Case Study

Quality Monitoring of Water Being Fed to Livestock in Haryana - A Case Study

Samanwita Banerjee*, Anil Kanaujia, Suruchi Malik and Surbhi Sharma

*Ayurvet Research Foundation, Research and Development Centre, Village, Chidana,
Sonepat-131306, Haryana, India*

*Corresponding author

A B S T R A C T

The quality of water depends upon several chemical constituents and their concentration, which are derived from the geological formation. The poor quality of drinking water results in sickness and even death, slowing down the labor productivity and economic growth. A sufficient quantity of clean, fresh drinking water is commonly regarded as critical for livestock health, milk yield, optimal growth, and reproduction. The presence of Escherichia coli and coliform in several sources of livestock drinking water in Haryana also shows that water pollution is on the rise, posing a major threat to human health, livestock, and the environment. It is the responsibility of the livestock farmer to monitor the water sources on a regular basis and also to prevent the sources from contamination by human and animal waste, which can harbor a variety of microorganisms.

Introduction

Livestock is one of the major sources of revenue in villages of Haryana, their health is directly linked to the type of nutrition being provided and water being fed. Rampantuse of synthetic fertilizer, pesticides and untreated manure to get the better productivity has led to contamination of groundwater in Haryana villages, ultimately adversely affecting the health of end user i.e. human and livestock.

Villagers generally provide the municipal committee supply water whose quality is not known or take their animals to pond, which is dumping site for many effluents/ waste disposals, thus polluting it and rendering it unfit for animal use.

Dumping of industrial waste and municipal solid waste is one of the major causes of water pollution particularly in rainy season and confined aquifers which render them unfit for drinking due to presence of various pollutants detrimental to the health of human beings and livestock. A sufficient quantity of clean, fresh drinking water is commonly regarded as critical for livestock health, milk yield, optimal growth, and reproduction. It has been reported that livestock drinking water of villages was contaminated with enteric bacteria which could be a

common source of exposure to possible livestock diseases i.e., mastitis, brucellosis, etc. resulting in infection of large numbers of animals in a short period of time. Contamination of water with untreated animal waste or agricultural waste enter into the food chain through a variety of routes, poses a risk to human and animal health. Physico-chemical properties of water suitable for livestock have been published but, despite the fact that waterborne transmission of pathogens among livestock has been long recognized, little information is actually available concerning the microbiological quality of water offered to livestock (LeJueune *et al.,* 2001).

A study was undertaken at the ARF R&D Centre to better understand the quality of water being fed to livestock and to educate farmers by drawing a correlation between animal health and clean drinking water in the districts of Sonipat and Panipat.

Materials and Methods

200 water samples which were being fed to livestock were collected aseptically in a sterile bottle from different villages of districts Sonipat and Panipat and transferred to the microbiology lab for analysis.

Detection of Coliform, Faecal coliform and *Escherichia coli*

Samples were inoculated into MacConkey broth with a Durham tube inverted to detect coliform bacteria and E. coli. The tubes were incubated at 37°C for 48 hours after inoculation. A colour shift in the broth and the generation of gas in the Durham tube both suggested positive outcomes. For coliform and Faecal coliform, the positive samples were inoculated into BGBL broth and incubated at 37°C for 48 hours and 44°C for 48 hours, respectively. Positive results with gas production were put into EMB agar plates for E. coli and incubated for 24 hours at 37°C. The presence of a green metallic sheen on EMB agar indicates the presence of E. coli,

which was validated through biochemical testing. The presence of *E. coli* indicates that the water has been contaminated with Faecal matter.

Results and Discussion

Out of 200 samples, 120 samples were collected from Sonipat District whereas 80 samples were from Panipat District of Haryana (Fig-2). Borewell (49%), Tank (46%) and Pond (5%) were used as a source of drinking water for Livestock (Fig 3).

As per IS 10500, drinking water guideline, total coliform count must not be found in 100ml of sample. Borewell water sample 97.75 %of were found to be contaminated with coliform and 62.89 % with E. coli, whereas 84.78 % of tank water were found to be contaminated with coliform and 76.09 % with E. coli. 100 % of pond water samples were found to be contaminated with both coliform and *E. coli*.

Many different forms of disease-causing organisms can be found in sewage and animal waste. Some of the species has been linked to various illness outbreaks such as Kidney failure, gastroenteric infection, pneumonia, urinary tract infection and respiratory disorders. Contaminated water is major source of mastitis causing pathogens. The presence of *E. coli* in water sources indicates that the source has been contaminated by the Feacal pathogens.

The presence of coliform bacteria including Escherichia coli has long been utilized as a microbiological quality indicator in drinking water. The findings of the study revealed that the majority of livestock drinking water sources were significantly contaminated. The presence of *Escherichia coli* and coliform in several sources of livestock drinking water shows that water pollution is on the rise, posing a major threat to human health, livestock, and the environment. It is advisable to monitor the water sources on a regular basis and also to prevent the sources from contamination by human and animal waste.

Fig.1 Common source of drinking water for livestock (Maneka Gandhi, 2020)
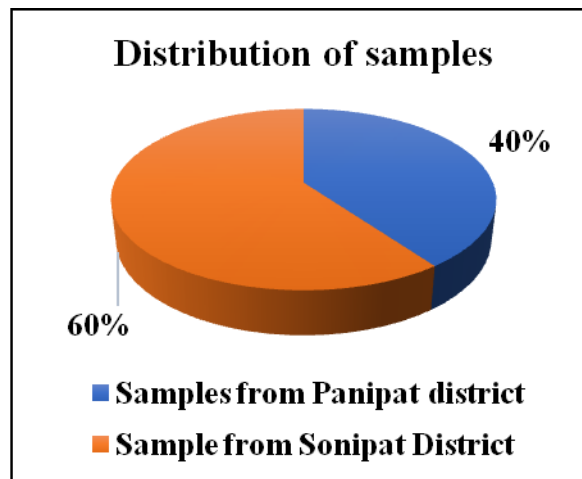

Fig.2 Number of samples analyzed

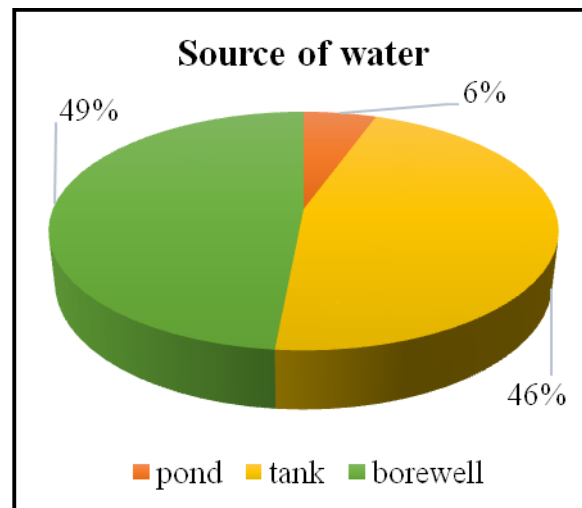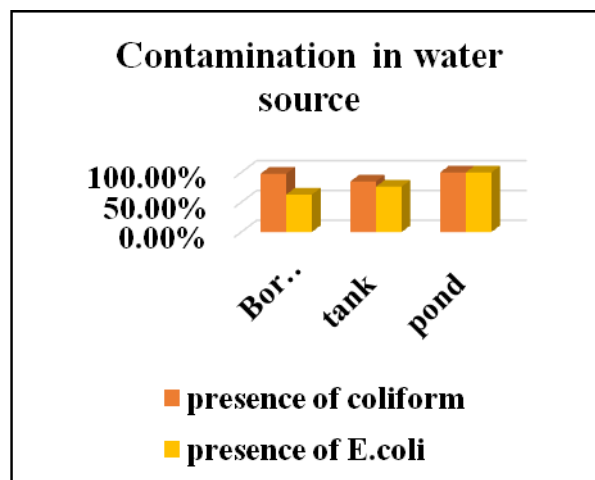**Fig.3** Source of water being fed to livestock.

Fig.4 Percentage of contaminated water samples

Acknowledgements

References

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How to cite this article:

Samanwita Banerjee, Anil Kanaujia, Suruchi Malik and Surbhi Sharma. 2022. Quality Monitoring of Water Being Fed to Livestock in Haryana - A Case Study. *Int.J.Curr.Microbiol.App.Sci.* 11(03): 22-25. doi: https://doi.org/10.20546/ijcmas.2022.1103.003