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Water medication: requirements for the drinking water system

Introduction

In order to be successful with water medication you need good water quality, a proper drinking water system and products that have the right formulation. Previously we discussed water quality and in this article we will focus on the drinking water system.

To ensure sufficient supply of drinking water and correct administration of medication a drinking water system should be properly designed, installed and maintained.

Design

Figure 1 shows a schematic drawing of a well-designed system.

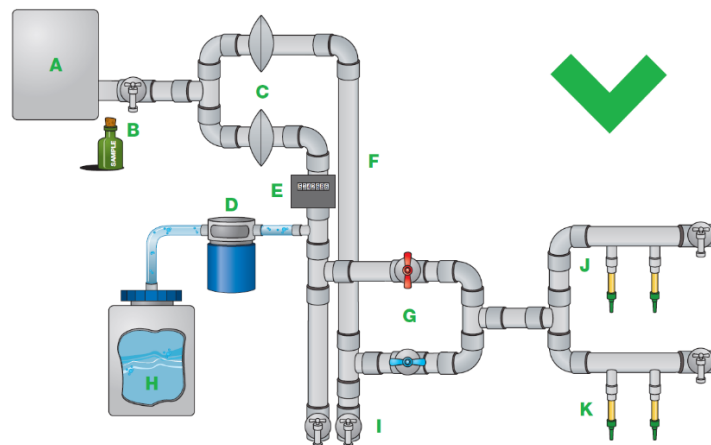


Figure 1 Good example of a drinking water system:

- A. Water treatment installation
- B. A sample of the incoming well water is taken regularly
- C. Pressure regulators are present
- D. An electronic dosing pump, calibrated regularly
- E. A flow controller to monitor the water intake of the animals
- F. It is a double system: one pipe is used only for plain water, the other one for medicated water
- G. Each compartment has a set of colored handles to easily switch from water to medicated water and back
- H. The reservoir for stock solution is closed with a lid and is big enough to provide medicated drinking water for up to 24 hours
- I. Flushing tap
- J. Each section has single flow pipes with minimal bends and a flushing tap at the end
- K. The connections to the nipples should be straight. Nipples should be sufficient in numbers and easily accessible.

Any drinking water system that is going to be used for medication should include some essential components:

1. Water treatment installation. This is not needed if the farm uses tap water, but well water often needs treatment to make it suitable for animals.
2. Reflux valve to prevent water from the farm flowing back into the source. This is mandatory when using tap water to avoid accidental contamination of the public system.
3. Pressure regulators to keep water pressure between 0.5 and 1 bar. Low pressure means insufficient flow of water, high pressure leads to spillage of water.
4. Water flow meter to record daily water intake, ideally per compartment. This also is a great tool to monitor the health status of the animals.
5. Stock solution container of sufficient size. If it is too small stock solutions will have to be prepared and refreshed more often. To avoid contamination with dust or rodents it should be a closed vessel.
6. Dosing pump. Electronic pumps are preferred over mechanical ones because they are more accurate at low flow rates. This is especially important for correct dosing of young animals that drink only small quantities.

For pigs a double line is recommended, which allows to switch between non-medicated and medicated water by compartment. For broilers this is not common as the barns usually are all in all out anyway.

The design has to have a unilateral flow of the water, so no circular lines and no dead ends. With a one directional flow the risk of residues of medication or contamination in the system is reduced and it is easy to flush the system. For this purpose flushing taps should be installed at the end of each line.

Installation

Figure 2 shows some common mistakes when installing a drinking water system.

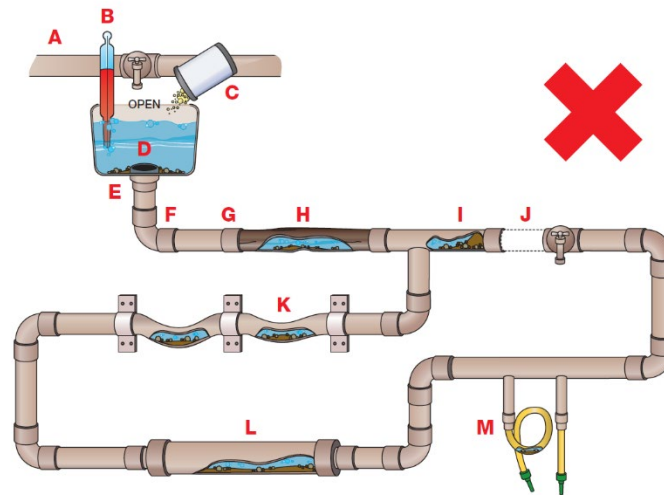


Figure 2 Common mistakes:

- A. No water treatment equipment installed
- B. Temperature of the incoming water is too high
- C. Water Medication products containing lactose
- D. Open header tanks inside animal compartments
- E. Tank connection / installation mistakes
- F. Excessive bends in the piping
- G. Couplings that do not fit
- H. Iron or galvanized pipes instead of PVC
- I. Dead end piping (stagnant water)
- J. Circular pipes allow for debris to build up
- K. Sagging pipes
- L. Varying diameters cause changes in water flow and turbulence
- M. Plastic hoses with loops

Once you have designed a drinking water system you have to make sure it is installed in the right way.

The preferred material for the pipes is PVC as it is smooth and resistant to many chemicals. Iron, galvanized or even stainless steel pipes will show corrosion sooner or later. Also iron and copper can inactivate some medications by binding to them in the water.

It is important to avoid turbulence as much as possible, because wherever there is turbulence any debris or bacteria will accumulate. Turbulence can be reduced by:

- minimizing the number of bends
- using the same diameter throughout the system
- making sure the lines are straight (don't cut down on the number of wall mounts, no loops in PE hoses)
- avoiding excessive glue on the inside of couplings.

Maintenance

The water treatment installation and the dosing pump need to be inspected and calibrated by a specialist at least once every year to ensure water of good quality and accurate dosing of medication.

Regular cleaning and disinfection (at least after every medication and between two batches) is a must. For optimal efficacy you have to use the right product in the right concentration for the right amount of time and make sure that the system is completely filled with the solution.

Several products with different active ingredients and mode of action are available on the market for cleaning and disinfection. In Table 1 you can find an overview. Always consult the product supplier for optimal use and correct dosage.

Agent	Use to	Note
Hydrogen peroxide	remove organic or Mn deposits disinfect (at >2%)	no effect on Fe or Ca deposits
Sodium hypochlorite (Chlorine)	disinfect	no effect on Fe or Ca deposits*
Organic acids	remove Ca or Fe deposits	creates organic remnants**
Peracetic acid	remove organic, Fe and Ca deposits disinfect	risk of toxic organic chlorine compounds

* use hydrogen peroxide first

** remove with hydrogen peroxide

Table 1 Groups of cleaning and disinfection products for water systems

Look for the root cause

In case of clogged nipples often immediate action is taken by adding some kind of biocide to the water to clean the system. However it is important to try and find the root cause of the problem.

If the problem occurs in one compartment, probably a cleaning protocol for that section will be sufficient. But if the water already has abnormal parameters when it enters the farm you have to take drastic measures like changing the source or installing a suitable water treatment installation.

If the water is clean at the point of entry, but all compartments have abnormal parameters one should consider to replace the whole system.

Involve an expert consultant (Dechra can help you find one)

Summary

In order to keep animals healthy and achieve good performance results, drinking water should be available in sufficient quantities and of good quality. Therefore it makes sense to invest in a good drinking water system. This will also improve the efficacy of water medication.