

Water Quality for Livestock

Dr. Steve Ensley, DVM

ISU Veterinary Diagnostic and Production Animal Medicine

Water is essential for all forms of life. The availability of adequate quantities and quality of water has the largest impact on the types of life and numbers of individuals that an environment can sustain and may be a limiting factor for livestock production systems. As water availability for human use becomes limited, water quality available for production animals will likely be of lesser quality. Large-scale animal production practices and emphasis on animal performance increase the demands on water delivery systems and increase concern about water quality.

Water quality generally refers to parameters used to assess the suitability of water for some purpose. Parameters may include color, odor, taste, bacterial content, mineral content, salinity, and the amounts of inorganic or organic compounds. Parameters used to assess water quality depend upon the proposed water use. For example, parameters used to assess drinking water quality for production animals is not the same as those used to assess drinking water for humans.

The Assessment of Water Quality

It is advisable to assess water quality to determine if water is suitable for a particular purpose, to determine if there has been a significant change in water quality, or if adverse health effects that are occurring may be attributable to water contamination. Numerous commercial, governmental and academic laboratories offer water quality analytical services and assessment of the results requires some sort of standards against which to compare the results.

National, state or provincial, or local governments may regulate water quality and water quality standards may be established by any or all of those governmental bodies. The quality of drinking water intended for consumption by humans is almost always more extensively regulated than for any other water use.

Reports of results of water quality analyses often include water quality standard ranges against which to assess the reported results. They may include graphical comparisons of the results to the water quality standards, making identification of parameters that fall outside of the standard limits easily identifiable. Such reports often use water quality standards intended for human drinking water to aid in the assessment of suitability, which may cause unnecessary concern about the quality of the submitted water for use by animals.

Assessment of the results of water quality analyses must be done using standards that are applicable for the intended use of the water and which are in force for the venue at which the water is to be used. The suitability of water intended for use as drinking water by animals is better assessed using drinking water standards for animals instead of for humans. Otherwise, animal owners may take unnecessary and costly actions to mitigate what are erroneously believed to be unacceptably high risk of some sort of adverse health effect.

Water Quality Standards for Animals

Water quality standards for animals are not the same nor are they enforced with the same authority as are those for humans. Water quality recommendations for animals have been made by several organizations, the US EPA (1973), National Academy of Sciences (NAS) (1974) and Canada (1999 with updates).

Those publications include recommendations for water use by animals other than just livestock

US EPA Water Quality Criteria for Animals

The US EPA published proposed water quality standards for irrigation, livestock, aquatic life, wildlife, public freshwater, marine aquatic life and recreational water in 1973.

The criteria were formulated and published by the US EPA pursuant to the Federal Water Pollution Control Act Amendments of 1972 and the Water Quality Act of 1965. The water quality criteria documented in Volume I are arranged alphabetically by intended use along with the limits and supporting scientific rationale for each chemical. The report states: “Almost all of the criteria are taken from the recommendations of the National Academy of Science’s report on Water Quality Criteria (in press) developed under contract to the Environmental Protection Agency.”

National Academy of Sciences Recommended Limits in Drinking Water for Livestock and Poultry

The NAS report summarizes what was known at the time of publication about effects of nutrient and toxic substances that were found in water consumed by domesticated animals. It also contains information about water requirements and the percentages of recommended intake of various substances provided by normal daily water consumption, and toxic concentrations for various species.

The publication includes a table summarizing the effects of toxic concentrations of various chemicals in water for various domestic and laboratory animals.

Canadian Environmental Quality Guidelines

Canadian water quality standards for agricultural use, including livestock, were first published in a document titled *Canadian Water Quality Guidelines* in 1987 by the Canadian Council of Resource and Environment Ministers (CCREM). That organization was later renamed the Canadian Council of Ministers of the Environment (CCME). In April 1996, CCME began work that consolidated national environmental quality guidelines for water, soil, sediment, tissue residues and air into one document, which was published as *Canadian Environmental Quality Guidelines* by CCME. The guidelines are continually reviewed and updated as deemed necessary

Drinking Water Quality Standards

In the US, legal limits have been established for about 90 contaminants, called maximum contaminant levels (MCLs). If contaminant concentrations in public water supplies and certain private supplies are found to be above applicable MCLs, then the water supplier must take action to bring the contaminant concentration down below the MCL. Meanwhile, an alternate source of water that meets the standards must be provided.

In the US, there are primary and secondary water standards. Primary drinking water standards are legally enforceable and water providers cannot provide water containing contaminants higher than their respective MCLs. Secondary standards are non-enforceable guidelines for contaminants that may cause cosmetic effects, such as skin or tooth discoloration, or unacceptable aesthetic effects, such as unacceptable taste of, odor from or discoloration of the water.

Primary standards are established considering the adverse health effect caused by the contaminant and the dose at which such effects occur. A reference dose (RfD or RfD) is estimated based upon the amount of the contaminant to which a person may be exposed on a daily basis that is not anticipated to cause the adverse health effect over a person's life time. Consequently, the standards may not reflect the risk of adverse health effects in animals, and care should be use applying them to water intended for consumption by animals.

A complete listing of drinking water standards and health advisories applicable to humans is compiled as needed by the US EPA Office of Water.