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# Analysis of Stagnant Surface Water Used for Drinking Purposes for Livestocks

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## Abstract

The physicochemical properties of cattle drinking water samples collected from Falfal, Degehabur, and Bulale districts in Ethiopia's Somali regional state were examined in this study. The purpose of this study was to investigate the physicochemical properties of cattle drinking ponds. The outcomes were the pH, temperature, and average concentrations of the ions calcium, magnesium, and chloride. The average chemical and biological oxygen demands were also recorded. The gathered information was further contrasted with local, national, and worldwide criteria to determine the calibre of cattle drinking water. As a consequence, the measured pH met the standards established by the World Health Organization and the Ethiopian Standards Agency. The World Health Organization and the Ethiopian Standards Agency both set higher standards for temperature, total hardness, and chloride ion content. The concentrations of total dissolved solids, $Mg^{2+}$, and $Ca^{2+}$ all met the requirements established by the Ethiopian Standards Agency and the World Health Organization. The requirements for Chemical Oxygen Demand and Biological Oxygen Demand were not available to either the World Health Organization or the Ethiopian Requirements Agency.

**Keywords:** Surface water • Physicochemical analysis • Livestock • Drinking water • Water quality

## Introduction

Water is an essential resource for cattle and should meet all of the animal's nutritional needs. The expansion of a wholesome cow population depends on a reliable and ample water supply. Poor water quality adversely affects the growth, reproduction, or productivity of cattle and poultry [1]. Water is the resource that is most adversely affected by pollution, despite the fact that it is both beneficial and necessary. Fresh water has become a valuable resource as a result of overuse and water degradation [2]. Among other things, it could be physically or chemically contaminated. This includes hurried industrialization, the careless application of chemical pesticides and fertilisers in agriculture, and human-made activities that are polluting the aquatic environment in a number of ways that are causing the water quality to deteriorate and the aquatic biota to vanish, making the water unfit for drinking and other uses [3]. Access to clean drinking water is crucial for maintaining human and animal health, environmental preservation, and sustainable development [4].

The availability of water of excellent drinking quality is essential to human physiology and is crucial to the survival of man [5]. To avoid health risks linked to contaminated drinking water, both rural and urban populations must have access to potable water. The majority of people on the planet utilise potable water for drinking, cooking, personal hygiene, and household cleaning. Physical, chemical, and biological elements were necessary for an aquatic ecosystem to be healthy. Any ecosystem's water quality offers important clues regarding the resources that can be used to sustain life there. Physical, chemical, and biological factors govern and determine the high quality of water supplies. These traits are able to pinpoint specific ecological conditions in living things and recommend suitable conservation and management tactics.

There are several places where you can get water, including streams, lakes, rivers, ponds, rain, springs, and wells. Water that is clean, pure, and safe can only be found briefly in nature before it is contaminated by the environment and human activity. Therefore, without some type of treatment, most water sources are not fit for immediate consumption. There are various water sites used for livestock drinking in Ethiopia's Somali regional state. The livestock's health depends on the reliability and safety of these water sources.

## Methods

### Study area

This research was conducted in the Somali Regional State of Ethiopia's Jarar Zone. The Jarar Zone's administrative town is Degehabur. It is situated at 8013'N 43034'E, on the northern edge of the Fafan zone, 165 kilometres north of Jijiga town, the region's seat. The area is 1,044 metres above sea level. You can find Degehabur, Falfal, and Bulale in Jarar Zone. The district has a variety of water ponds utilised for cattle drinking.

### Survey

In the chosen location, Jarar Zone, a pilot assessment was conducted to examine the aesthetic characteristics of water ponds and the general environment of cattle drinking water.

### Physicochemical analysis

Before analysing each parameter, the instruments were calibrated. The distilled water used to make all of the stock solutions. In accordance with accepted procedures, the obtained samples were examined for a variety of physico-chemical characteristics, including temperature, pH, chloride ($Cl^-$), dissolve oxygen (DO), chemical oxygen demand (COD), calcium, magnesium, total hardness, and total dissolved solids (TDS). At the time and location of sampling, a pH metre was used to determine the PH of the water. A conductivity metre was used to measure electrical conductivity. Using EDTA (Ethylene Diamine Tetra Acetic Acid) as a titrant with an ammonium hydroxide and ammonium chloride buffer solution (pH-10) and Erichrome Black T as an indicator, total hardness was calculated.

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## Discussion

The mean values of the physicochemical parameters of the livestock drinking water sources from each location, the overall mean of the three areas, and the aesthetic (physical) parameters (Falfal, Degehabur and Bulale). The Canadian Council of Environment Ministers proposed a standard water temperature of 15°C. In this instance, it was discovered that the temperature measured from the three research regions was greater than the norms. This might be the effect of the region's generally hot climate.

Total dissolved solids ranged in concentration from 8 to 24 mg/L. Degehabour had the lowest average total dissolved solid content, 8.67 mg/L, whereas Bulale had the highest average total dissolved solid concentration, 23.00 mg/L. The total dissolved solid concentration that was detected was less than the maximum allowable limit (1000 mg/L). There is no health-based limit for TDS in drinking water, according to the WHO, as TDS occurs in water at concentrations considerably below those at which harmful consequences may occur. However, water with a TDS level of less than 500 mg/L is typically regarded as having pleasant taste. TDS levels above roughly 1000 mg/L dramatically and progressively make drinking water tasteless.

## Conclusion

The pH of the water sample taken from the three research areas was virtually neutral and in accordance with WHO and national criteria for Ethiopia, according to the results. Due to the research area's hot climate, the water's temperature was higher than the standards (15°C). A normal increase in water temperature (to a higher degree) may encourage microbial activity and output. The World Health Organization and Ethiopian Standard Agency both deemed the Total Dissolved Solids concentration collected from the research region to be within the limit of acceptable drinking water. The measured total hardness of the water was higher than the WHA and Ethiopian standard agency's top level for safe drinking water. It was thought that the water in those locations was hard water. The World Health Organization and Ethiopian Standard Agency's upper limit concentration for chloride ions was exceeded by the concentration of chloride ions found in the falfal and Bulale area. The water sample taken from the Degehabur area, however, was less contaminated than the others and met the requirements for being safe for livestock to drink. According to national and international norms, the $Mg^{2+}$ and $Ca^{2+}$ ion concentrations were within the safe range.

## Acknowledgement

None.

## Conflict of Interest

None.

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