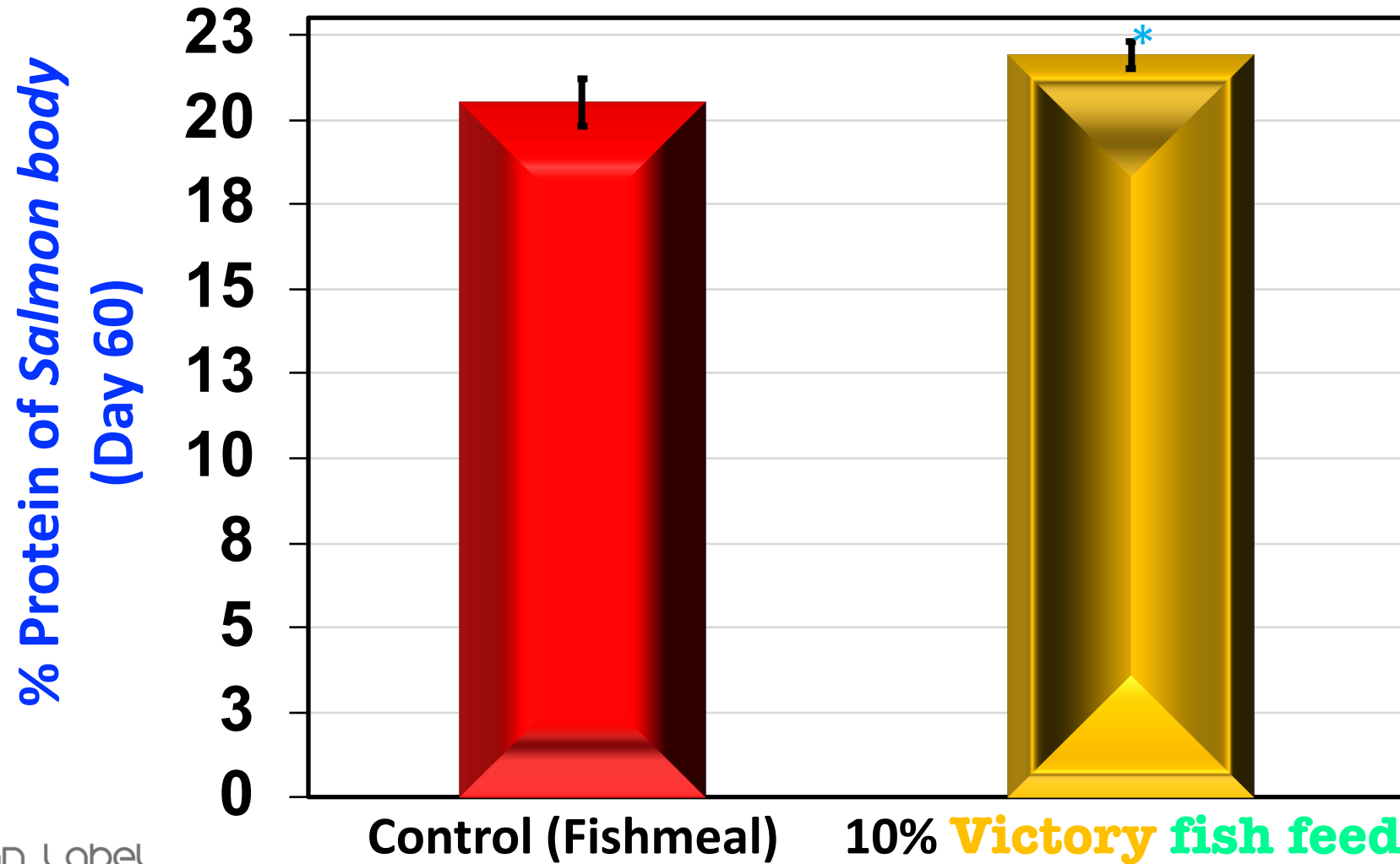
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Performance of **Victory™ fish feed** on the *Salmon* body weight



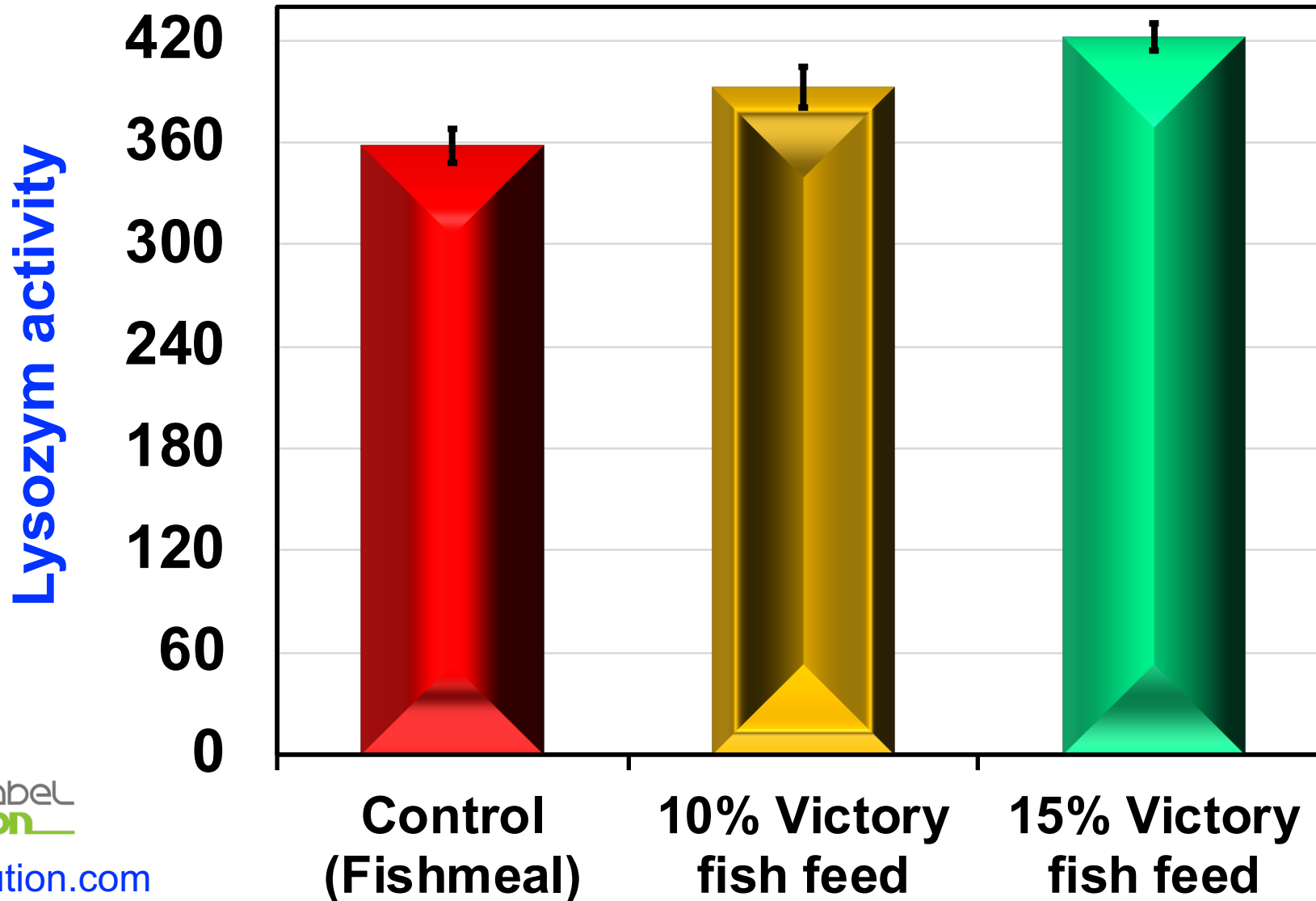
Performance of **Victory™ fish feed** on the *Salmon* protein level



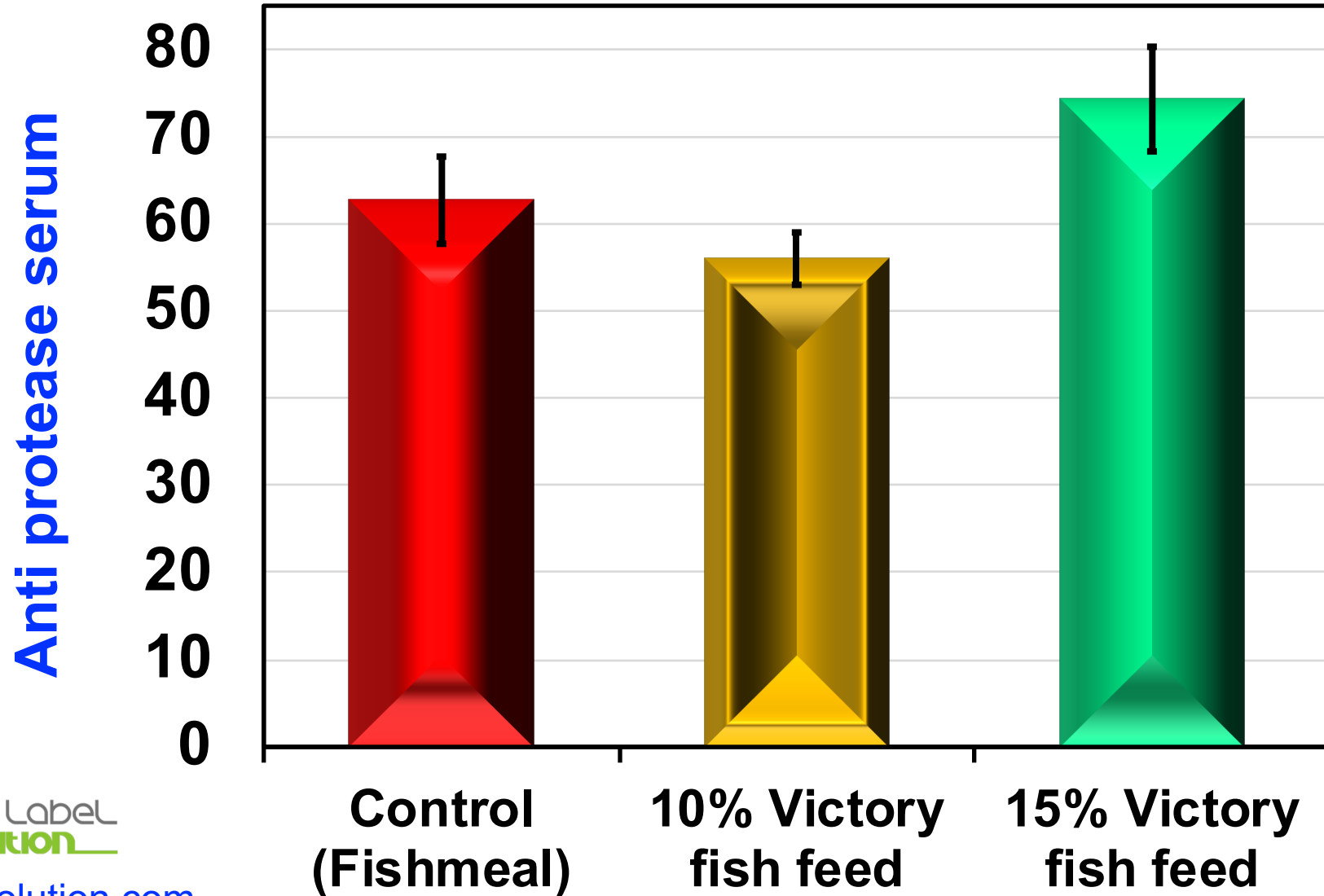
* Significantly different ($P < 0.05$)



Performance of **Victory fish feed** on the *Salmon* immune system



Performance of **Victory™ fish feed** on the *Salmon* immune system





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CLS-Shrimp feed



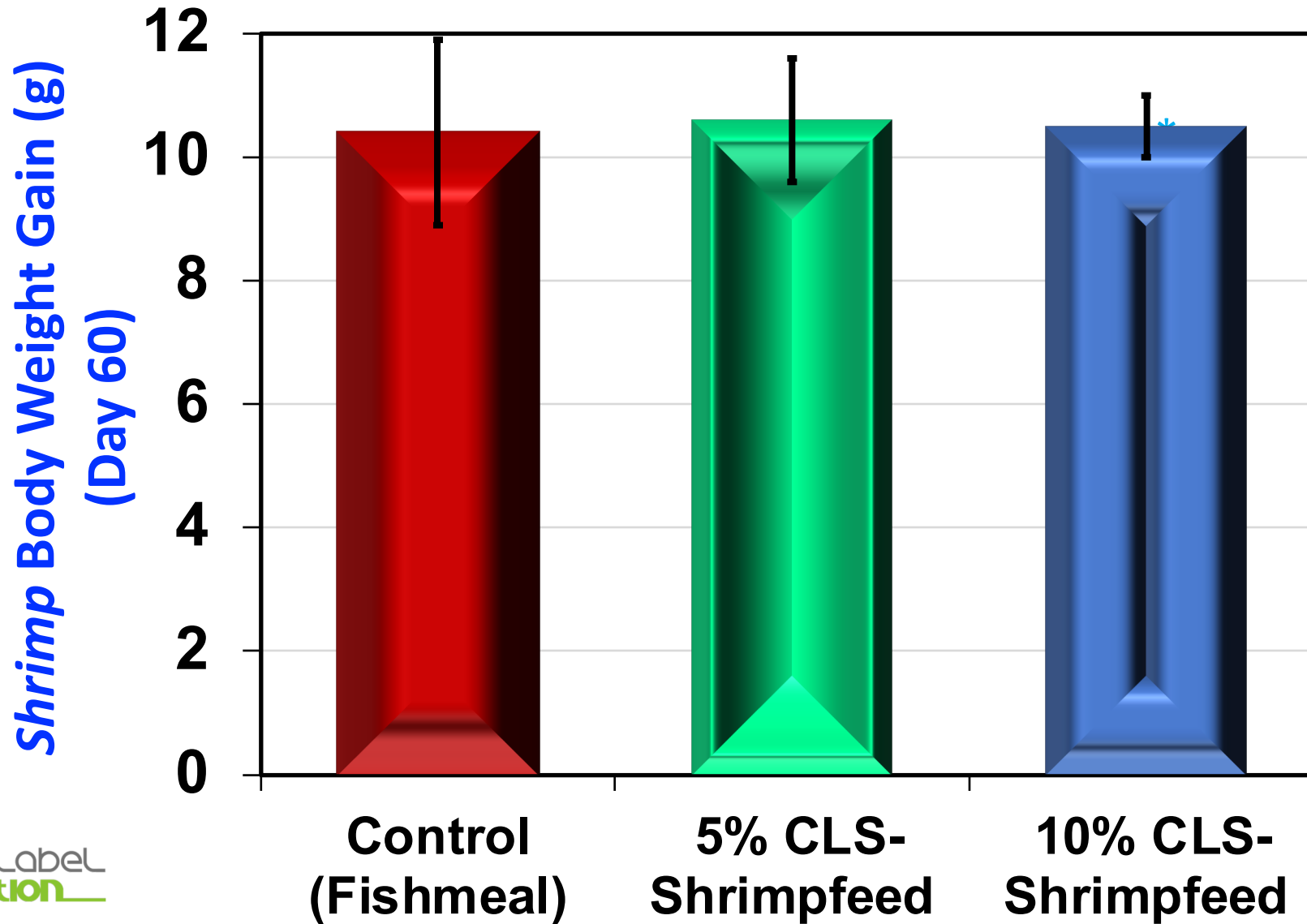
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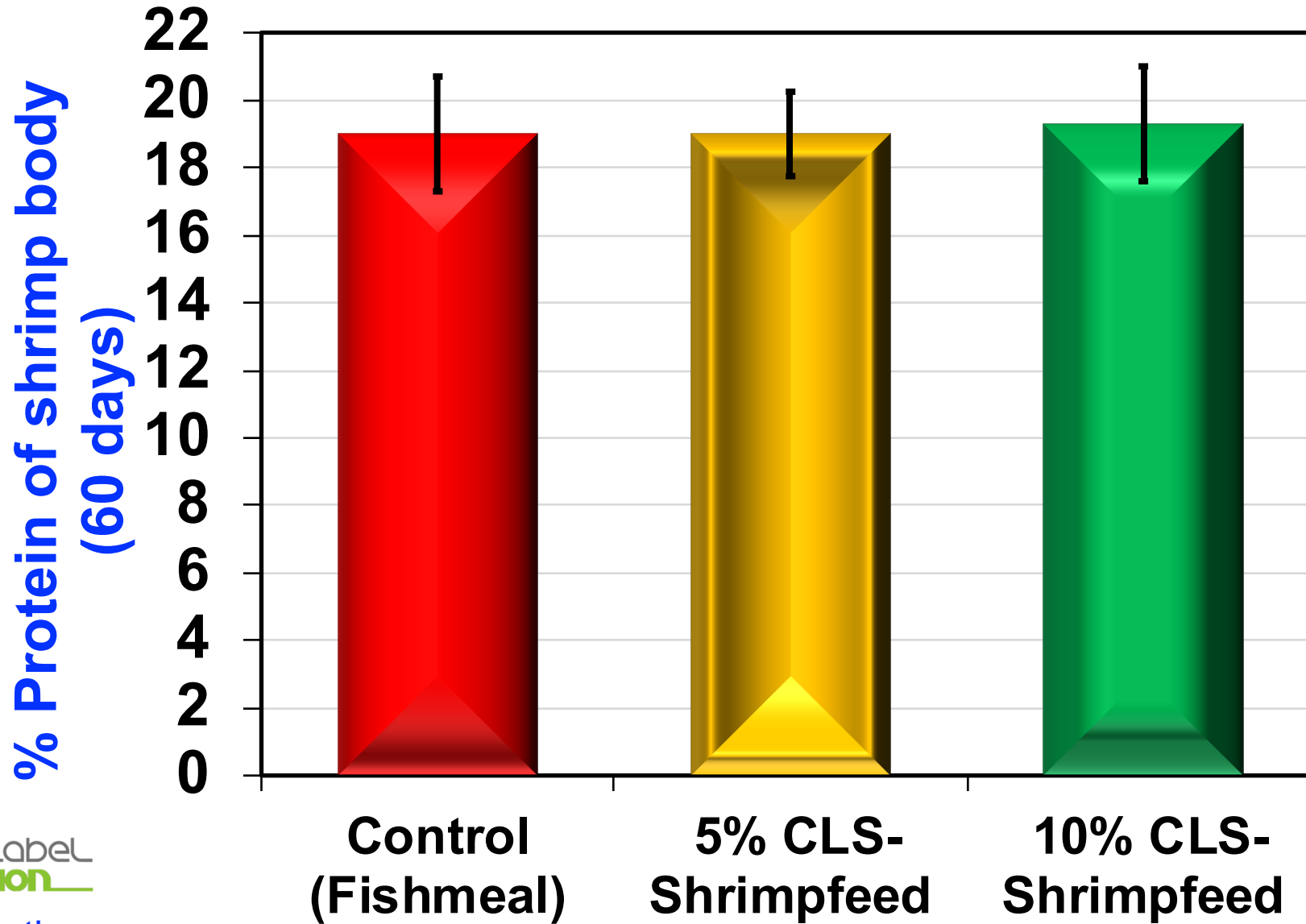
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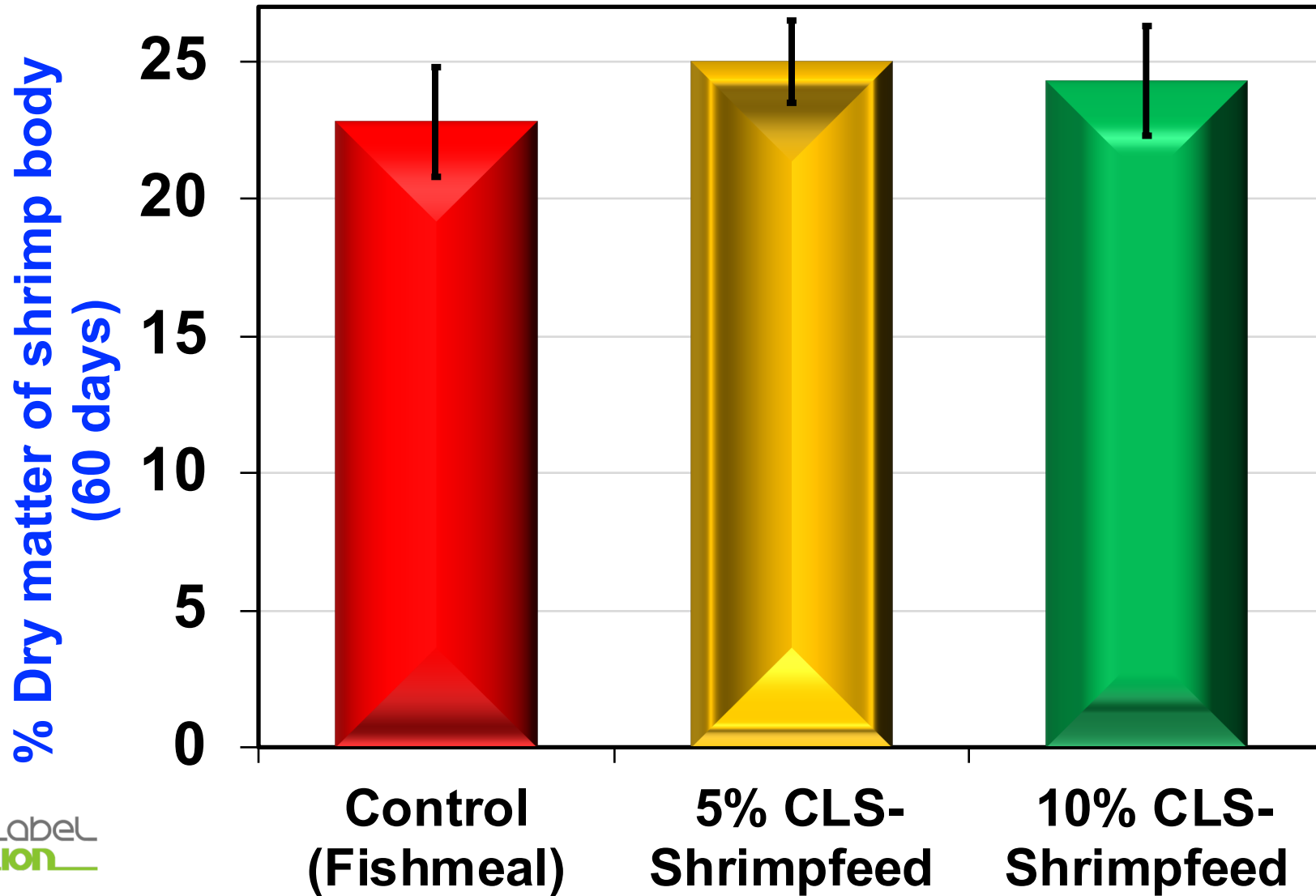
Performance of **CLS-Shrimpfeed** on the *Shrimp* weigh gain



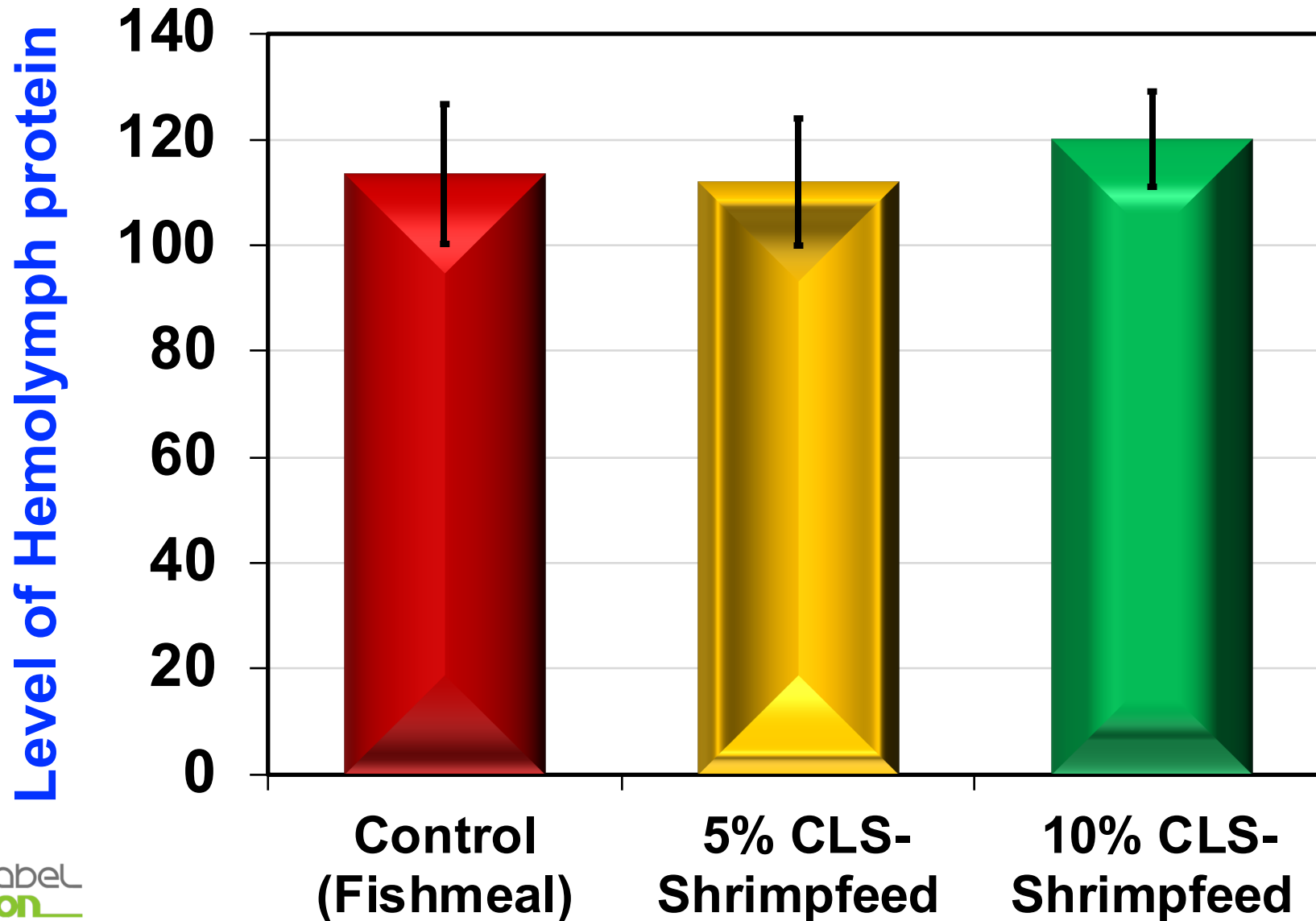
Performance of **CLS-Shrimpfeed** on the *Shrimp* protein level



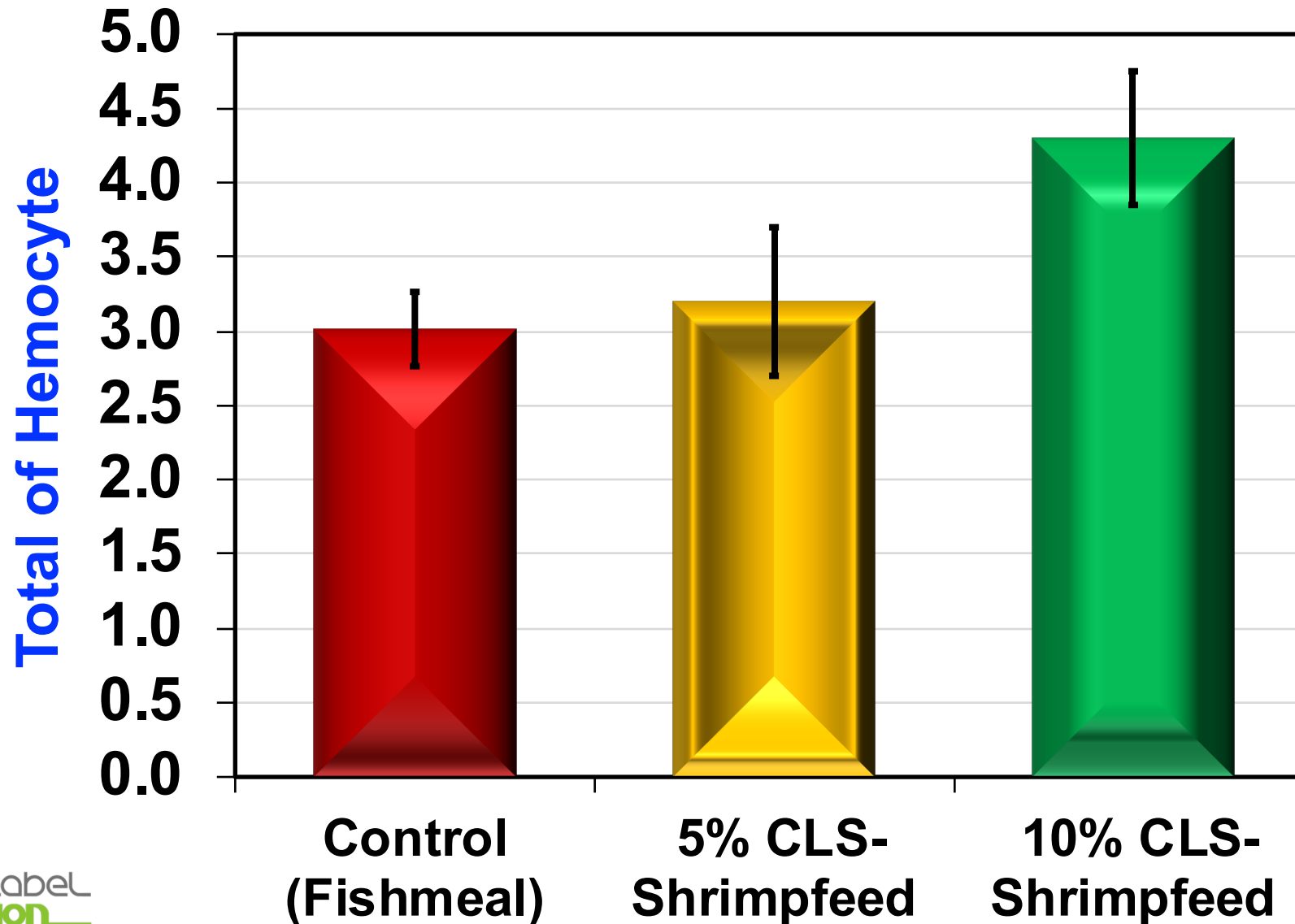
Performance of **CLS-Shrimpfeed** on the *Shrimp* dry matter



Performance of **CLS-Shrimpfeed** on the immune system of *Shrimp*



Performance of **CLS-Shrimpfeed** on the immune system of *Shrimp*





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Bi-Pass Larva



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Black Soldier Fly Larvae

- Black soldier fly larvae (BSFL) can convert waste to a high-quality animal feed.
- BSFL can contain up to 43% protein and 20% oil.
- The prices for BSF in the last few years have been doubled, due to the increasing demand for BSF products and government approval for use in animal feed.

CLS's Innovation

The **first non-commodity** Black Soldier Fly larva-based animal feed with the following features:

- 100% natural ingredients
- higher digestible protein
- 10% reduction in CO₂ output
- 20% less production energy consumption
- 20% time of operation reduced
- high-palatability



Multi-Step Protein Evaluation

Protein that is digested in **pepsin** for 1 hour, then in **trypsin**, **chymotrypsin**, **amylase**, and **lipase** for 24 hours

Bi-Pass Larva*

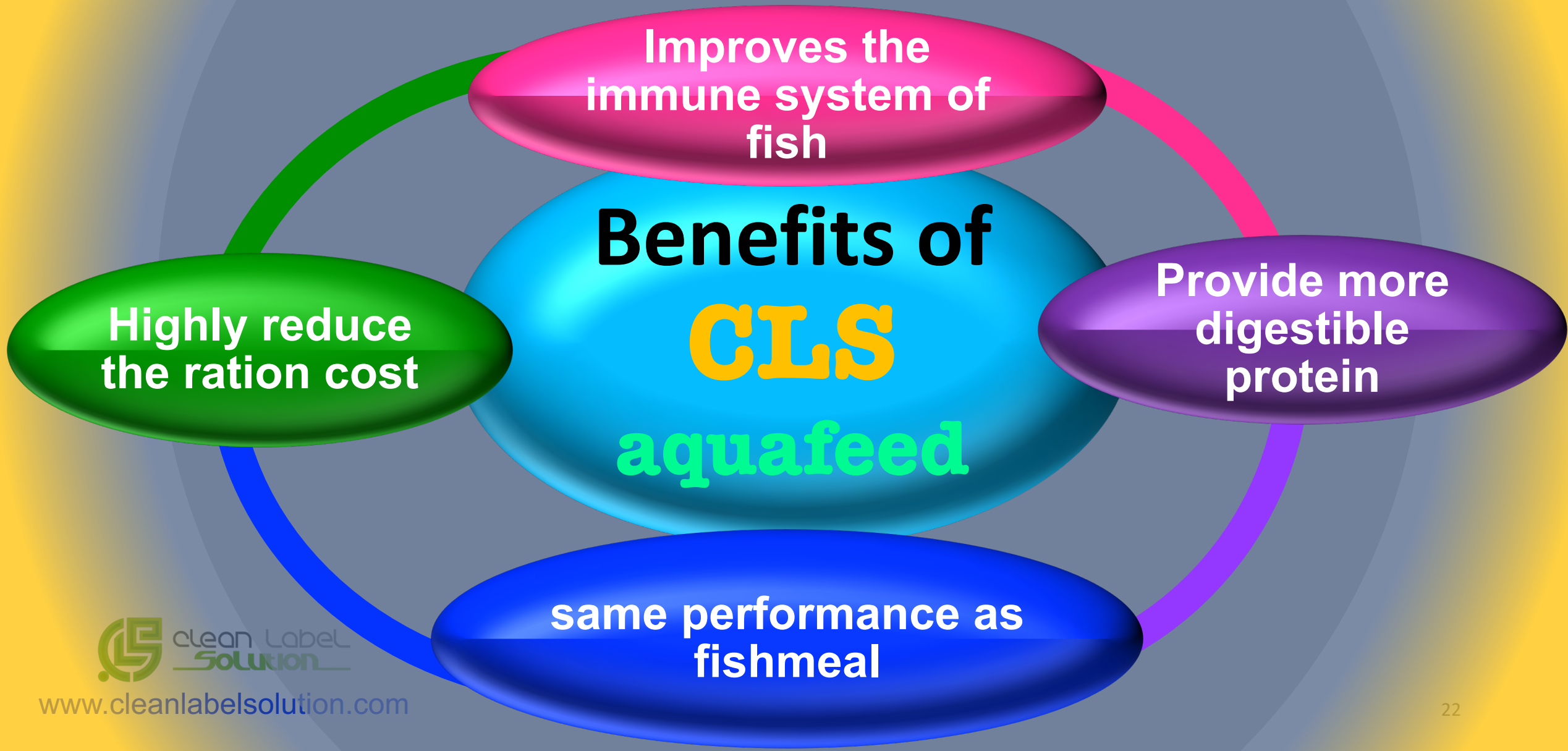
TOTAL TRACT DIGESTED PROTEIN	% CP	% DM
Total protein less intestinal undigested residue recovered by 1.5 micron filter	74.3	32.2

Black Soldier Fly Larva*

TOTAL TRACT DIGESTED PROTEIN	% CP	% DM
Total protein less intestinal undigested residue recovered by 1.5 micron filter	73.3	29.1



Why **CLS** aquafeed?





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THANK YOU

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