Environmental Impacts of Shewashok Oil Field on Sheep and Cow Meat Using Vital Trace Elements As Contamination Bioindicators

Maamun Qadir Salih¹ Rawaz Rostam Hamadamin² Rostam Salam Aziz³
Aim

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- Study Area
- Methodology
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- Conclusion
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Abstract

Ambient environment is built based on interaction of living and non-living organism, chemical and physical compounds, thus oilfield emissions, effluents and its general waste can be a part of environmental condition of certain area. This study is to investigate the environmental impacts of oilfield on sheep and cow meat around Shewashok oilfield. It has been performed at the Laboratories of the Department of Medical Microbiology / Koya University, by detecting, measuring heavy metals and vital trace elements as contamination indicators. 20 meat samples of domestic animals (Cow and Sheep) in both control and affected area were collected for the purpose of detecting the concentration of heavy metals in the animals. The samples dried and digested with concentrated HNO$_3$ and concentrated H$_2$O$_2$. The concentration of heavy metals of the sample digested domestic animal were determined using inductively coupled plasma–optical emission spectroscopy (ICP-OES). This study show that, Iron, Cobalt, Copper, Zinc, Arsenic, Manganese, Aluminium, Mercury and Chromium were detected in all the meat samples. Overall this study confirms that, the Cow and sheep meat are still safe to eat in both locations, because only Al, Fe and Hg were found danger in both sheep and cow’s meat in comparison with allowed limits of world health organization 2017, all other trace elements are complying with the global standards.
Introduction

➔ The Shewashok oil field
➔ Air, water and food are the basic needs
➔ Previous Researches
➔ Trace Elements
➔ Heavy Metals
➔ WHO standards
Study Area
Methodology

- Sample collection
- Used materials and chemicals
- Digestion procedure
- Inductively coupled plasma optical emission spectrometry (ICP-OES)
- Statistical analysis
- Comparison of the study observations with WHO standards for trace elements
Result and Discussion

First Section: Comparison of Study Area with Control Area

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Section Two: Comparing Study Area with WHO 2017 Standards

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Table 1

<table>
<thead>
<tr>
<th>Elements</th>
<th>Control group (ppb)</th>
<th>study group (ppb)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>254.6±48.51</td>
<td>404.5±126.3</td>
<td>0.275</td>
</tr>
<tr>
<td>Fe</td>
<td>1941±295.2</td>
<td>474.1±121.2</td>
<td>0.0001</td>
</tr>
<tr>
<td>Hg</td>
<td>26.12±0.434</td>
<td>26.91±0.484</td>
<td>0.229</td>
</tr>
<tr>
<td>Mn</td>
<td>159.5±31.21</td>
<td>179.7±28.88</td>
<td>0.638</td>
</tr>
<tr>
<td>Zn</td>
<td>1006±100.9</td>
<td>1080±128.8</td>
<td>0.654</td>
</tr>
<tr>
<td>As</td>
<td>8.005±0.789</td>
<td>7.478±1.010</td>
<td>0.683</td>
</tr>
<tr>
<td>Co</td>
<td>0.000±0.000</td>
<td>0.266±0.116</td>
<td>0.028</td>
</tr>
<tr>
<td>Cr</td>
<td>0.000±0.000</td>
<td>0.752±0.347</td>
<td>0.037</td>
</tr>
<tr>
<td>Cu</td>
<td>492.6±61.65</td>
<td>1038±253.8</td>
<td>0.043</td>
</tr>
</tbody>
</table>

Results expressed as mean±SE
### TABLE 2: Trace element concentrations in control and study groups of cow meat

<table>
<thead>
<tr>
<th>Elements</th>
<th>Control group (ppb)</th>
<th>Study group (ppb)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>186.2±31.59</td>
<td>278.7±41.19</td>
<td>0.08</td>
</tr>
<tr>
<td>Fe</td>
<td>1356±154.9</td>
<td>3720±534.3</td>
<td>0.00001</td>
</tr>
<tr>
<td>Hg</td>
<td>26.49±0.455</td>
<td>26.78±0.585</td>
<td>0.699</td>
</tr>
<tr>
<td>Mn</td>
<td>104.9±22.35</td>
<td>110.0±12.45</td>
<td>0.842</td>
</tr>
<tr>
<td>Zn</td>
<td>685.9±90.73</td>
<td>1688±264.4</td>
<td>0.001</td>
</tr>
<tr>
<td>As</td>
<td>8.015±0.812</td>
<td>6.256±0.950</td>
<td>0.171</td>
</tr>
<tr>
<td>Co</td>
<td>0.271±0.127</td>
<td>1.242±0.344</td>
<td>0.012</td>
</tr>
<tr>
<td>Cr</td>
<td>0.000±0.000</td>
<td>6.692±4.636</td>
<td>0.157</td>
</tr>
<tr>
<td>Cu</td>
<td>922.2±268.9</td>
<td>134.3±28.96</td>
<td>0.006</td>
</tr>
</tbody>
</table>

Results expressed as mean±SE
<table>
<thead>
<tr>
<th>Elements</th>
<th>WHO (ppb)</th>
<th>Study group (sheep) (ppb)</th>
<th>Study group (cow) (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>200</td>
<td>404.5</td>
<td>278.7</td>
</tr>
<tr>
<td>Fe</td>
<td>100-300</td>
<td>474.1</td>
<td>3720</td>
</tr>
<tr>
<td>Hg</td>
<td>1-6</td>
<td>26.91</td>
<td>26.78</td>
</tr>
<tr>
<td>Mn</td>
<td>100-400</td>
<td>179.7</td>
<td>110.0</td>
</tr>
<tr>
<td>Zn</td>
<td>3000</td>
<td>1080</td>
<td>1688</td>
</tr>
<tr>
<td>As</td>
<td>10</td>
<td>7.478</td>
<td>6.256</td>
</tr>
<tr>
<td>Co</td>
<td>3</td>
<td>0.266</td>
<td>1.242</td>
</tr>
<tr>
<td>Cr</td>
<td>50</td>
<td>0.752</td>
<td>6.692</td>
</tr>
<tr>
<td>Cu</td>
<td>1000</td>
<td>1038</td>
<td>134.3</td>
</tr>
</tbody>
</table>

This table is made based on Tables 1 and 2 and the WHO standards for heavy metals 2017.
Conclusion

- The present findings indicated that these trace elements, iron, cobalt, copper, zinc, arsenic, manganese, aluminum, mercury and Chromium were detected in all the samples.

- Only, Hg, Al, Fe, in both sheep and cow’s meat presented high values for both groups in comparison with allowed limits of WHO 2017.

- But, overall this study confirms that, the Cow and sheep meat still safe to eat in study area, because only Al, Fe and Hg were found danger, but all other elements are complying with the global standards.
Acknowledgment

- Our special thanks and much appreciation goes to the workers in slaughterhouses of Erbil and Koya, for their support and cooperation with the data collection.

- We would like to thanks Garmian University for testing the samples and Koya University for using its laboratories.
References


