



## EFFECTS OF FERMENTED GARLIC *Allium sativum* POWDER ON GROWTH PERFORMANCE, BLOOD BIOCHEMICAL, HEMATOLOGICAL FACTORS AND IMMUNE SYSTEM ON RAINBOW TROUT *Oncorhynchus mykiss* JUVENILES

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**Introduction:** Herbal derivatives and extracts have been used in fish diets as natural growth promoters and immune stimulants (Abdelwahab et al., 2020). Fermented Garlic is produced under controlled conditions (70 °C, 75% humidity for 35 days) (Wang et al. 2010) from fresh garlic (*Allium sativum*) which belongs to the *Liliaceae* family (Lee and Gano 2012). Rainbow trout (*Oncorhynchus mykiss*) is a domesticated species from the *Salmonidae* family which is a carnivorous and cold-water fish species (Hardy 2002) and is cultured in recirculating aquaculture system (RAS) in Europe (Suurnäkki et al. 2020).

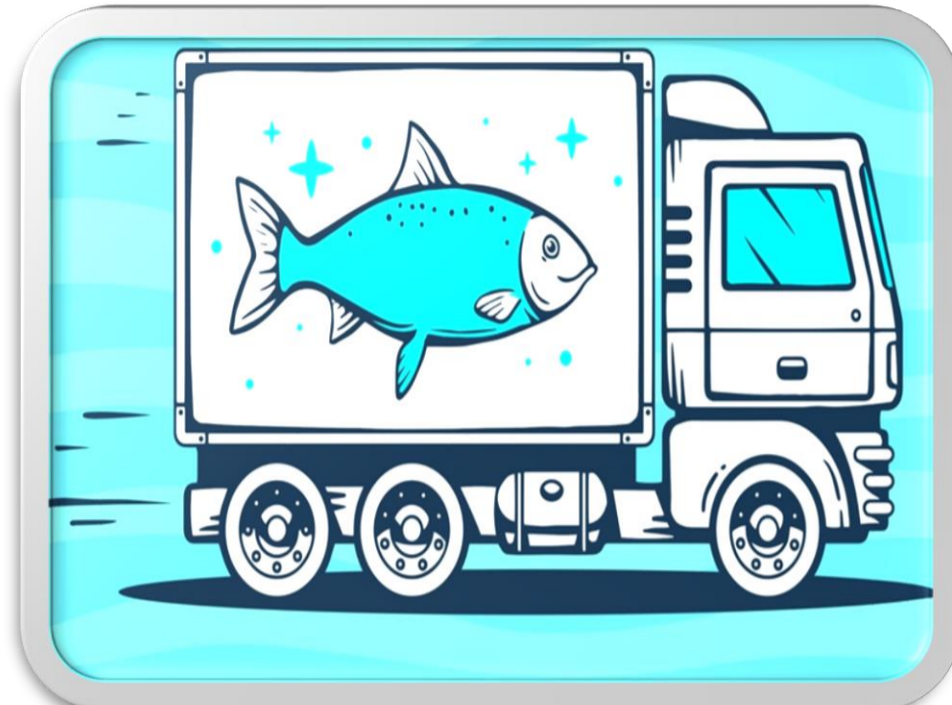
**Aims:** The present study aimed to investigate the effects of fermented garlic powder in feed on growth performance, and selected immune, hematological, and blood serum parameters in rainbow trout juveniles.

### Materials and Methods

#### Transporting and stocking



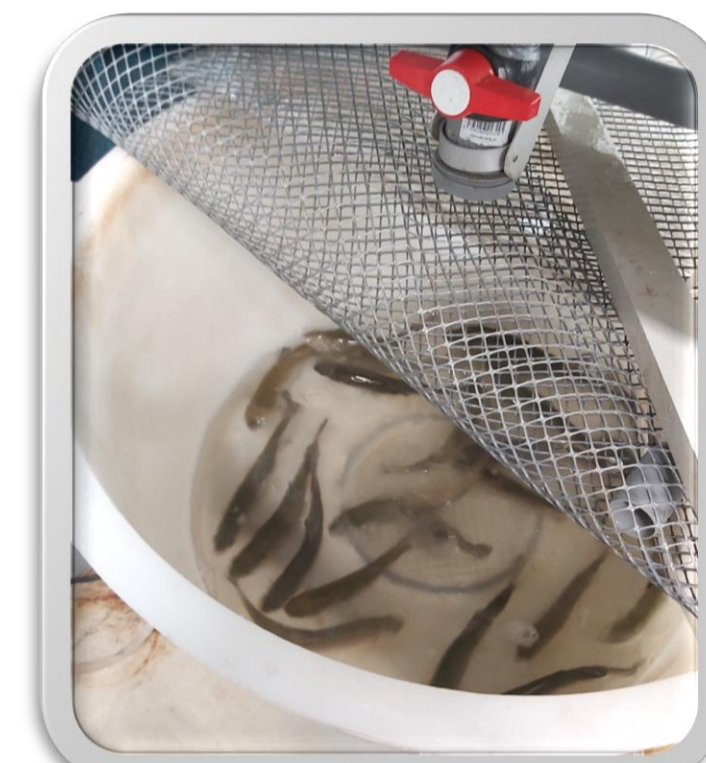
Rainbow trout (*Oncorhynchus mykiss*)



#### Feeding trial and sampling



Fermented garlic



#### Treatments

- ✓ Control (without fermented garlic powder), 10 (FG10), 20 (FG20), and 30 (FG30) g fermented garlic powder per kilogram of diet. Fish were fed for 63 days at 08:00, 12:00, and 16:00 three times a day.
- ✓ Basal diet dry matter, crude protein, crude fat, and ash were 98.85%, 49.59%, 17.37%, and 8.09% respectively.

### Results:

- ✓ No significant differences in growth performance and nutritional factors were observed among groups ( $p > 0.05$ )
- ✓ Immune factor measurements showed significantly higher myeloid cell phagocytic activity in the control group compared to FG30 ( $p < 0.05$ ). However, no significant differences were observed between FG10, FG20, and the control or FG30 ( $p > 0.05$ ).
- ✓ Lymphoid cell phagocytic activity in the FG30 group increased significantly compared to FG10 and the control group ( $p < 0.05$ ). However, no significant differences were observed between FG20 and the other groups ( $p > 0.05$ ).
- ✓ Hematological evaluations showed higher red blood cells in FG30 compared to other groups ( $p < 0.05$ ), whereas white blood cells demonstrated no significant difference among groups ( $p > 0.05$ ).
- ✓ No significant difference in granulocytes, lymphocytes, and monocytes percent, and hemoglobin among groups was observed ( $p > 0.05$ ).
- ✓ The level of hematocrit % in FG30 was higher than other groups significantly ( $p < 0.05$ ).
- ✓ No significant differences in blood serum ALT and AST activity, triglycerides, or total protein were observed among groups.
- ✓ Blood biochemical analysis showed that aspartate aminotransferase enzyme significantly decreased in the FG30 group compared to the FG20 group ( $p < 0.05$ ) however no significant difference among control, FG10, and FG30 was found ( $p > 0.05$ ).
- ✓ No significant difference in cholesterol, triglyceride, total protein, albumin, alkaline phosphatase, low-density lipoproteins, high-density lipoproteins, and glucose ( $p > 0.05$ ).

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### References:

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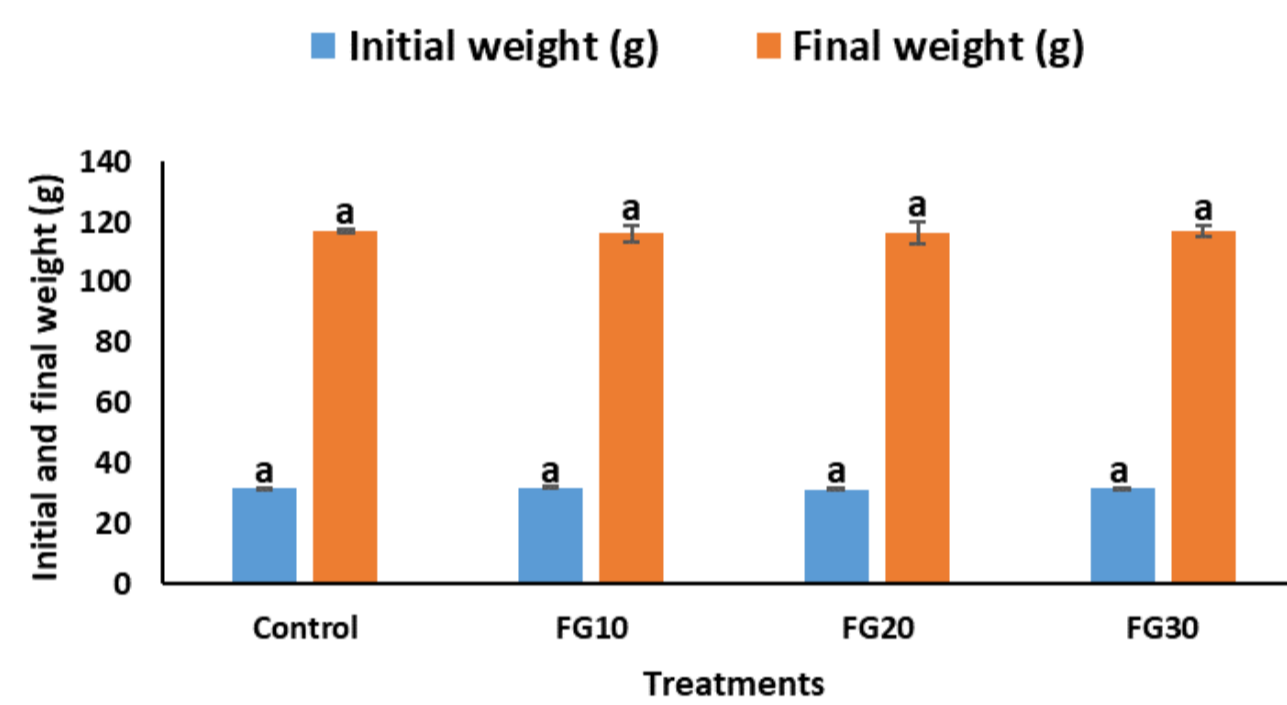


Figure 1. Growth performance of juvenile rainbow trout consuming feed supplemented with fermented garlic powder.

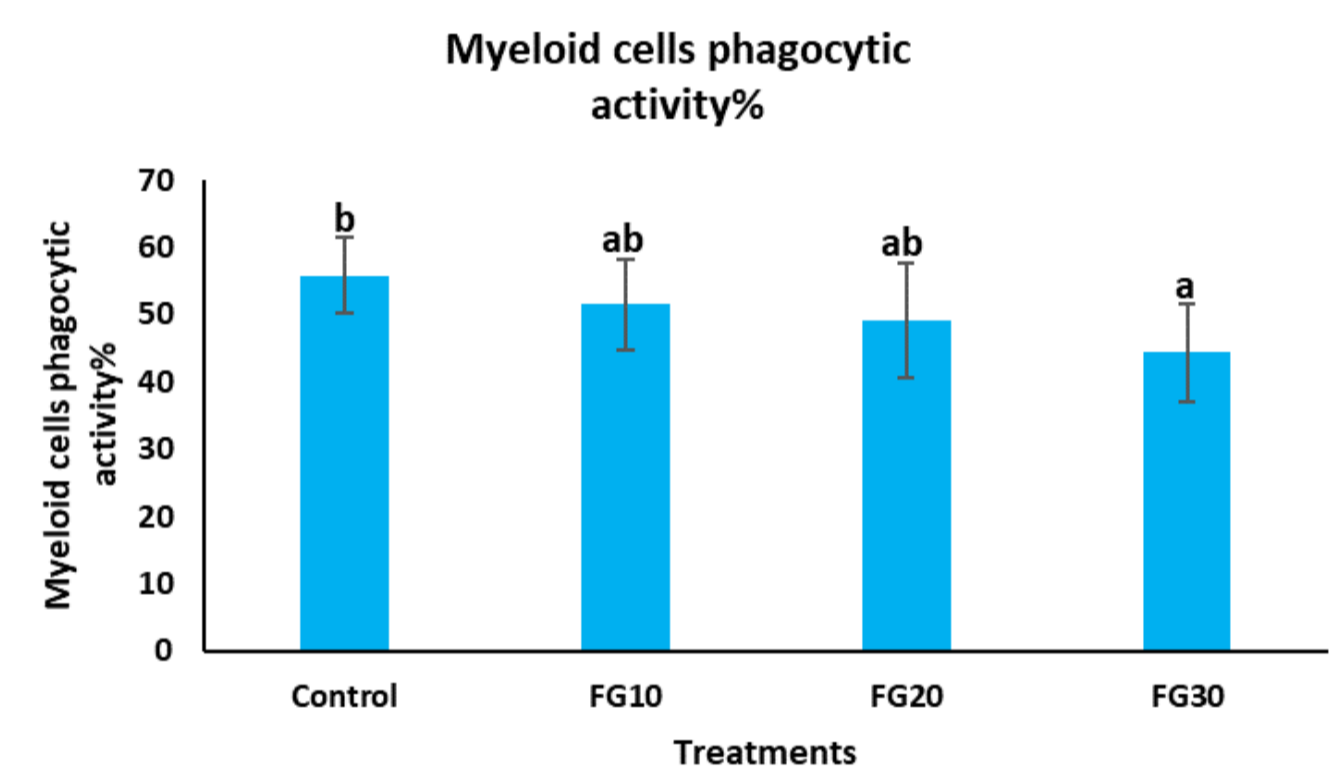


Figure 2. Myeloid cells phagocytic activity % of juvenile rainbow trout consuming feed supplemented with fermented garlic powder.

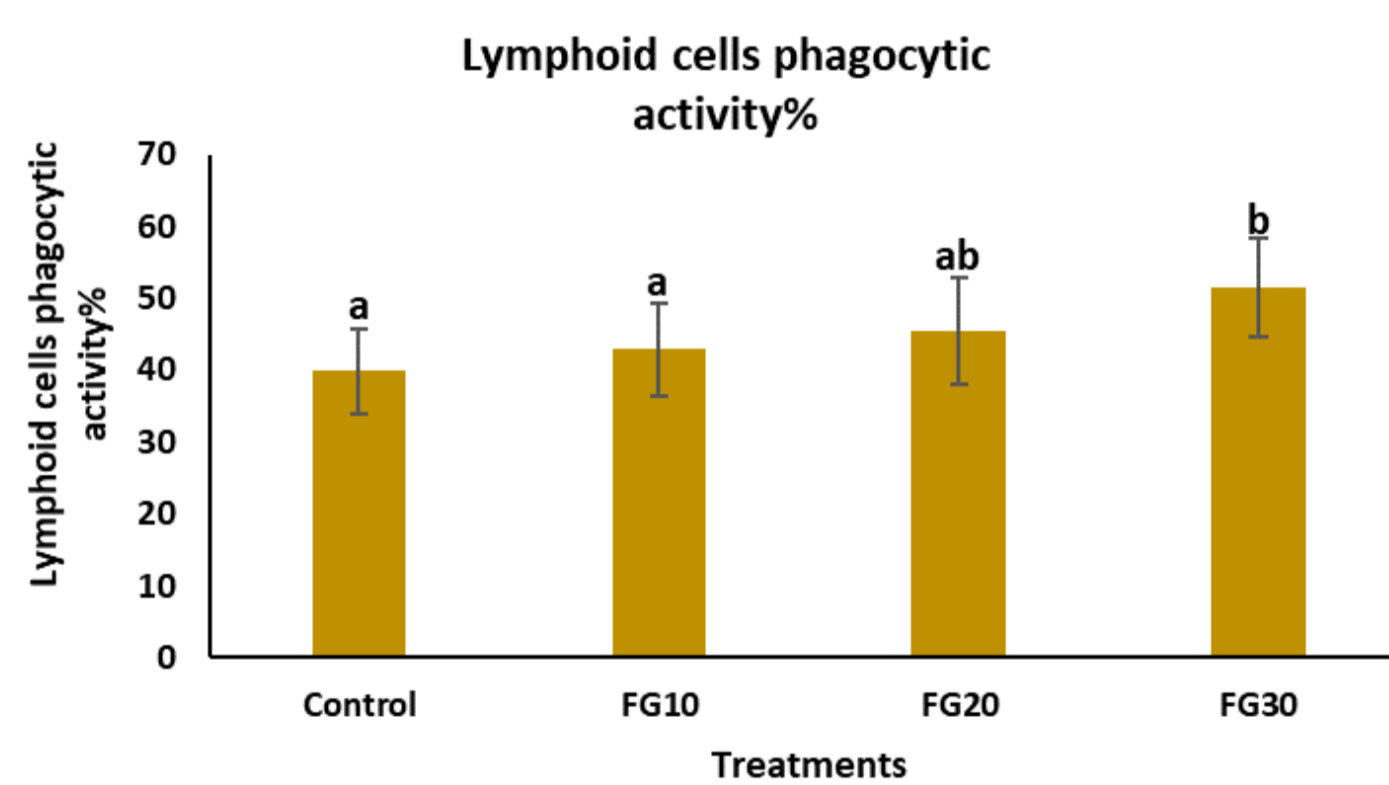


Figure 3. Lymphoid cells phagocytic activity % of juvenile rainbow trout consuming feed supplemented with fermented garlic powder.

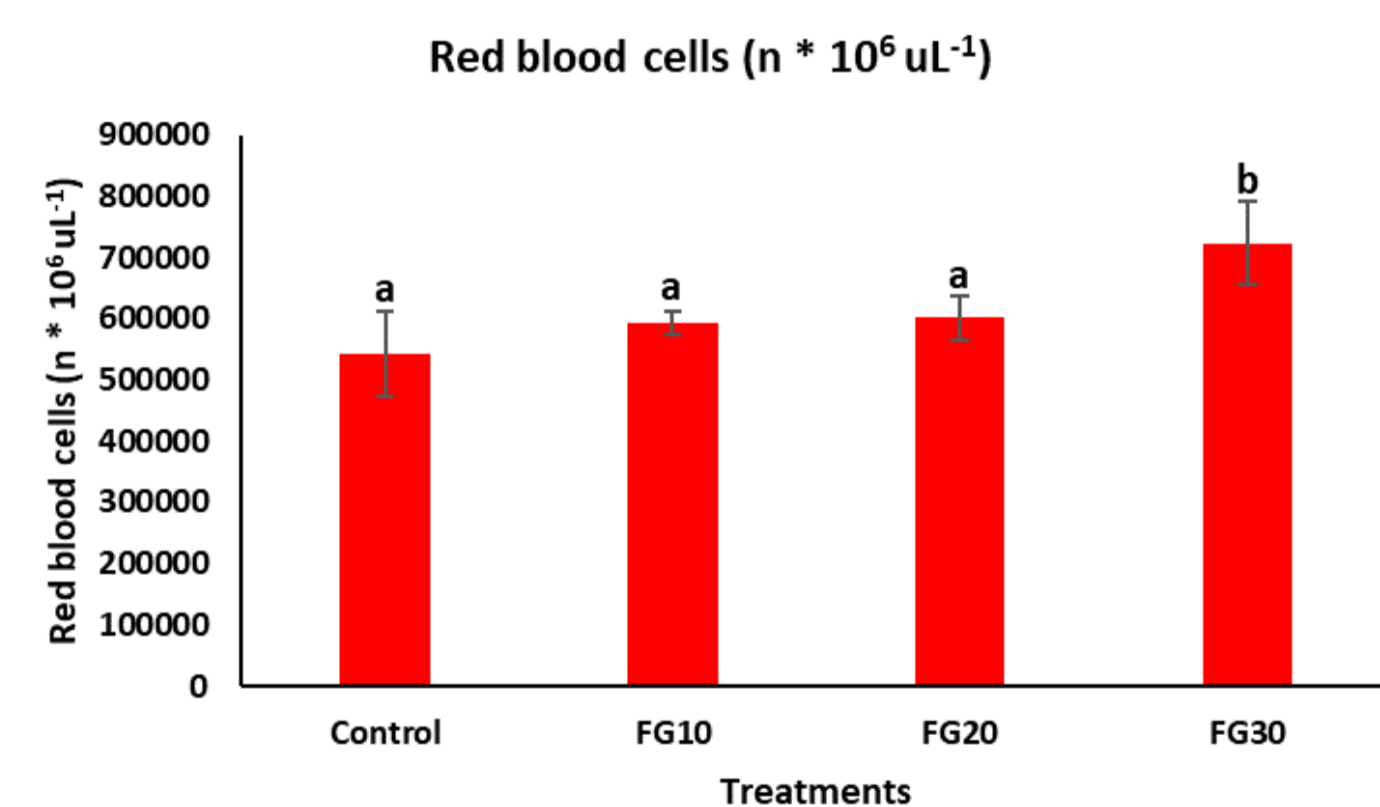


Figure 4. Red blood cells of juvenile rainbow trout consuming feed supplemented with fermented garlic powder.

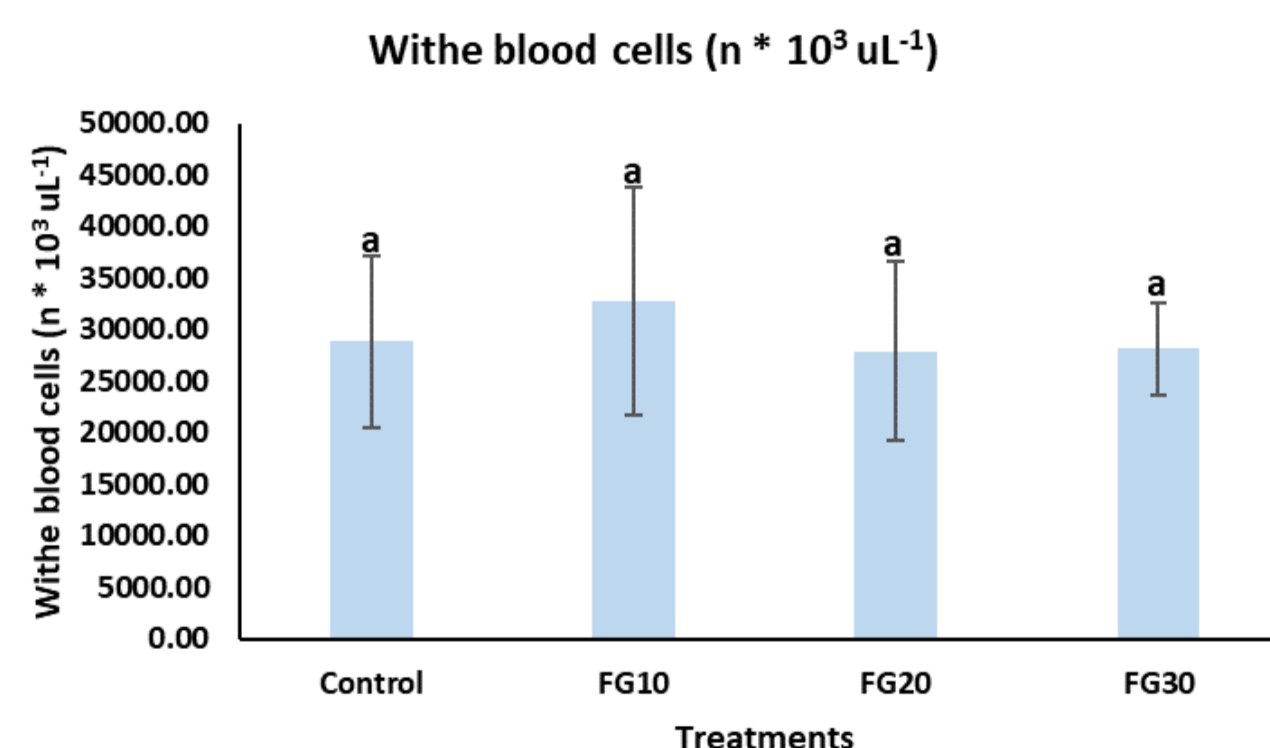


Figure 5. White blood cells of juvenile rainbow trout consuming feed supplemented with fermented garlic powder.

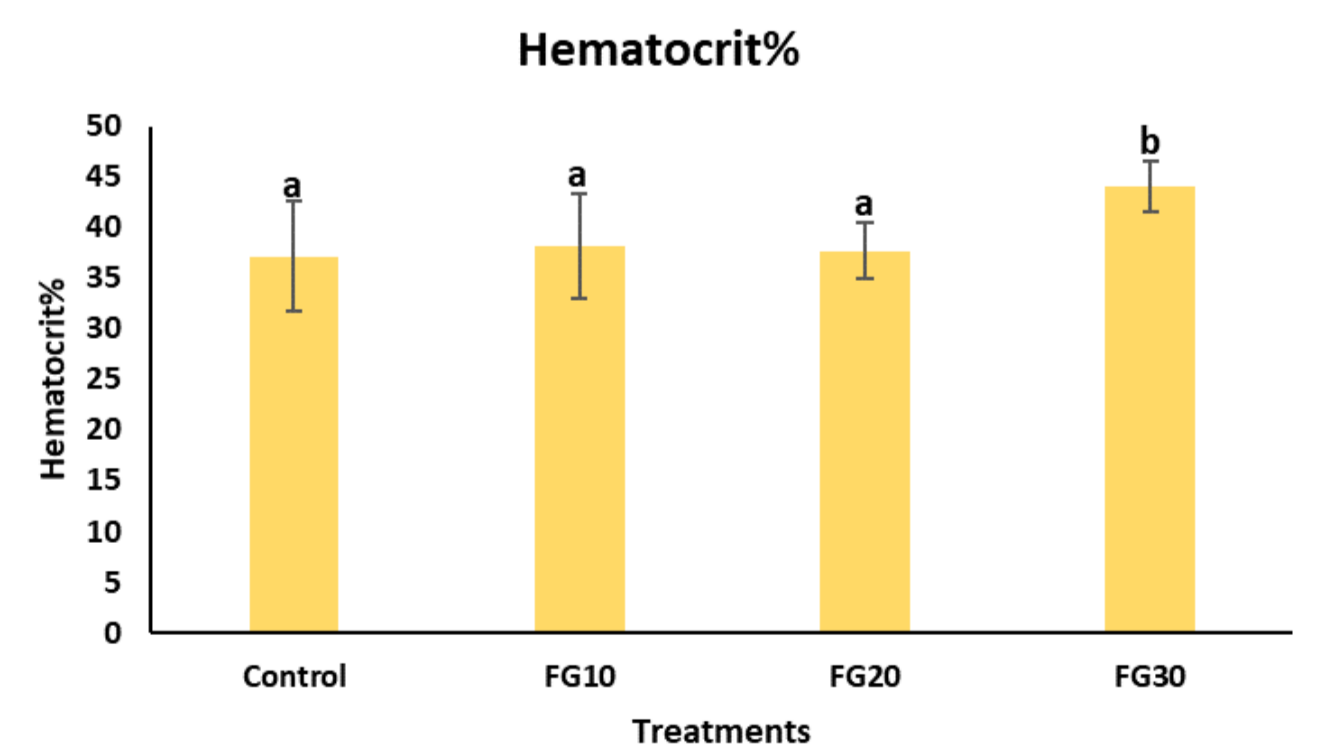


Figure 6. Hematocrit% of juvenile rainbow trout consuming feed supplemented with fermented garlic powder.

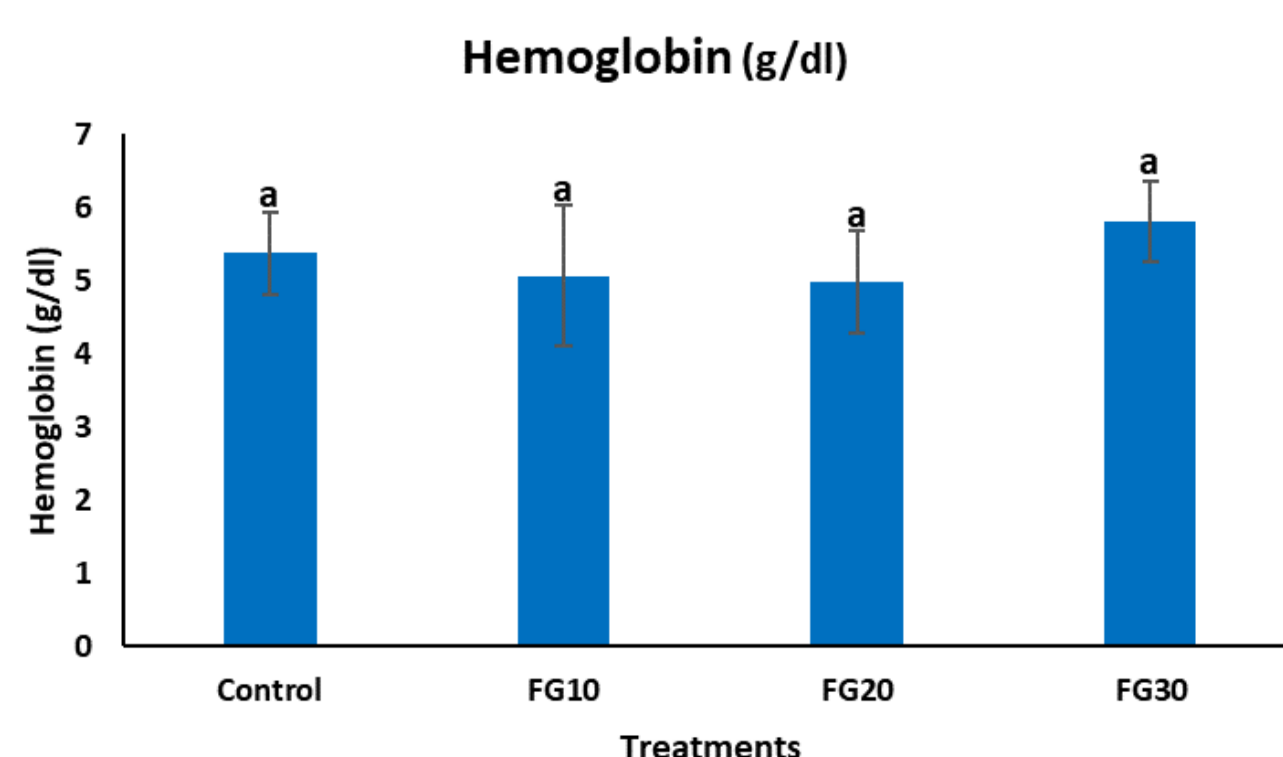


Figure 7. Hemoglobin (g/dl) of juvenile rainbow trout consuming feed supplemented with fermented garlic powder.

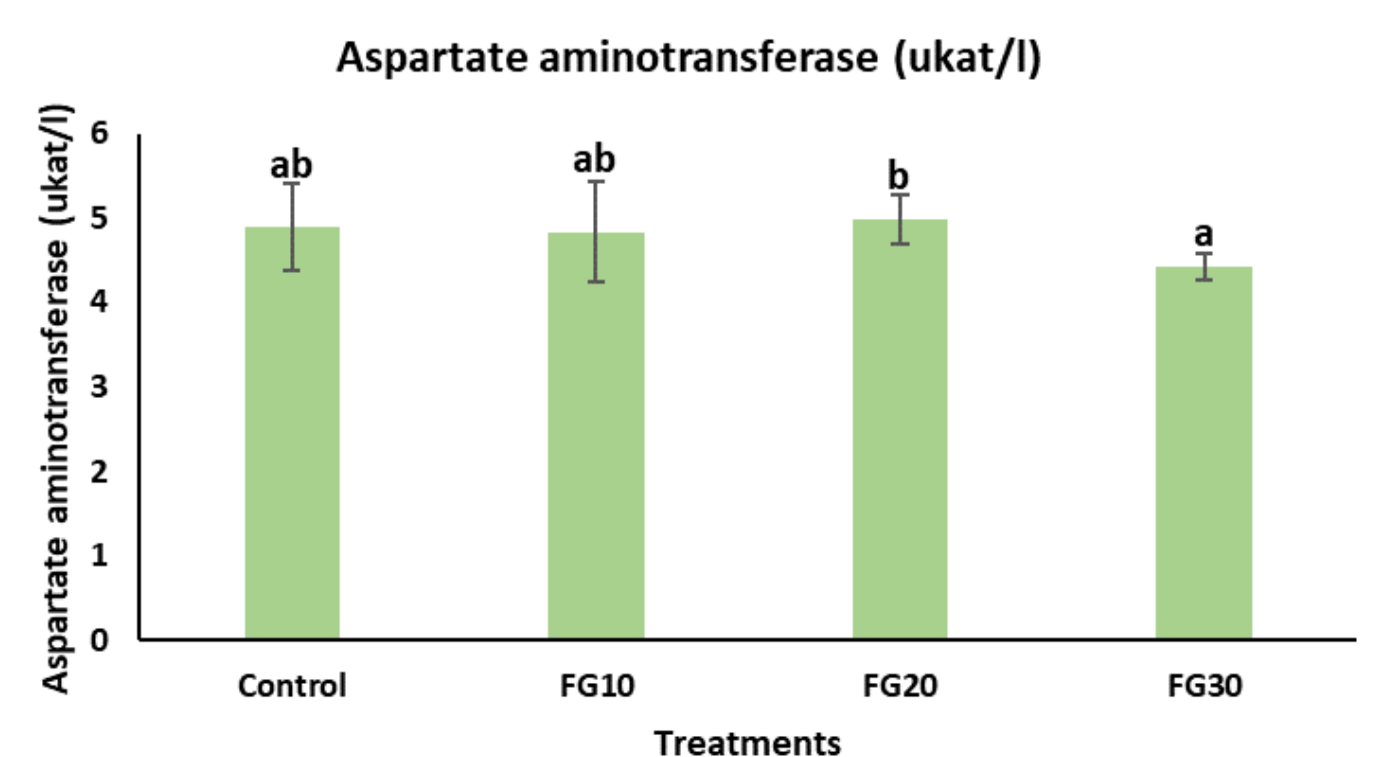


Figure 8. Blood serum aspartate aminotransferase enzyme of rainbow trout provided feed supplemented with fermented garlic powder.