

LOHMANN SCHOOL 2015

“DRINKING WATER”

The most important nutrient for Poultry

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Water covers 71% of earth's surface

thereof:

97% in oceans

1.5% in glaciers & ice caps

1.5% in groundwater

0.001% in the air as vapor & clouds

**Just less than 1% of the total water in the Earth
is fresh accessible water for humane use!**

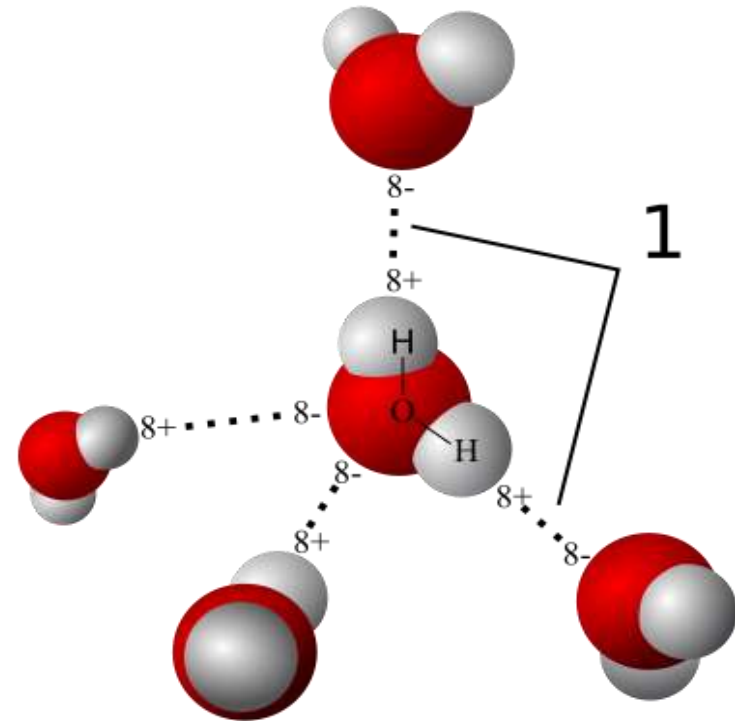
Importance of Water



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- Water plays an important role in the world economy
- As a solvent for a wide variety of chemical substances
- As a means of transportation and industrial functions i.g. cooling etc.
- Approximately **70% of the fresh water** used by humans goes to agriculture!

● A chemical substance **VITAL** for all known forms of life!



Importance of Water for living Organism



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- **All chemical procedures in body proceed in water**
- **Water is carrier of nutrients and oxygen to cells**
- **Water is essential for feed intake and digestion procedures**
- **Water regulates the body temperature**
- **Blood consists about 83%, Brain 80%, Muscles 75% and bones 25% water**
- **A newborn chicken consists of up to 75% water!**
- **An adult bird consists of about 60 – 70 % water!**
- **Early access to water & feed after hatch is essential for development of gastrointestinal tract and immune system and helps residual yolk to be absorbed more rapidly!**



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Video: IntraHydroCare, Source: YouTube

GOOD QUALITY & FRESH DRINKING WATER must be always available for birds!



Chemical Factors?

Physical Factors?

Bacterial Count?

.....

Standard Values



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Parameter	Recommended Range for Poultry	German Human Drinking water ordinance
Calcium	60 - 75 mg/L	No limit
Copper	0.6 - 1 mg/L	2 mg/L
Iron	0.2 - 0.3 mg/L	0.2 mg/L
Magnesium	50 - 75 mg/L	-
Manganese	0.1 mg/L	0.05mg/L
Nitrate	15 mg/L	50 mg/L
pH	6 – 8	6.5 – 9.5
Phosphorus	0.1 mg/L	-
Potassium	250 - 500 mg/L	-
Sodium	50 mg/L	200 mg/L
Sulfate	100 – 200 mg/L	240 mg/L
Hardness	60 – 180 mg/L	-

Possible impacts of exceedance of the standard values

(Depending on age and body size)



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- **Nitrites & Nitrate:** Decrease of oxygen absorption in blood (Lazy & sluggish birds, Blue Comb & Wattle); Low Fertility; Respiratory Infections, low feed Intake, lower weight gain and performance
- **Iron:** Gastrointestinal Disorders, negative impacts on vaccines and medication efficiency; clogs the water pipes up, bad odor or taste, encourage the bacteria growth
- **Sulfate:** Laxative effect, fishy egg smell, negative impacts on nervous system, bitter taste, reduced water intake
- **Calcium & Magnesium (Water Hardness):** Lime Deposit in the water system, high magnesium levels (50 ppm) can have laxative effect esp. when the Sulfate or Chloride levels are high
- **Chloride:** Detrimental effect on Metabolism
- **Sodium:** Laxative effect
- **Lead, Zinc:** Toxic
- **Copper, Manganese:** bitter taste
- **pH:** Low values harms Vaccines and medications



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Parameter	Unit	Recommended Range	German Drinking water ordinance
Bacterial Count (20°C)	In 1 mL	< 100	1000
Bacterial Count (36°C)	In 1 mL	< 100	100
Coliform Bacteria (e.g E. Coli)	In 100 mL	< 10 (0)	0
Escherchia Coli	In 100 mL	< 10 (0)	0



Survival period of pathogenic Germs in Water

Pathogenic germ	Survival Time
Salmonella Typhi	2 - 93 Days
Shiegella Dysenteriae	15 - 27 Days
Brucella Abortus	5 - 85 Days
Clostridium Tetani (Spores)	unlimited
Bacillus Anthracis (Spores)	unlimited
Enteroviruses	200 Days

Water Quality must be tested and analyzed occasionally specially using your own source of water like well water!



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Same Farm, different well waters!



Take samples from all parts of the house!

How take a Water Sample correctly!



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- **Take the samples from different parts of the water system e.g. dead ends**
- **Clean and disinfect the openings and nipples thoroughly before taking samples**
- **Water should be first run for some minutes to get a representative sample**
- **For bacteria count tests the sample should arrive the laboratory within 24 hours otherwise the water sample should be frozen!**
- **Glass bottles are more preferred than plastic ones**
- **As Biofilm may not be releasing pathogens when you take a water sample, It is recommended to use swab samples from inside the water system (Biofilm swabbing)**



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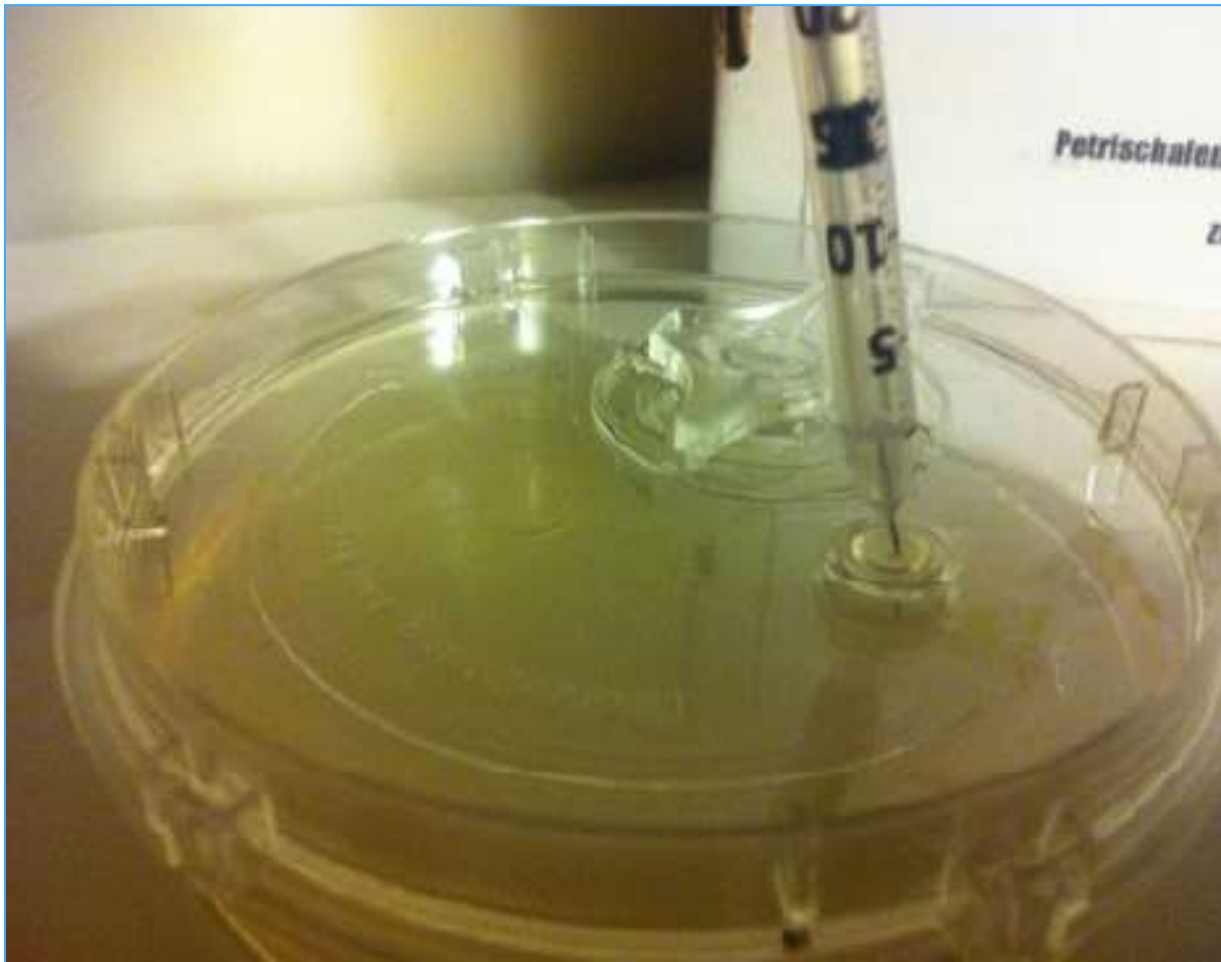




Use fast simple tests, if you don't have access to a laboratory!



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Picture: Agrel GmbH



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Picture: Agrel GmbH



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Open Drinkers e.g. Bell Drinkers

Pro:

- Very easy water access
- Easy Handling
- Low Prices

Contra:

- Low Hygiene
- Wet Litter (splashing water)
- Normally just suitable for first days in Rearing & Hot Climate areas





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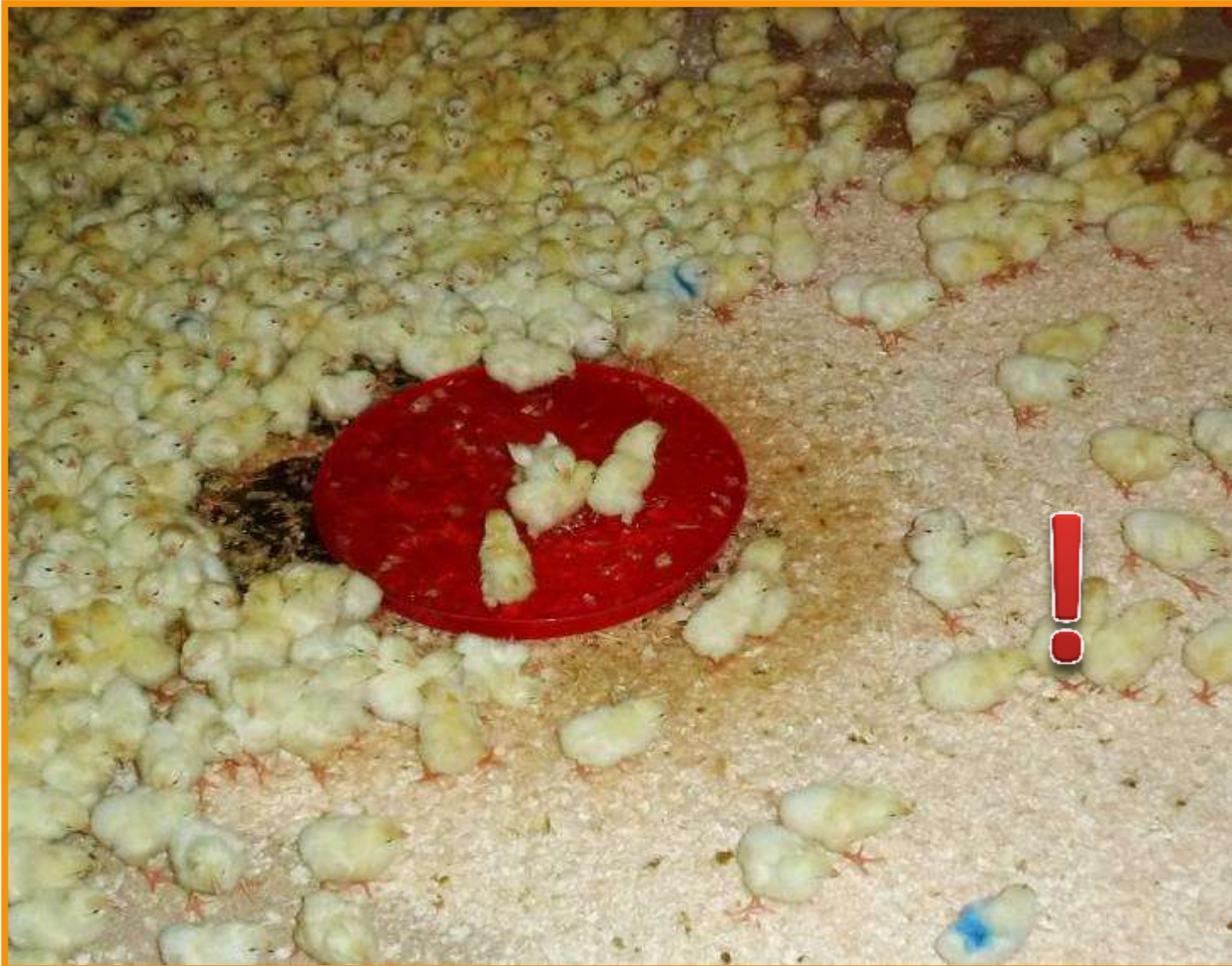


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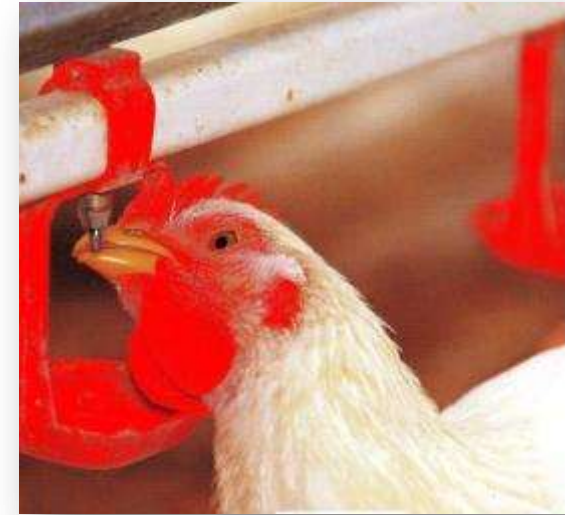
Nipple Drinkers

Pro:

- No open water source (good Hygiene)
- No splashing water
- Suitable for all Poultry in all ages
- More access to water because of drinking line

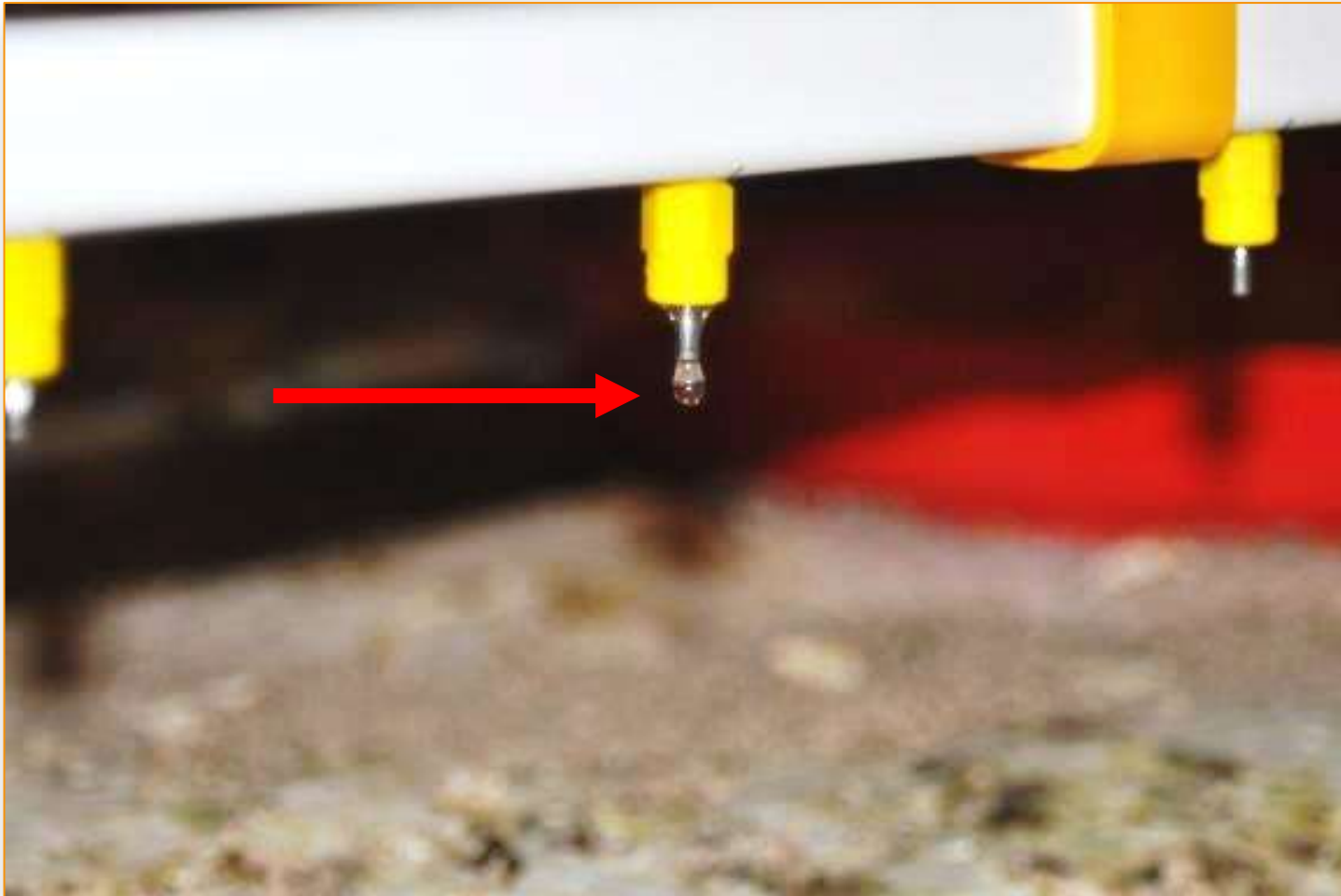
Contra:

- High price
- Good water monitoring and management is needed





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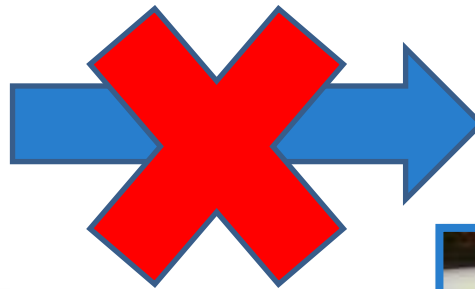


Reduce the water pressure of the nipples in order to enable chicks to find water easily!

Use the same drinkers in rearing & production (color & Type)



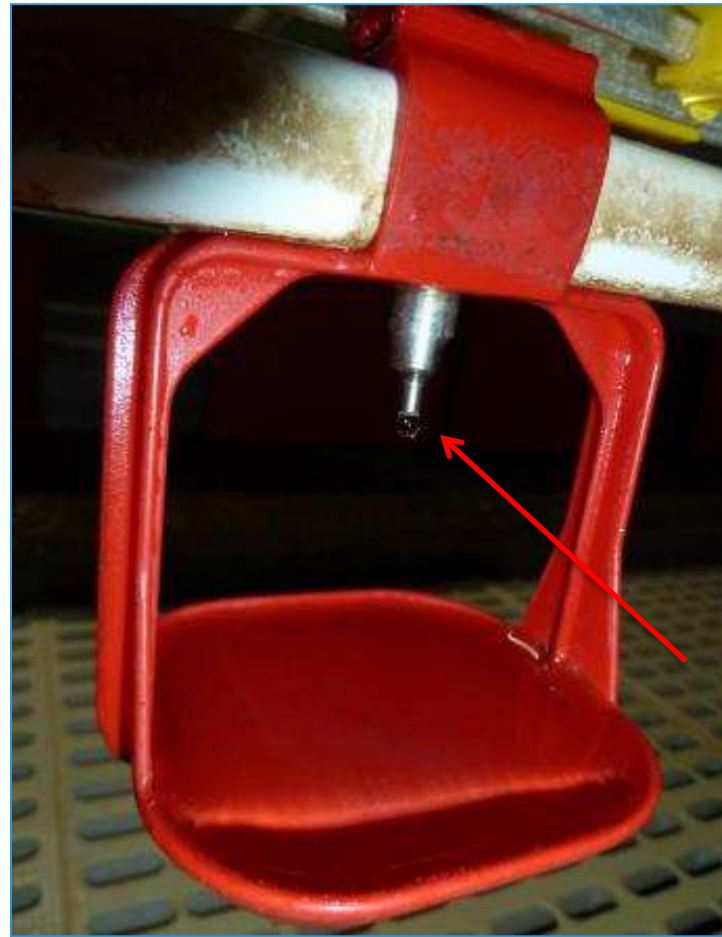
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Check always the functionality of your water system!



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Check always the functionality of your water system!



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Water Temperature

- The optimal water temperature is about **15 - 20°C!**
- Water Temperatures of **ca. 18 - 22°C** is recommended for day-old chicks in first days.
- Birds drink more water at high ambient temperature. (**> 25°C**)
- The water to feed ratio at comfort temperature is around **1.8 – 2: 1**
- This relation increases up to **5:1** or even higher at high ambient temperatures. (**> 30°C**)
- Birds refuse to drink, if the water temperature is too high!

Birds do not EAT, if they do not DRINK!

Consumption of drinking water (litre/1000 birds) of layers in cages related to temperature and feed-intake



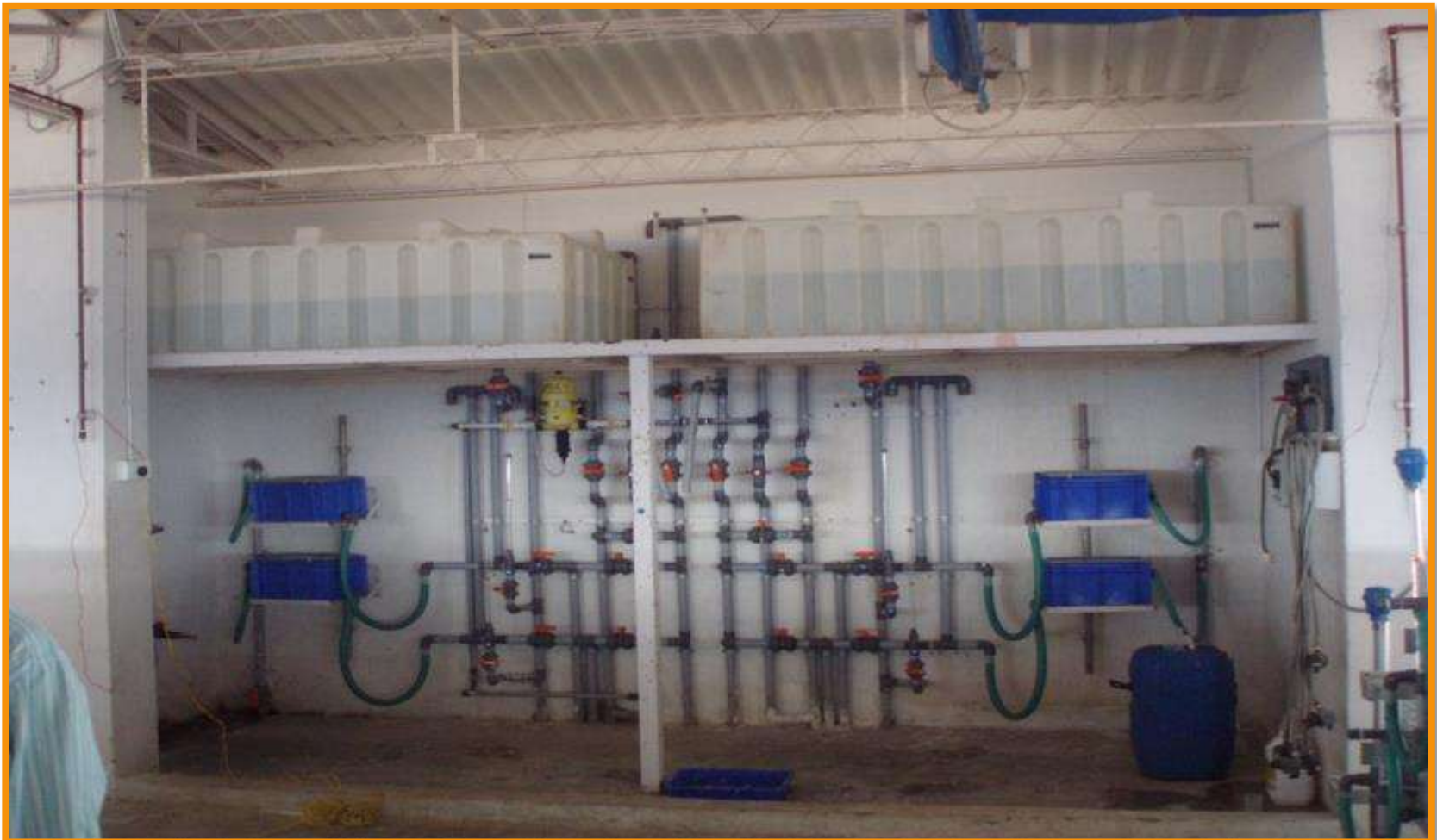
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Feed in g / day	15 °C	20-25 °C	25-30 °C	30-35 °C
82	148	163	227	401
86	155	174	242	424
91	163	182	254	447
95	170	189	265	469
100	182	201	280	492
104	189	208	291	515
109	197	220	307	538
113	204	227	318	560
118	212	238	333	579
122	220	246	344	602
127	227	254	356	625
Feed / Water	1.8 : 1	2.0 : 1	2.8 : 1	4.9 : 1

Open Water Tank without Cooling Water Temperature $>40^{\circ}\text{C}$!



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Water tank should be insulated, light coloured and shaded to keep water cool!





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**Drinking water can be cooled by flushing
waterlines with fresh cool water or
renewing water in bell drinkers!**

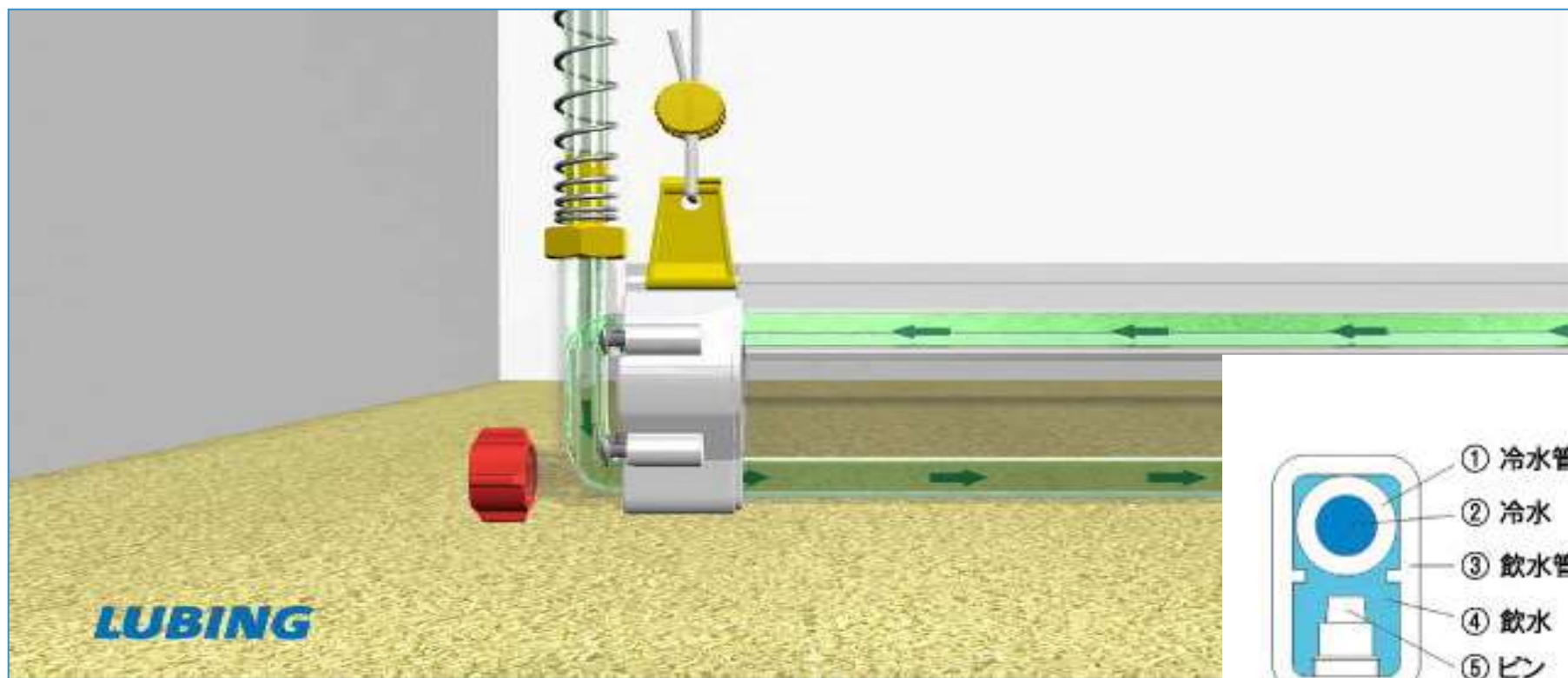


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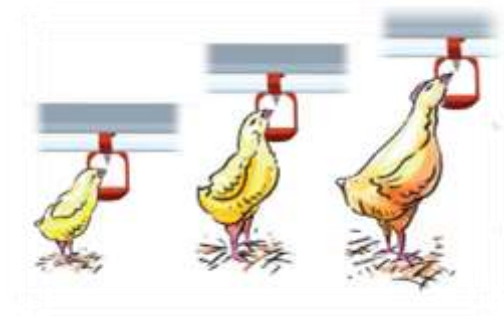
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**Check the drinkers height regularly
especially in first days of Rearing!**



Too Low



Too High



Right Height

Pictures: LUBING GmbH & Co. KG



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Water Consumption

- **Accurate water consumption must be always checked daily!**
- **Sudden increase or decrease of water consumption can indicate serious problems!**
- **It can indicate issues with birds like environmental stress (e.g. Heat Stress) or diseases!**
- **It may also indicate issues with water system! (e.g. Leaks, Air Locks, Residue Build-Ups etc.)**
- **A water meter is the best useful tool to monitor water consumption!**



Water as a tool for Medication, vaccination and other additives e.g. Vitamins

- **Drinking Water is used often for medications and vaccinations (Antibiotics and vaccinations such as Newcastle, Gumboro, Salmonella, IB, AE, ILT etc.)**
- **Drinking Water vaccinations are not labor intensive but must be carried out with the greatest care to be effective!**
- **The water used for medications and vaccinations must not contain any disinfectants!**
- **The accurate water consumption is needed to make the right dosage!**
- **The amount of vaccine solution should be calculated for complete consumption within about 2 hours e.g. Bronchitis!**
- **When vaccinating Live Vaccines, use stabilizer to protect the virus titer!**

Water Stabilizers

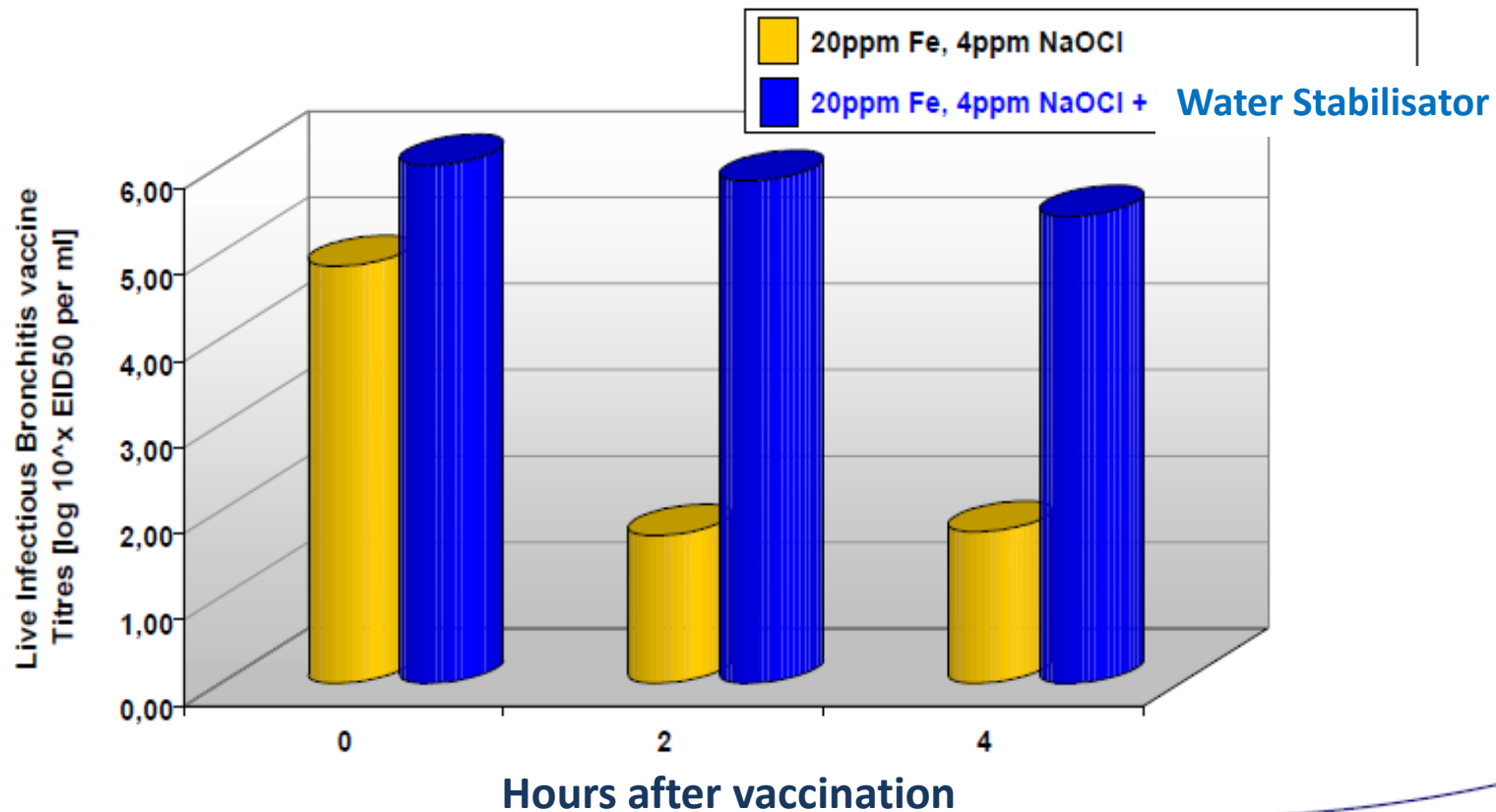


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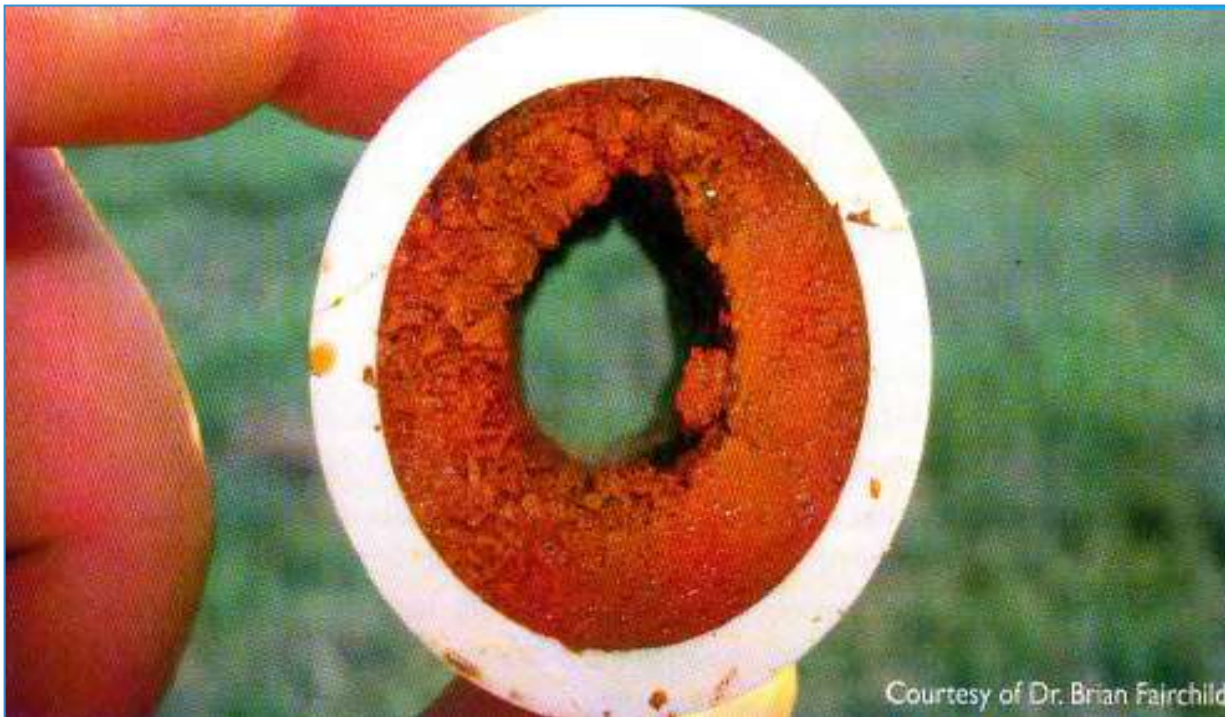


Pictures: LAH GmbH & Co. KG

Titerentwicklung einer IB Vakzine in Lösung



Biofilm is a mixture of Fungi, Algae and Bacteria and organic contaminants e.g. sugar bound together stuck on the inner surface of the pipelines and water system!



Biofilm



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Causes:

**Dirty water source, low water flow rate,
standing water,
medications, vaccinations &
high water temperature!**

**Be sure, although you don't see it,
Biofilm & Mineral Deposits
are inside your waterlines!**



Picture: Selko feed additives



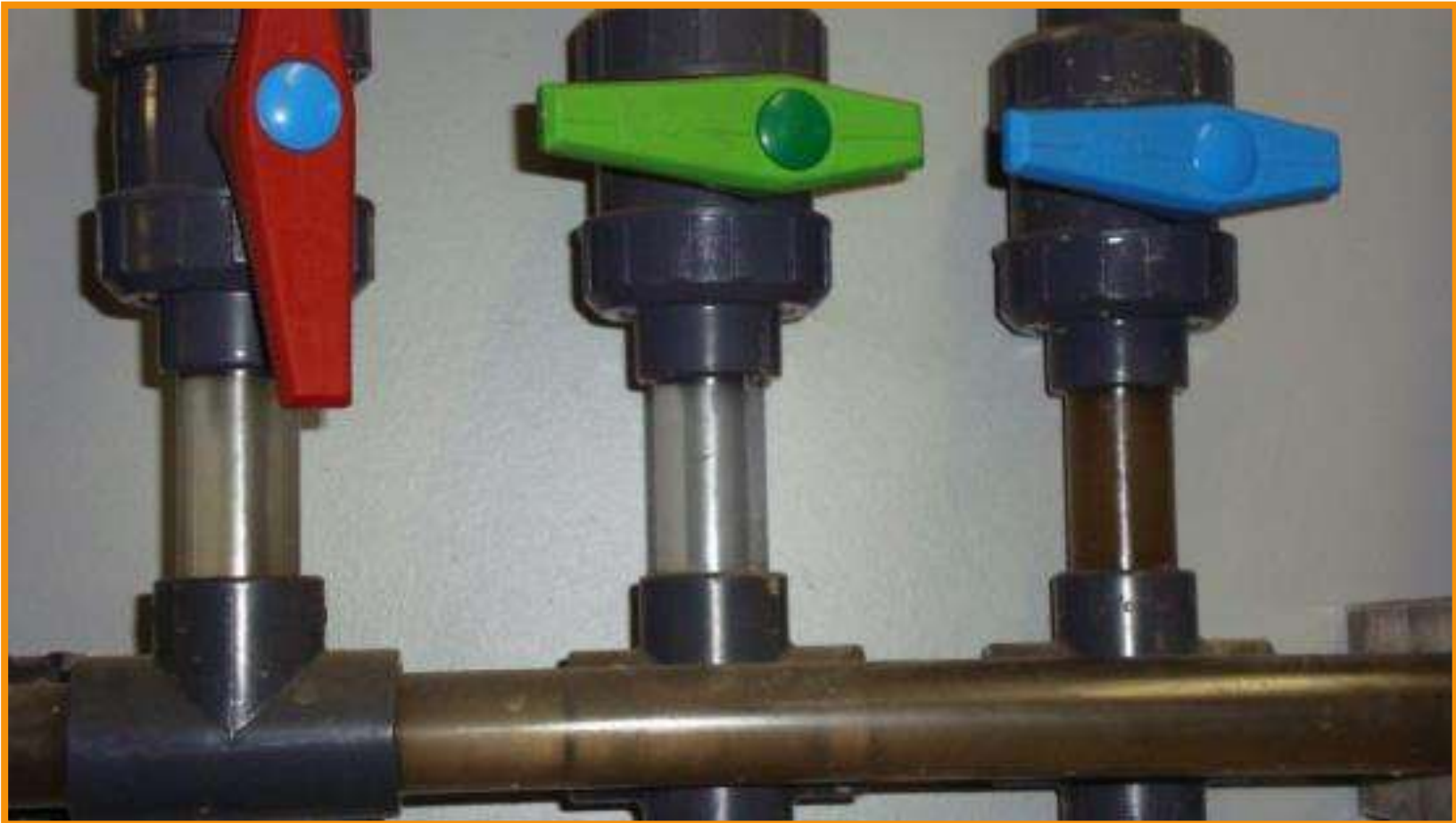
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<http://www.wattercompany.com>; Source: YouTube



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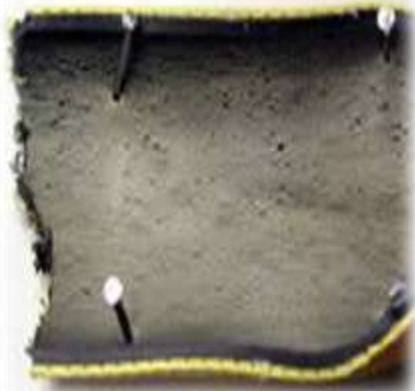
Source: Selko feed additives

Negative impacts caused because of Biofilm



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- **Negative impacts on Medications & Vaccines applied through drinking water**
- **An optimum medium for pathogenic germs (Salmonella + Campylobacter ...)**
- **Negative impact on feed conversion**
- **Drop in Egg production**
- **Increased mortality**
- **Negative impact on drinking system specially nipple drinkers**

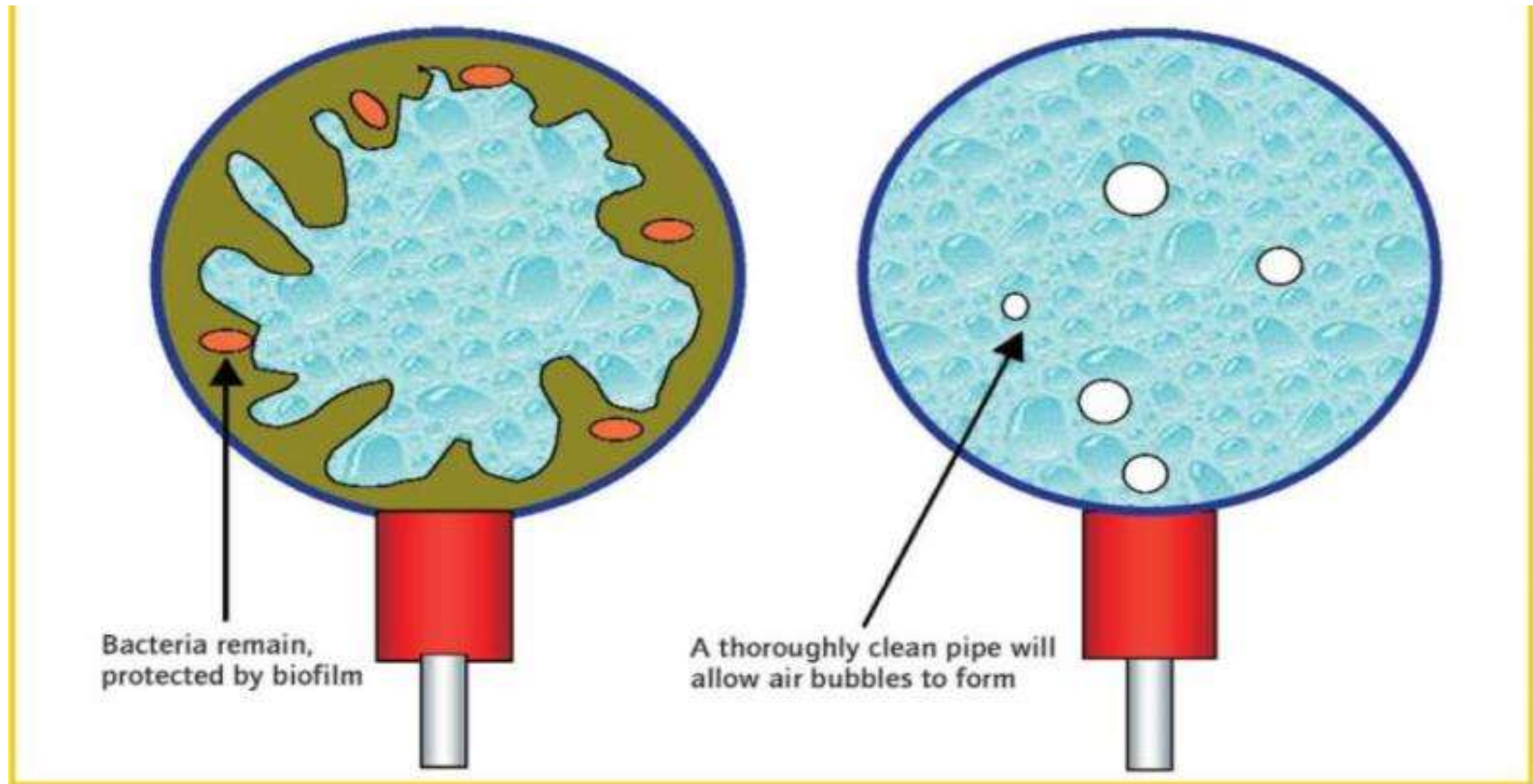


Pictures: LAH GmbH & Co. KG

A single Bacteria can increase to over 2 Mio. within just 7 hours under ideal conditions inside Biofilm*



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*World Poultry, Volume 18, No 5. 02



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Biofilm swabbing



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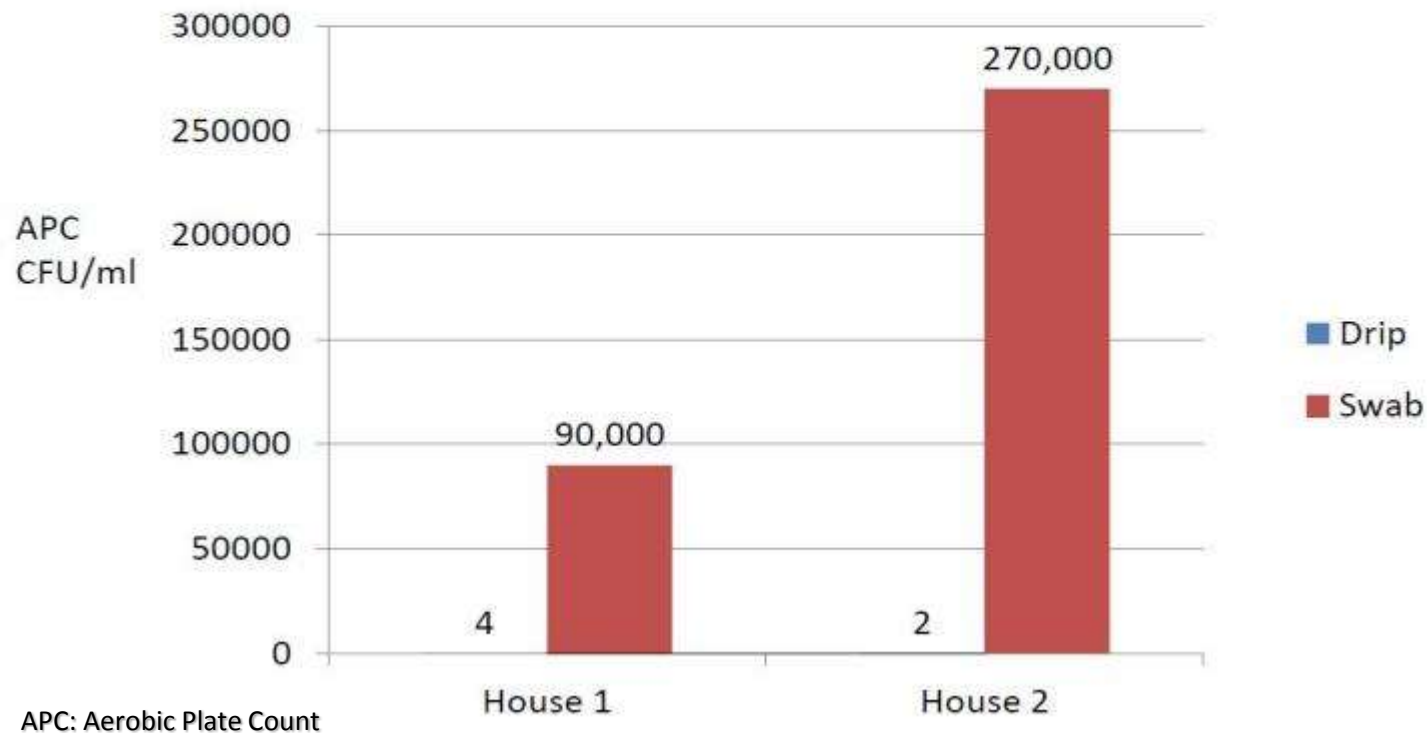
Source: Dr. Susan Watkins, University of Arkansas System's Division of Agriculture

Biofilm swabbing



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Comparison of Drip Versus Swab Samples for Evaluating Water Lines



Source: Dr. Susan Watkins, University of Arkansas System's Division of Agriculture

Various water treatments* are available to eliminate or at least to reduce impurities, scale and lime build-ups, Biofilm and Bacteria Count

Chemical Treatments

- Chlorination (unsafe, bad smell, not completely effective)
- Hydrogen Peroxide
- Polyphosphate Compounds
- Organic Acids (not completely effective)
-

Physical Treatments

- Electromagnetic Methods
- Ultraviolet light, Ozone Treatment (Limited effect on bio-film)
- Laser (Only effective at point of use)
- Softener Equipment
- Pressure impulse methods
-

*Only a very few treatments can be used during the production cycle!

Other effective treatment must be applied during service period!



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Water Treatment

	Disinfection	Desinfection under hard conditions*	Lime sclae Elimination	Biofilm Elimination	Acidification	Stability	Toxicological Properties
Peracetic Acid	Excellent	Good	Good	Good	Good	Good	Excellent
Hydrogen Peroxide	Good	Poor	Good	Good	Poor	Good	Satisfactory
Organic Acids	Satisfactory	Good	Satisfactory	Good	Good	Satisfactory	Good
Chlorine Compund	Good	Poor	Poor	Good	Poor	Good	Poor
Chlorine Dioxide	Good	Good	Poor	Good	Poor	Poor	Good
Chloramine T	Good	Good	Good	Good	Good	Good	Excellent

Lohmann Animal Health 2010

Excellent

Good

Satisfactory

Acceptable

Poor



*PH, Water Hardness, Temperature

Chlorine and chlorine-releasing compounds



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- **Effective against Bacteria, Viruses, Mycoplasmas and Protozoa**
- **Less effective against Bacterial and fungal spores**
- **Not effective against Eimeria (Coccidiosis)**
- **Not effective if a big amount of Biofilm is inside the water system (reaction with organic compounds)**
- **To check the efficiency of Chlorination, free chlorine must be measured and not the total Chlorine**
- **A standard level of 2-3 ppm free Chlorine in drinkers is recommended**
- **The most free Chlorine is available in pH levels of 6 – 7**
- **If the pH level is too high acidification may be necessary**
- **Never mix Chlorine and Acids in concentration form, they must be dispensed separately into water system!**



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PH Chlorine ORP Analyzer ALL IN ONE

0.01~10.00ppm(Total chlorine)
0.00~14.00 pH
0~+999mV
(-5 ~ 90)°C



ALVIN INSTRUMENT



Organic Acids



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- **Not effective as single organic acids against different Pathogens**
- **High dosages of single acids can damage water system and also be fatal to birds**
- **Single acids application causes slime formation and blocks pipelines and nipples**
- **A combination of proper organic acids is recommended**
- **Low pH-levels harms vaccines and medications**
- **Laying birds refuse to drink water at low pH levels**

Physical Treatments:

APIRE[®] (Lohmann Animal Health GmbH)



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- The APIRE drinking line cleaning equipment
- A new method based on pulsed Water & Air pressure produced in specific intervals in pipelines
- A chemical-free method
- Suitable for empty houses (in the service period) and occupied houses
- Complete elimination of Biofilm
- Easy and fast application
- Does not cause any corrosion in the system. It can be used in the long term and at any frequency.
- Works under lower pressure, thus does not overload the water mains network.





APIRE[®] (LAH GmbH)



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APIRE[®] (LAH GmbH)



Simple Pipeline Flushing without APIRE[®]



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APIRE[®] (LAH)



First Flushing with APIRE[®]

APIRE[®] (LAH)



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Third Flushing with APIRE[®]

APIRE[®] (LAH)



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Fifth Flushing

**VS
with APIRE[®]**

Third Flushing

APIRE[®] (LAH)



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According to the Dutch Poultry Health Service (GD) over a third (36%) of the drinking water used in commercial poultry farms has a poor quality!

According to calculations done by GD the contaminated water with mold and yeast causes damage of 12.000 € (for a flock of 30.000 laying hens).

Bacterial contamination of the drinking water of 30.000 broilers can lead to financial losses up to 2000 € per cycle!

The importance of good quality drinking water is often underestimated!

So Pay Attention to it!

Easy access to fresh clean water must be always ensured!

(For Day-Old-Chicks one of the most vital factors)

The farmer should always ask himself:

“WOULD I DRINK THIS WATER MYSELF?”

- More than **one in 6** people in the world don't have access to **clean drinking water!**

- About **1.8 Mio. People** die yearly of diarrheal diseases like Cholera as a result of drinking **polluted water!**





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Thank you for your attention!