INTRODUCTION

Feeding highly bio available forms of trace minerals can support essential physiological functions necessary to animal health and structural integrity. Birds fed HMTBa-chelated Zn, Cu and Mn exhibit better bone strength, skin integrity, and immune response. Evidence these trace minerals play a key role in egg shell formation suggest supplementing hens with HMTBa-chelates of Zn, Cu and Mn will support the production of quality eggs across the laying period.

MATERIALS AND METHODS

A 56 wk (24 to 80 wk of age) study was conducted to determine the long term effects of feeding CTM (MINTREX®, metal methionine hydroxy analogue chelates of Zn, Mn or Cu, Novus International Inc) vs. ITMs (inorganic trace minerals) in layers on performance, egg shell quality, tibia breaking strength, and immune response.

A total of 216 Hy-Line W-36 laying hens were assigned to 6 treatments with 36 pens/treatment and 1 hen/cage. The study was carried out under randomized complete block design. The data were analyzed using both 1-way ANOVA (including all 6 treatments) and 2x2 factorial design with 2 sources (CTM vs. ITMs) and 2 levels (20-5-20 vs. 40-10-40ppm of Zn-Cu-Mn) of supplemental minerals.

RESULTS

Table 1:

<table>
<thead>
<tr>
<th>Treatment (T)</th>
<th>Zn (ppm)</th>
<th>Cu (ppm)</th>
<th>Mn (ppm)</th>
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<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<td>5</td>
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<td>10</td>
<td>40</td>
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<tr>
<td>6</td>
<td>80</td>
<td>20</td>
<td>80</td>
</tr>
</tbody>
</table>

(CTM, chelated trace minerals (HMTBa-chelates of Zn, Cu and Mn); ITM, inorganic trace minerals as sulfates; CTM, chelated trace minerals (HMTBa-chelates of Zn, Cu and Mn).)

**RESULTS**

**FIGURE 1:** CTM red hens had significant increase in shell breaking strength compared to ITM-fed hens especially at week 76 sampling (source effect; P<0.05).

**FIGURE 2:** CTM red hens had better shell thickness compared to eggs from ITM-fed hens. The numbers are consistently higher for all the sampling periods from week 44 to 74, and statistically significant (P<0.05) improvement is noticed at week 74.

**FIGURE 3:** CTM red hens had significantly better AB titers values compared to ITM-fed hens at week 63. The main effects for source was significant for IgG (P=0.04) at 2 weeks after secondary injection of SRBCs.

**OTHER RESULTS**

The increase in minerals levels increased tibia breaking strength (P=0.07). CTMs supplementation increased tibia breaking strength numerically compared to ITMs (P=0.19).

**CONCLUSIONS**

Supplementing trace minerals as CTM vs. inorganic sources to layer diets resulted in improved shell breaking strength (P<0.05; wk 68), improved shell thickness (P<0.05; wk 74) and improved immune response (P<0.05; wk 63). These results were obtained despite of using the same or lower levels of Zn, Cu and Mn than in the ITM treatments, thus suggesting a higher bio availability of HMTBa-chelates than inorganic sources in laying hens.

**ACKNOWLEDGMENTS**

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**REFERENCES**
