Review of: "The Growth Performance of Nile Tilapia (Oreochromis Niloticus) Fed Low-Cost Fish Feeds Formulated From Fish By-Products, Fishery By-Catch and Pig Blood-Meal"

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Potential competing interests: No potential competing interests to declare.

The manuscript titled "The Growth Performance of Nile Tilapia (Oreochromis Niloticus) Fed Low-Cost Fish Feeds Formulated From Fish By-Products, Fishery By-Catch, and Pig Blood-Meal" is a comprehensive study that explores alternative, cost-effective feed options for Nile Tilapia. The research is thorough, covering aspects from feed formulation and experimental design to detailed analysis of growth performance, feed utilization, and cost-benefit analysis.

Abstract:

The abstract provides a concise overview of your study, detailing the experimental design, main findings, and implications. However, as a reviewer, I recommend the following improvements for clarity and completeness:

1. **Precision and Clarity**: Specify the initial average weight of the fingerlings more clearly. There seems to be a typographical error ("00.6 ± 0.02g"). Confirming the correct weight will enhance the reader's understanding.
2. **Methodological Detail**: Briefly mention the duration of the feeding trial to give readers a sense of the study timeline.
3. **Statistical Analysis**: While you mention significant differences in growth performance, providing a brief overview of the statistical methods used for analysis could enhance the credibility of the findings.
4. **Results Interpretation**: Highlight key results more prominently, such as the superior growth performance with 100% by-catch and by-products diets, and the cost-effectiveness of the pig blood meal. This could be made more explicit to immediately grasp the study's impact.
5. **Implications**: Expand slightly on the practical implications of these findings for aquaculture, emphasizing the potential for cost reduction and sustainability.
6. **Language and Grammar**: Minor grammatical revisions could improve the readability of the abstract. For example, consider revising "fed with seven fish diets of 35% crude protein formulated by replacing fishmeal at 0%, 50%, and 100%" for smoother flow.

Introduction:

1. **Contextualization**: The introduction effectively sets the stage by highlighting the importance of aquaculture and the challenges related to feed costs. Please include the recent statistics or studies that could update and strengthen this

context.

2. **Literature Review**: While the introduction references a number of studies on alternative feed ingredients, it could be enhanced by more directly linking these studies to the gaps your research aims to fill. This would better establish the novelty of your work.
3. **Objective Clarification**: The introduction outlines the problem but could more explicitly state the study's objectives or hypotheses.
4. **Technical Accuracy**: Ensure that all references are correctly cited and up to date. For example, the repetition in the paragraph about Zimbabwe's aquaculture industry could be an editing oversight.
5. **Coherence and Flow**: The introduction covers a broad range of topics. Ensuring a logical flow from global aquaculture trends to the specific challenges faced by Zimbabwean fish farmers would enhance coherence.
6. **Relevance and Justification**: The justification for the study, based on the need for cost-effective feeds in Zimbabwe, is compelling. Further emphasizing how this research could impact small-scale farmers and contribute to food security could strengthen the introduction.
7.

Integrating the "**Study Area**" section into "Materials and Methods" would enhance the coherence of the manuscript by providing context directly related to the experimental setup and conditions. Here are some suggestions:

Here are some suggestions for **Materials and Methods**:

1. **Location Contextualization**: Begin the "Materials and Methods" section with a brief introduction to the study locations, emphasizing their relevance to the research. For instance, mention the selection of University Lake Kariba Research Station and the University of Zimbabwe Department of Biological Sciences for feed preparation and experimental work due to their specific agro-ecological conditions and facilities.
2. **Environmental Conditions**: Detail the environmental conditions (e.g., temperature, rainfall) of each site within the experimental setup description. Explain how these conditions influence the research or the choice of these locations for conducting experiments.
3. **Experimental Relevance**: Clarify the significance of conducting the experiment in a greenhouse at Harare's specific agro-ecological region. Discuss how maintaining constant temperatures contributes to the reliability and validity of the growth performance results.
4. **Methodological Detailing**: Incorporate the specific geographical and climatic information when describing the water source, experimental aquarium setup, and the rationale behind using borehole water mixed with municipal chlorine-treated water. This detail adds depth to the understanding of the experimental conditions and potential impacts on the study's outcomes.
5. **Connection to Aquaculture in Zimbabwe**: Tie the choice of study areas to the broader context of aquaculture in Zimbabwe, particularly how the selected regions represent the varied climatic and ecological zones impacting aquaculture practices in the country.

Results:

1. **Proximate Composition Analysis**: The detailed breakdown of the proximate composition for both the individual feed ingredients and the experimental diets provides a clear understanding of their nutritional profiles. Ensure that the data presented in the tables aligns with the narrative descriptions. For clarity, consider discussing the implications of these nutritional differences on feed choice. Please provide the statistical differences in all tables between treatments with different superscripts as shown in Table 5.
2. **Energy Levels in Diets**: The presentation of energy values adds valuable information. Discussing how these energy levels correlate with growth performance could offer deeper insights into diet efficiency.
3. **Water Quality Parameters**: Reporting water quality ensures the experimental conditions are understood and replicable. However, elaborating on how these parameters compare with optimal conditions for Nile tilapia culture could contextualize the findings.
4. **Feed Intake and Utilization**: The significant differences in feed intake and feed conversion ratios (FCR) among diets are crucial findings. Expanding on the potential reasons for these differences and their practical implications for feed formulation would strengthen this section.
5. **Growth Performance**: The significant growth performance variations among diets underscore the study's main findings. Clarifying whether the growth differences are biologically as well as statistically significant would provide a more comprehensive analysis of the results.
6. **Specific Growth Rate (SGR) and Protein Efficiency Ratio (PER)**: The discussion on SGR and PER is informative. Linking these findings more directly to the specific components of the diets could offer actionable insights for feed formulation.
7. **Cost-Benefit Analysis**: This analysis is essential for understanding the economic viability of the different diets. Further analysis comparing the cost savings to potential productivity gains or losses would provide a more rounded view of the economic implications.
8. **Graphical Data Presentation**: The reference to growth curves in Figure 1 suggests a visual comparison of the treatments. Ensuring that these figures are clearly presented and discussed in the text will enhance the reader's understanding of the temporal aspects of growth performance.
9. **Statistical Analysis Clarification**: There seems to be a discrepancy in the significance reporting (e.g., significant differences reported with "p>0.05" or "p*0.05"). Clarify these to ensure they accurately reflect the statistical findings, as typically, a p-value less than 0.05 indicates significance.
10. **General Suggestions**: Consistently ensure accuracy in statistical reporting and clarity in linking the results to the study's objectives and hypotheses. Enhancing the discussion around the implications of these findings for practical aquaculture feed formulation and the sustainability of Nile tilapia production could significantly increase the manuscript's impact.

Discussion:

1. **Alignment with Literature**: The discussion effectively ties the results to existing research, reinforcing the credibility of the findings. However, directly comparing your results with specific studies, including differences and similarities, could provide deeper insights into the context of your findings.

2. **Nutritional Implications**: The discussion on the nutritional content of feed ingredients and their implications for growth performance is well-presented. Expanding on how these findings can influence practical feed formulation, especially in resource-limited settings, would be beneficial.
3. **Economic Considerations**: Highlighting the cost-effectiveness of alternative feeds is crucial. Further discussion on the economic implications for small-scale farmers, including a more detailed cost-benefit analysis considering long-term productivity and potential market barriers, would enhance the discussion.
4. **Environmental Impact**: The study touches on the sustainability aspect by utilizing by-products, which is commendable. A more thorough discussion on the environmental benefits, such as reduced waste and pollution, alongside the nutritional and economic advantages, would provide a holistic view of the study's implications.
5. **Limitations and Future Research**: While the study mentions temperature effects and the need for amino acid profiling, explicitly stating the limitations, such as the scope of the experimental conditions and their generalizability, would strengthen the study. Additionally, outlining specific future research directions based on the findings could guide subsequent investigations.
6. **Technical and Scientific Language**: Ensure the discussion maintains a high level of scientific rigor and clarity. Avoid general statements and ensure all claims are supported by data or relevant literature.
7. **Feed Quality and Fish Health**: Briefly discussing the potential impacts of feed composition on fish health and quality, beyond growth performance, would provide a more comprehensive understanding of feed choice implications.
8. **Practical Application**: The discussion could benefit from more direct suggestions on how these findings can be implemented in practical aquaculture operations, especially in the context of developing countries or regions with similar ecological and economic conditions.
9. **Summary of Findings**: Conclude the discussion with a strong summary of the key findings, their practical implications, and the contribution to the field of aquaculture, reinforcing the study's significance and potential impact.

The manuscript lacks a Conclusion section, which is essential and should be added. Additionally, there are inconsistencies in font and style throughout the document. It is important to ensure uniformity in formatting, adhering strictly to the journal's guidelines for style.