The importance of drinking water

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Despite its vital importance in terms of animal breeding, drinking water is a factor that is too often neglected.

With the main objective being profit, the attention of farmers is logically focused on feed which, as everyone is aware, has increased considerably in price, whereas the design of hydraulic installations, water quality, and expertise in the techniques of administering treatments via drinking water are often relegated to the background.

It is therefore appropriate to remember that animals drink 2-3 times more than they eat, that any deficiency in water intake has harmful consequences on animal production and that the best of treatments, if administered in poor conditions, can fail.

Hydraulic installations

Hydraulic installations must be looked after particularly carefully, taking into account factors such as:

- Protecting wells against the risk of contamination (especially during periods of rain), having adequate sized water pumps, tanks and water lines to reduce pressure loss.
- Good filtration (60 microns) which reduces fouling of the circuits, clogging or leaks in the drinking troughs, and suspended matter which can accelerate bio-film development.
- A water meter in order to allow regular measurement of water consumption and thus detect any leaks, blockages or unusual variations which would indicate certain pathologies or abnormal stress in the animals. A good awareness of consumption will also reduce mistakes when administering treatments via the drinking water.
- Elimination if possible of traditional head tanks (often used for medication and vaccination) which encourage the development of bacteria and potential contamination by insects or rodents. These tanks are also polluted by sediments from antibiotics which may then affect the titre of vaccines used via the drinking water.

An alternative that is commonly found in some countries is the use of pressurised tanks for wells or connection to mains water supply with a pressure regulator and a dosing pump (medicator) for administering treatment. These installations have sufficient water pressure to function properly and to be able to efficiently clean the circuits in periods of depopulation.

- Sufficient numbers of properly adjusted nipple drinkers and/or drinking troughs in appropriate locations.

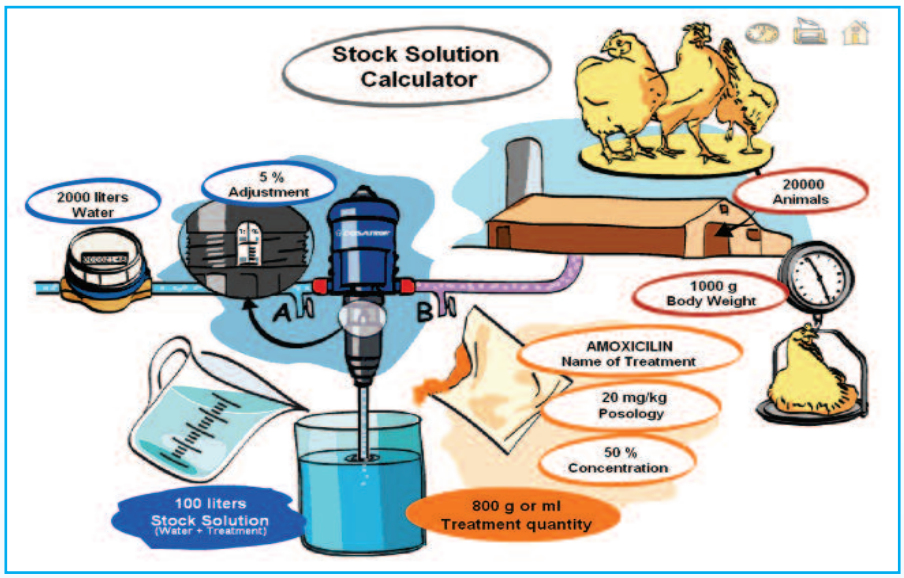

Fig. 1. Dosatron's automatic medication calculation software based on bodyweight.

Water quality

For water quality there are certain rules that must be respected. In the absence of any specific standards for animal breeding, it is commonly accepted that the standards applied for human drinking water should apply, although some parameters may vary according to the animal category.

Ideally, two water quality analyses per year are recommended (dry season/rainy season or summer/winter) including physicochemical characteristics (pH, hardness, levels of organic matter, iron, nitrates, nitrites, ammonium, chlorides, etc.) and bacteriological characteristics (coliforms, faecal streptococci, E. coli, clostridium, pseudomonas, staphylococci, etc).

These analyses must be carried out on samples from the water supply (bore-hole, well, surface water, mains water) but also from the buildings at the end of the drinking lines where the water is often contaminated by the animals themselves when they drink.

This retro-contamination can encourage the development of bio-films and it is therefore absolutely necessary to regularly clean the circuits and filters. Certain rules must be observed when taking water samples for analysis.

Depending on the analysis results, some water treatments may be necessary in order to protect the animals, to facilitate chlorination (which can be a problem in hard, ferruginous or alkaline water) and to prevent the rapid deterioration of the installations (corrosion, scaling, clogging, leaks, etc).

Recommended treatments

According to water characteristics, different treatments can be recommended:

- Chlorination (very often carried out before a buffer tank in order to ensure the 20-30 minutes of contact time needed for the chlorine to become bactericidal, fungicidal, virucidal).
- Disinfecting the water using peroxides, electrolysis or chlorine dioxide.
- Filtration (to reduce the amount of matter in suspension).

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- Acidification using mineral acid to reduce the pH of the water.
- Iron removal (at certain concentrations iron may alter vaccine titre, render chlorination difficult, accelerate corrosion and clogging of the equipment and encourage the development of bacterial flora),
- Nitrate removal to reduce the nitrate concentration, which could adversely affect the animals' health.
- Softening to avoid scaling or corrosion of the equipment and pipes, to limit the proliferation of bio-film which fixes easily onto scale and to facilitate chlorination which can be difficult in hard water.

Preventive or curative treatments through drinking water, which have been used for at least 30 years, are now expanding rapidly and the products available for drinking water have improved considerably thanks to the efforts of various laboratories.

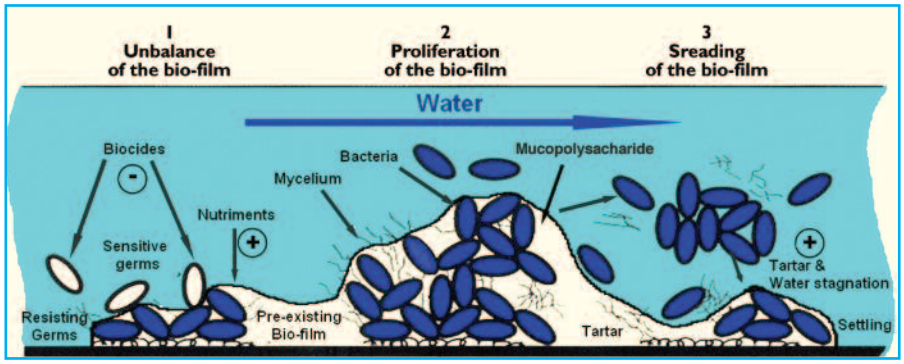

Fig. 2. The build up of bio-film.

The recent ban of antibiotic growth promoters in Europe and the well known constraints specific to medication via feed or injection are also encouraging drinking water administration.

Among the treatments that can be administered via drinking water are anti-infectives, anti-parasitics, vaccines as well as vaccine boosters, supplements, probiotics and organic acids.

Treatment via drinking water

Some of the advantages of treating via drinking water are:

- The tendency for sick animals to eat less and drink more in order to compensate for dehydration, body temperature or stress.
- Flexibility (doses and administration periods can be adjusted).
- Easy to implement (compared with administering medication by injection or in feed).
- Rapid intervention when a problem is detected compared with the delays for production and delivery of medicine premixes (sometimes a specific silo required).
- Less risk of cross-contamination, which can occur in feed from the production unit to the farm.
- Dosage can be adapted to the body weight of the animals throughout the entire treatment period.
- Mass vaccination is possible, which represents a considerable saving of time and labour provided that strict rules are observed (duration, water consumption estimates, protecting the vaccines from chlorine or other treatments present in the water which may affect the vaccine titre – check with vaccine suppliers).

Advantages of treatments through drinking water using dosing pumps include:

- It does away with the need to use medication head tanks which can have many disadvantages, such as:
  - Limited capacity so farmers are sometimes obliged to refill them several times per day.
  - Possibility of handling or dosing errors.
  - Sedimentation and antibiotic residues which can be deposited at the bottom of the tanks and on the float valves that control water level. These may alter vaccines admin-

istered via the drinking water. A separate small plastic tank can be used for vaccination with a dosing pump, thus avoiding any risk of interference.

• Development of bacteria and contamination by various parasites or rodents (risk of Leptospirosis).

• Requires heavy duty cleaning which is therefore carried out less often (tanks are large, high and cumbersome).

• Risk of a break in water supply at the end of treatment (with traditional head tanks) if the technician does not arrive in time as the treatment is finishing. Some dosing pumps continue to function when the additive tank is empty with no mechanical risk and will simply inject a small amount of air at the end of the treatment without interrupting the supply of water to the animals.

• Poor homogeneity when medication head tank has no recirculation system.

● Easy to adapt the dose (pulse medication with dosing pumps).

● Possible to inject certain pure liquid treatments.

● In case of mistake in the treatment choice (diagnosis) or preparation of the treatment, it is possible to solve the problem quickly and easily just by rinsing the dosing pump; this takes only a few minutes (injection of clean water). It must be understood, however, that no matter how attractive this method may be, when administering medication via drinking water a number of rules should be observed as a minimum.

Efficient medication

The points to note for efficient medication via drinking water are:

● Ensure that drinkers are well adjusted.

● Using a water meter, take regular readings of water consumption throughout the chosen treatment period. Many automated poultry houses have a control system which records water consumption for the previous days, body weight and the number of animals present, which gives considerable help to farmers administering medication via drinking water.

● When using powder for medication, select those with good solubility. Alkaline antibiotic molecules are more soluble in acid water (and vice versa) and hard water can result in precipitation of antibiotics. Tepid water can also improve solubility.

● Use a medication pump that provides a homogenous mix even at low water flow, is accurate, easy to maintain and clean, with a high dosage rate to guarantee a sufficiently large volume of stock solution (water plus medication), thus optimising the quantity of powder which can be dissolved. In many cases it is easier to dissolve and administer treatments using medicators which can dose up to 5%.

● The dosing pump is installed on a by-pass line with a graduated tank of stock solution (60, 120 or 240 litre plastic tank) with a stirrer.

After every medication, refill the stock solution tank with clear water and let the dosing pump run for a few hours to completely rinse the system (some stock solution tanks can be rinsed automatically at the end of the treatment).

● Be familiar with the techniques for calculating the antibiotic amount to be administered (stock solution calculators for medication via a dosing pump are now available in a dozen languages, see Fig. 1).

● Carry out a thorough cleansing of the water lines and the drinkers during depopulation. Use, for instance, an alkaline detergent injected via the dosing pump then after rinsing with water use an acid disinfectant to eliminate scale and bio-film. At each stage, activate the nipples manually to ensure that they are completely disinfected and rinse with sufficient pressure to detach and evacuate any deposit and the biofilm. ■

Medication can be administered effectively through the drinking water.