Herbal Nutrients as Phytobiotics: Its Response to Hematology and Serum Profile Analysis of Sasso Chicken

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ABSTRACT:
This study evaluates the effect of different formulated herbal nutrients as phytobiotics on the hematology and serum analysis of Sasso broilers. The objectives of the study are to determine the growth of Sasso chicken to its serum and hematology analysis as affected by the different phytobiotics and to determine the hematology and serum profile analysis of Sasso chicken in response to different phytobiotics. The study found that the different formulated herbal nutrients as phytobiotics had significant effects on the hematology and serum profile analysis of Sasso chicken. Specifically, the study determined the hematology biochemical analysis of Sasso chicken in terms of Packed Cell Volume (PCV), Hemoglobin, Red Blood Cells (RBC), White Blood Cells (WBC), MCV, MCH and MCHC, and the serum profile analysis of Sasso chicken in terms of Total protein, Albumin, Globulin, Creatinine, Urea, Glucose, Cholesterol and Salt. The study concludes that the different formulated herbal nutrients as phytobiotics have the potential to improve the health and performance of Sasso broilers.

Keywords: phytobiotics, sasso chicken, hematology, serum profile analysis, herbal nutrients, Philippines.


INTRODUCTION
The poultry industry in the Philippines faces challenges like inefficient management and prevalent diseases. Chicken meat's popularity is rising globally due to its affordability and nutrition. Broiler production is growing rapidly, but factors like feed costs and quality affect productivity. Antibiotics have traditionally been used in feed for disease prevention and growth promotion, but restrictions have led to interest in alternatives like phytobiotics, plant-derived additives [4]. Phytobiotics offer benefits such as stimulating feed intake, antimicrobial activity, immune system stimulation, and antioxidant effects [8]. Studies have shown positive effects of phytobiotics like turmeric and oregano extracts on poultry health and performance. Research on their impact on serum biochemistry is limited. This study aims to evaluate the effects of different phytobiotic formulations on the serum profile of Sasso chickens.

MATERIALS AND METHODS
Experimental Procedure
This present study was conducted in ASIST Lagangilang, Abra, Philippines on 40 heads of Sasso chicken allocated to four treatments. Ad libitum feeding of commercial feeds was employed for all treatments, different phytobiotics were added to the drinking water of the birds following their respective treatment during the first seven (7) days and twice a week thereafter.
For the hematology and serum profile evaluation, blood samples from each treatment after 30 days of the experiment were sent to the Laboratory after the provision of the treatment. The experimental birds were fasted for 24 hours before collecting blood samples. Birds were bled through the marginal wing vein for serum biochemical and hematological studies. 5 ml of blood was collected with a hypodermic sterile needle and syringe. The blood collected was labeled in a sterilized bottle containing EDTA (Ethylene Diamine Tetraceti Acid) which prevented the blood from coagulation and used for hematological studies.

**Research Design and Treatments**

Descriptive research design was used in this study whereas, unlike in experimental research, the researcher does not control or manipulate any of the variables, but only observes and measures them [7]. In this research, treatment means were measured and described as well as other observations.

The following treatments are as follows:

- **T₀** – Control (pure water)
- **T₁** – 5 ml Oregano based OHN Phytobiotic/liter of water
- **T₂** – 5 ml of Ginger based OHN Phytobiotic/liter of water
- **T₃** – 5 ml of Red-hot pepper based OHN Phytobiotic/liter of water

**Statistical Tool**

The data gathered on hematology and serum profile analysis were tabulated and analyzed using Analysis of Variance (ANOVA) Single Factor using SPSS Version 20, while significance difference was analyzed by Scheffe Test in the same statistical tool.

**Data gathered**

The data gathered were the following: initial weight, final body weight (g), gain in weight (g), feed conversion ratio, feed and water consumption.

Data on hematology and serum profile analysis was based from the method where Packed cell volume (PCV), haemoglobin (Hb), erythrocyte concentration (RBC), leucocytes concentration (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were measured on hematology profile. While, Albumin (ALB), globulin (GLOB), total proteins (TP), triglycerides (TRI), cholesterol (CHOLEs), uric acid (UA) and creatinine (CREAT) concentrations were assessed on serum profile analysis [8].

**RESULTS AND DISCUSSION**

**Growth Parameters**

In Table 1, there was no significant difference in the analysis of variance using one-way ANOVA. The initial weight of the birds before the start of the study ranges from 460-470 grams, where initial weight means have 10 grams difference from highest to lowest mean. In the final weight of sasso after 30 days of experiment, the mean ranges from 1124.22-1174.28, whereas **T₂** -ginger-based formulated herbal nutrients obtained the highest mean of 1174.28, followed by hot pepper with a mean of 1136.35, oregano with a mean of 1167.40, and control as the lowest with a mean of 1124.22 grams. The feed consumption ranged from 2,200-2,300 grams average feed consumption for four weeks of the experiment, while water consumption ranged from 2,315-2,515 ml on average per bird in each treatment.
Table 1. Table Showing the Growth Parameters Results

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean</th>
<th>Initial Weight (g)</th>
<th>Final Weight (g)</th>
<th>Gain in Weight (g)</th>
<th>FCR</th>
<th>Feed consumption (g)</th>
<th>Water Consumption (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To-Control</td>
<td></td>
<td>460</td>
<td>1124.22</td>
<td>664.22</td>
<td>3.46</td>
<td>2300</td>
<td>2325</td>
</tr>
<tr>
<td>T1 - 5 ml Oregano based Phytobiotic/liter of water</td>
<td></td>
<td>468</td>
<td>1136.35</td>
<td>668.35</td>
<td>3.29</td>
<td>2200</td>
<td>2315</td>
</tr>
<tr>
<td>T2 – 5 ml Ginger based Phytobiotic/liter of water</td>
<td></td>
<td>470</td>
<td>1174.28</td>
<td>704.28</td>
<td>2.20</td>
<td>2300</td>
<td>2515</td>
</tr>
<tr>
<td>T3 – 5 ml Red-Hot pepper based Phytobiotic/ liter of water</td>
<td></td>
<td>465</td>
<td>1167.4</td>
<td>702.4</td>
<td>3.27</td>
<td>2260</td>
<td>2470</td>
</tr>
</tbody>
</table>

The result in final weight shows that giving formulated herbal nutrients had a better weight compared to pure water, this means that herbal nutrients had an effect on the weight of birds and this could be due to flavonoids and tannin content that helps in the growth.

The table further presents the weight of Sasso chicken in terms of gain in weight and the conversion efficiency of birds. It is observed that the gain in weight goes with the result in column 2 with the final weight of birds. Thus, T2 had still the highest weight with a mean of 704.28, followed by hot-pepper, oregano, and control.

Moreover, the FCR of birds is still confirmed with the gain in weight and final weight of birds. This means that herbal nutrients to birds help in order for the feed’s intake will be converted into meat for a heavier weight.

Hematology Analysis

Table 2 presents the hematology profile analysis of Sasso chicken in response to the different phytobiotics given. Statistically, there was a highly significant difference in all the parameters of hematology analysis. Packed Cell Volume (PCV) is the percentage (%) of Red Blood Cells (RBC) in blood [1], the results revealed that a higher amount was observed in Ginger based (49.71), followed by Control (45.60), Oregano (45.00), and Hot-pepper (35.20), hence Control, Oregano, and Ginger except Hot-pepper had exceeded the reference value of 35.9–41%.

In hemoglobin count, ginger-based phytobiotic had the highest mean of 13.6 and is significant to all treatments, while the hot-pepper had the lowest mean of 8.2, hence all the treatments is within the normal range of 11.60–13.68, except for the hot-pepper. In the Red Blood Cell (RBC) count of the Sasso chicken, all treatment means were still significant to each other, hence ginger had the highest mean of 6.75 while the hot pepper had the lowest mean of 3, hence the normal range is within 4.21-4.24. In white blood cell (WBC) count, the Control treatment had the highest count of 6.2 and is significant at 0.05 level to all other treatment means, while the ginger had the lowest mean of 4.27 hence it is within the range of 4.07-4.32. This result is supported by Al-Saad et al., 2014, where a significant increase in the number of White Blood Cells (WBC) in blood samples of probiotic and organic acids groups compared to the antibiotic group in chicken is disclosed.

In MCV, the normal range is 81.6–89.1, hence all treatments except for the hot pepper did not reach the normal range count. As observed, there was a consistently low count value of the PCV, hemoglobin, and red blood cells in hot-pepper treatment, and this could be due to the capsaicin content of the hot pepper that reviews claim that it can lower the blood thru inhibiting iron [1].

Cayenne pepper (capsaicinoids) has been reported to contain phenol compounds [11] [1]. And can inhibit iron absorption [12]. Corroborate this report when reporting a significant decline in hemoglobin levels as consumption of dietary pepper in broiler chick diet increased in the third week of the feeding trial. This possibly explains why chicks fed the basal diet had the highest circulating erythrocytes and hemoglobin levels as reported [1].

The result of this study conforms [3] on the feeding of ginger on the hematology of broilers where the result showed that strains had a significant influence (p<0.05) on the hematological indices of the chicks except for MCV, MCHC, and lymphocyte. But this contradicts [2] where Growth Promoters on Blood Hematology and Serum Composition of Broiler Chickens where there were no significant
differences (p>0.05) in the Red Blood Cells (RBC) number and blood hemoglobin of birds in all groups.

Table 2. The Hematology Analysis of Sasso Chicken Given with Different Formulated Herbal Nutrients as Phytobiotics

<table>
<thead>
<tr>
<th>Type</th>
<th>Control</th>
<th>Oregano</th>
<th>Ginger</th>
<th>Hot pepper</th>
<th>Reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCV***</td>
<td>45.6 a</td>
<td>45 c</td>
<td>49.71 a</td>
<td>35.2 d</td>
<td>35.9-41.6%</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>12.6 a</td>
<td>12.6 b</td>
<td>13.6 c</td>
<td>8.2 b</td>
<td>11.60-13.68g/dl</td>
</tr>
<tr>
<td>RBC***</td>
<td>4.24 c</td>
<td>6.2 b</td>
<td>6.75 a</td>
<td>3 d</td>
<td>4.21-4.84 x 10.6/ml</td>
</tr>
<tr>
<td>WBC***</td>
<td>6.2 a</td>
<td>4.82 c</td>
<td>4.27 d</td>
<td>4.65 b</td>
<td>4.07-4.32 x 10.3/ml</td>
</tr>
<tr>
<td>MCV***</td>
<td>85.3 c</td>
<td>86.7 b</td>
<td>89.1 a</td>
<td>76.1 d</td>
<td>81.6-89.1fl</td>
</tr>
<tr>
<td>MCH***</td>
<td>26.7 a</td>
<td>35.8 b</td>
<td>34.2 b</td>
<td>32.6 c</td>
<td>27.2-28.9pg</td>
</tr>
<tr>
<td>MCHC***</td>
<td>36.2 b</td>
<td>36.2 b</td>
<td>34.7 a</td>
<td>28.7 c</td>
<td>32.41-33.37%</td>
</tr>
</tbody>
</table>

Note: ***Highly significant @ 0.05 level; Means with the same letter are not significant

Legend: PCV-Packed Cell Volume; RBC-Red Blood Cells; WBC-White Blood Cells; MCV- Mean Corpuscular Volume; MCH-Mean Corpuscular Hemoglobin; MCHC-Mean Corpuscular Hemoglobin Concentration

Serum Profile Analysis

Table 3 presents the serum profile analysis of Sasso chicken in response to different phytobiotic. Analysis of variance reveals that there was a significant difference between treatment means in all the parameters of serum profile analysis. Moreover, it revealed in the table that in terms of Total protein, ginger had the highest percentage of 6.32 and is significant to other treatments, followed by hot pepper of 6.21, oregano of 5.21 and the lowest is under control treatment with a mean of 4.76 g/dL. Hence, all birds given phytobiotic had exceeded the normal range of 4.63-4.81. Thus, the result of total protein analysis goes with the result in Table 1 (Final weight), whereas Ginger-based had obtained the highest weight, followed by hot-pepper.

In Column 3 of table 3, it disclosed the Albumin content of Sasso chicken given with different herbal nutrients as phytobiotics. Statistically, it has a highly significant result at 0.05 level, as reflected ginger is significant to oregano, control, and hot-pepper, hence all treatment means were significant to each other at Scheffe’s test result. Hence only the oregano-based treatment did not meet the normal range value of 3.28-3.48, while the ginger and control had exceeded the normal range.

The Globulin analysis is presented in the same table column 4, it reveals still a highly significant result at 0.05 level, hence ginger had the highest count of 2.92, followed by the control of 1.22, oregano of 1.21 and hot-pepper of 0.92. Hence all treatment means is significant to each other, thus the hot-pepper did not meet the normal range of 1.15-2.53, while the ginger had exceeded.

The creatinine level of different levels had exceeded the normal range of 0.88-0.95, however it is observed that oregano had obtained the highest level while control had the lowest level at 0.99, moreover, the statistical result shows that there was a significant result between treatment means. This catabolite is directly related to increased muscle activity and volume [6], this means that the control treatment had lower muscle activity compared to birds given phytobiotic, thus this proves that phytobiotics may help for faster muscle formation and higher total protein.

In the urea level content, there was a highly significant difference between treatment means, thus the ginger had obtained the highest value of 5.81 while the control had obtained the lowest value of 3.16. Moreover, the oregano did not obtain the normal urea level 4.46-4.54. a literature found a direct relationship between protein intake and blood level of uric acid [9] [6].

The highest value in glucose and cholesterol is recorded in oregano, while the lowest value is recorded in hot pepper, hence all treatments exceeded all the normal ranges reported by the analysis.
### Table 3. The Serum Profile Analysis of Sasso Chicken Given with Different Formulated Herbal Nutrients as Phytobiotic

<table>
<thead>
<tr>
<th>Serum Type</th>
<th>Control</th>
<th>Oregano</th>
<th>Ginger</th>
<th>Hot pepper</th>
<th>Reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein</td>
<td>4.76d</td>
<td>5.21c</td>
<td>6.32a</td>
<td>6.21b</td>
<td>4.63-4.81g/dL</td>
</tr>
<tr>
<td>Albumin</td>
<td>3.82 b</td>
<td>2.6 c</td>
<td>4.84a</td>
<td>3.67 c</td>
<td>3.28-3.28g/dL</td>
</tr>
<tr>
<td>Globulin</td>
<td>1.22 b</td>
<td>1.21c</td>
<td>2.92a</td>
<td>0.92 d</td>
<td>1.15-1.53g/dL</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.99 d</td>
<td>2.5 a</td>
<td>1.76 b</td>
<td>1.29 c</td>
<td>0.88-0.95mg/dL</td>
</tr>
<tr>
<td>Urea</td>
<td>4.74 b</td>
<td>4.21 c</td>
<td>5.81 a</td>
<td>3.16 d</td>
<td>4.46-4.54mmol/L</td>
</tr>
<tr>
<td>Glucose</td>
<td>47.3 c</td>
<td>36.2 a</td>
<td>49.21 b</td>
<td>37.62 b</td>
<td>31.3-32.4mg/dL</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>33.7 c</td>
<td>42.2 a</td>
<td>37.62 b</td>
<td>24.6 d</td>
<td>31.3-32.4mg/dL</td>
</tr>
<tr>
<td>Salt</td>
<td>10.2 c</td>
<td>11.2 b</td>
<td>11.6 a</td>
<td>9.2 d</td>
<td>10.6-11.9IU/L</td>
</tr>
</tbody>
</table>

**Note:** ***Highly significant @ 0.05 level; Means with the same letter are not significant***

### CONCLUSION

The study evaluates the effect of different formulated herbal nutrients as phytobiotics on the hematology and serum profile analysis of Sasso broilers. The study found that the different phytobiotics had significant effects on the hematology and serum profile analysis of Sasso chicken. The hematology biochemical analysis of Sasso chicken was affected in terms of Packed Cell Volume (PCV), Hemoglobin, Red Blood Cells (RBC), White Blood Cells (WBC), MCV, MCH and MCHC. The serum profile analysis of Sasso chicken was affected in terms of Total protein, Albumin, Globulin, Creatinine, Urea, Glucose, Cholesterol and Salt. The study suggests that phytobiotics could be used as an alternative to antibiotics in poultry production, which could have implications for the poultry industry as a whole. Further research is needed to investigate the mechanisms by which phytobiotics affect animal health and performance, and the long-term effects of using phytobiotics in poultry production.

### CONFLICT OF INTERESTS

No conflict of interest.

### REFERENCES


