

Water quality in animal husbandry

Analysis results

Between February 2025 and April 2026, water analyses were carried out at **10 agricultural holdings** (4 in France, 6 in Germany), some of which were repeated.

Samples were taken from **water sources (springs, boreholes)** in the **Upper Rhine region**, as well as at **various points along the water supply chain**: from the **raw water source**, through the **treated water**, to the water available in the **drinking troughs**.

Typology

Resource	Collection	Storage	Filtration	Treatment	Usage
Ground water (10)	Spring (9) Borehole (1)	From 0 to 20 m ³	None 25, 50, 100 µm	None Chlorine Peroxide UV	Watering Milking Processing

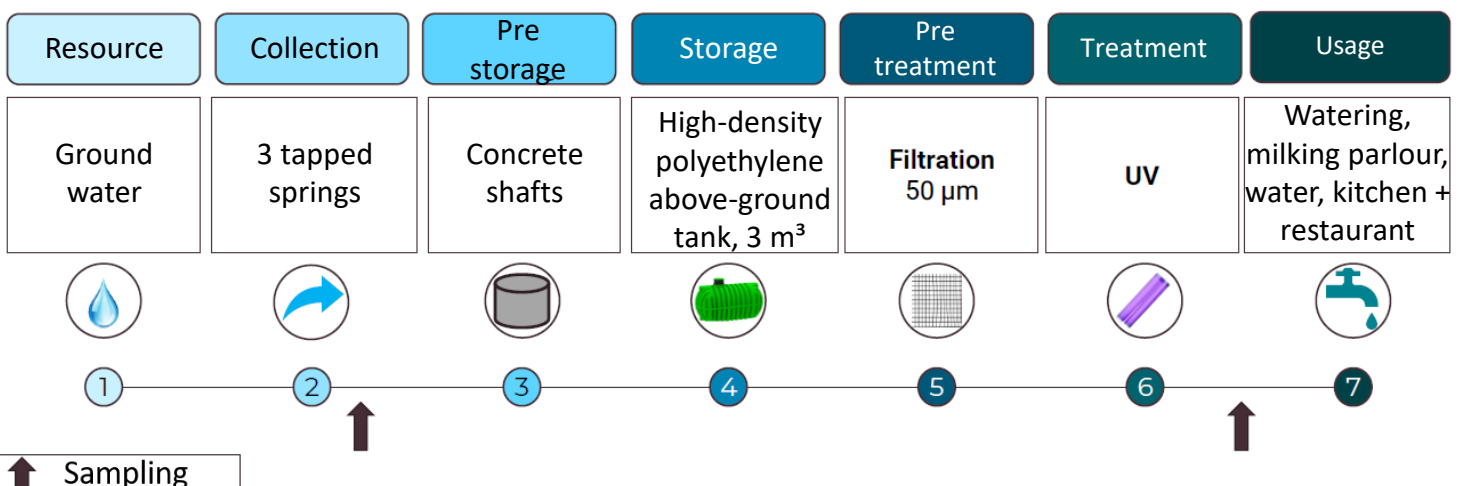
Example

Below is a description of a water cycle that we have come across. This enables us to understand the various facilities between the water source and its use. This diagram illustrates the type of water source, the various storage, filtration and treatment facilities, and the intended uses.

A good understanding of the water cycle is essential for interpreting an analysis.



Watercourse studied and sampling points



The parameters analysed

The analyses carried out focused on physico-chemical and bacteriological parameters.

Physical Chemistry

On the basis of physico-chemical parameters, water can not only be characterised by general parameters (**turbidity, mineral content, hardness**, etc.), but the concentration of various substances (**nitrate, organic substances, calcium, iron**, etc.) can also be determined.

Poor physico-chemical quality primarily affects the service life of the distribution networks, but also influences the choice and effectiveness of a treatment method.

Physical Chemistry	Turbidity (FNU)
	pH
	Conductivity ($\mu\text{S}/\text{cm}$)
	Hardness ($^{\circ}\text{dH}$)
	Total organic carbon (TOC) (mg/l)
	Nitrate (mg/l)
	Nitrite (mg/l)
	Sulfate (mg/l)
	Calcium (mg/l)
	Magnesium (mg/l)
	Iron ($\mu\text{g}/\text{l}$)

Apart from extreme cases, the physical and chemical properties of the water have **no effect on the animals' health**.

Or, if at all, only indirectly, by reducing the water's **palatability** (high levels of iron, organic matter, chlorine).



Bacteriology

Bacteriological parameters can be used to determine the **extent of bacterial contamination** in water. This contamination may be caused by **faecal matter** or originate from the **soil** or from **pipework**.

Depending on the extent of the contamination, there is a **greater or lesser risk** that pathogens may be present in the water.

Bacteriology	Total plate count at 22°C (CFU/ml)
	Total plate count at 37°C (CFU/ml)
	E. Coli (CFU/100ml)
	Total coliforms (CFU/100 ml)
	faecal coliforms (CFU/100 ml)
	Faecal streptococci (CFU/100 ml)
	Sulphate-reducing bacteria (CFU/100 ml)

Poor bacteriological quality can have a significant impact on the animals' health and performance.

Bacteriological parameters must be monitored **regularly** to assess the risk of potential pathogens being present in the water.

Quality features

Although there are no legal requirements regarding the quality of drinking water, there are reference values that can be used to determine the level of risk associated with the water.

Physical Chemistry

Parameter	Threshold	Consequence
Iron	> 500 µg/L	Reduced effectiveness of chlorination, blockages in the systems, taste
pH	> 8	Inactivation by chlorination
Organic matter (TOC)	> 2 mg/L	Inactivation of the chlorine treatment, formation of toxic compounds, taste
Conductivity	< 200 µS/cm	Corrosive effect on concrete and metals
Conductivity Hardness	> 1 100 µS/cm > 25 °F	Deposits in the pipes, taste

Bacteriology

ANSES* has issued the following recommendations (for E. coli and intestinal enterococci):

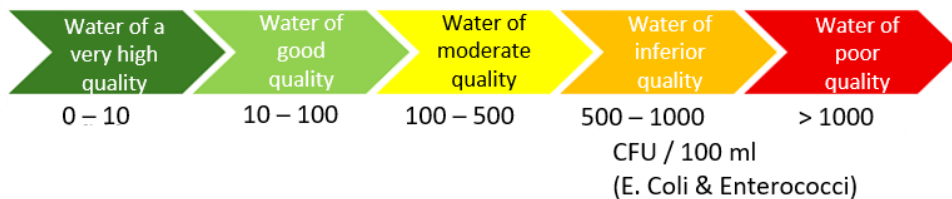
It is recommended to use the following:

- water intended for human consumption (EDCH),
- or groundwater from private wells or boreholes (ESO) (≤ 10 CFU/100 ml as evidence of the good protection of the resource and the integrity of the abstraction point).

If only surface water is available, it should be treated to achieve a microbiological quality equivalent to that of ESO.



low risk of pathogens being present



high risk of the presence of pathogens

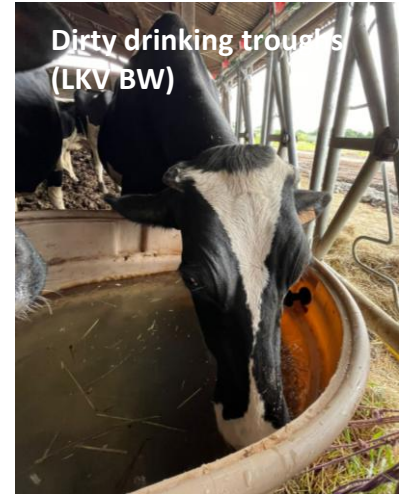
* ANSES, 2010, 'Review of practices and recommendations regarding the health quality of drinking water for farm animals' (FR)

Evaluation of the analyses carried out

The water in the drinking troughs is dirty

It comes as no surprise that the analyses of the **drinking troughs** reveal high to **very high levels of contamination**. This is primarily due to the fact that they are **not cleaned often enough**.

An analysis carried out at a drinking trough is not sufficient to determine the quality of a water source.



Resources of varying quality

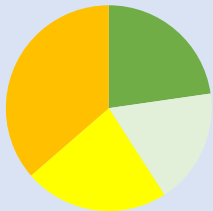
The water resources examined on the farms came **exclusively from groundwater** (boreholes, wells and springs).

Deep groundwater (provided the system is properly constructed) is **less susceptible to contamination** than surface water.

Nevertheless, **surface spring water** can be of a similar quality to deep groundwater if it is located **far away from potential sources of contamination** (livestock buildings, wastewater, pastureland) and the springs are well protected (with an extraction shaft sealed against the ingress of surface water).

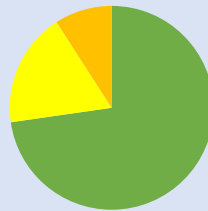
Summary of the results of bacteriological analyses of raw water (based on 22 analyses)

Total plate count at 22°C (CFU/ml)



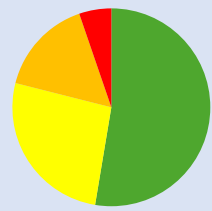
■ 0 ■ 1-10 ■ 10-100 ■ > 100

E Coli (CFU/100ml)



■ 0 ■ 1-10 ■ 10-100 ■ > 100

faecal streptococci (CFU/100 ml)



■ 0 ■ 1-10 ■ 10-100 ■ > 100

For **boreholes**, the subsoil plays an important role in the cleaning process.

As far as the **springs** are concerned, their location and high-quality construction are of crucial importance.

Effective treatments

The analyses carried out before and after treatment show that the **various treatment methods** investigated (chlorine, peroxide, UV, electrolysis) **are highly effective**.

It should be noted, however, that **UV treatment** has **no lasting effect** and that **recontamination** may occur after treatment.

These treatments are effective provided that the instructions for use are followed and they are properly maintained!

Maintaining water quality

As water quality can deteriorate at various points along its course, here are some recommendations on how to maintain it (listed in order of importance):

Monitoring and cleaning the drinking troughs

The drinking troughs must be **checked** at least once a day to ensure they are in good working order and clean, and must be **cleaned** as soon as they become soiled (straw, feed, faeces, etc.).

Even a tiny amount of faeces significantly reduces the animals' willingness to drink and can lead to **health problems** within the herd.



Conservation of resources

If there are several permanent water sources available, preference should always be given to the one whose **surroundings are safest** (the edge of a woodland, away from buildings, manure heaps, heavily grazed meadows, etc.).

If necessary, one should not hesitate to **fence off** the area around these water sources.

Subsequently, structural measures must be taken to **prevent** potentially contaminated surface water from **draining** into the groundwater source. To this end, shafts, wellheads and borehole heads must extend above ground level, be fitted with a **cover** and be **cemented** in place.



A shaft of sufficient height
A tight-fitting lid
Little pasture land
Above the buildings



The shaft is too deep
The lid is half open
Plenty of pasture land
Below the stables

Maintaining water quality

A well-designed network

To **minimise risks**, reservoirs, intermediate shafts and all structures containing water must be sealed **against the ingress of surface water**.

Furthermore, particular attention must be paid to the **joints between individual pipes**, which must also be **watertight**. In the case of high-density polyethylene pipework, for example, electrofusion joints are the most durable.

A well-thought-out treatment

Once all the aforementioned preventive measures have been implemented and an analysis still indicates the presence of contamination, **treatment** may be considered.

This must be **tailored to the physico-chemical properties** of the water, the degree of contamination and the intended use.

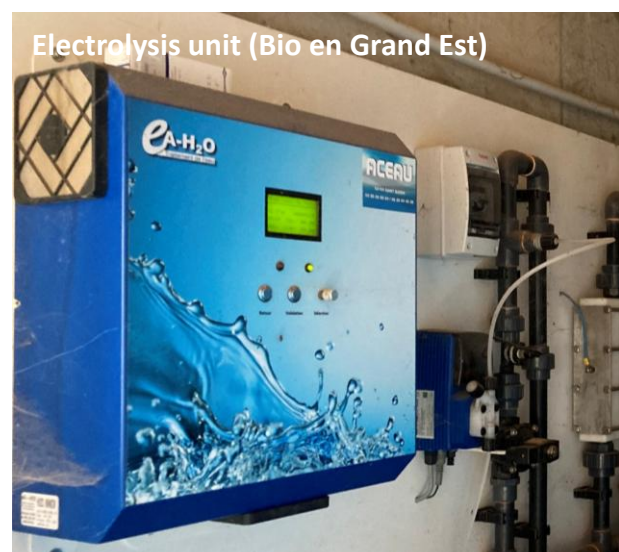
Treatment should only be carried out as a **last resort** or to safeguard a resource (e.g. for hygiene purposes (cleaning of milking and processing equipment)).



Metering pump (Chambre d'Agriculture Alsace)



Filter + UV (Bio en Grand Est)



Electrolysis unit (Bio en Grand Est)