

# STUDY OF THE INFLUENCE OF THE PHYSICAL WATER AQUA-4D® TREATMENT ON THE PREVENTION AND THE ELIMINATION OF THE BIOFILM IN A DRINKING WATER SUPPLY NETWORK OF A POULTRY HOUSE

## 1. Context of the study

On 15/12/2008, a test agreement (Appendix 1) was signed between MICARNA (a major Swiss poultry integrator from Migros company) and Planet Horizons Technologies (PHT) in which it was agreed that the physical water treatment system AQUA-4D® would be installed at Mr. Hans Aeby, 1717 St Ursen (Switzerland), producer of chickens (broilers) for MICARNA.

Mr. Hans Aeby has two strictly identical poultry houses from the dimensions and technical installations point of view. AQUA-4D® system was installed on the water inlet of one of the two poultry houses (poultry house on right-hand side N° B which has in a general way lower results compared to that of left).



The aim of the study is to follow the evolution of the development of the biofilm in the water drinking water pipes of chickens by comparison between the two poultry houses, one without AQUA-4D® treatment (Poultry house A or PA) and the other with AQUA-4D® treatment (Poultry house B or PB).

## 2. Test protocol

It was agreed to observe the results during 2 cycles of production (each one approximately 35 days), and to start with the cycle which begins towards the end of January 2009.

System AQUA-4D® is provided and left at disposal for this period by PHT which provides also the assembly instructions.

MICARNA ensures that the two poultry houses are provided with chicks of identical quality, and that food and the overall conditions are most similar possible.

MICARNA is responsible to collect and calculate the data of production per poultry house (a number of chickens, losses, weight by chicken, total weight, index of conversion of food, costs of medication, economic calculation). MICARNA provides also the data of the series of production before the test, to have a base of comparison.

After the 2nd cycle, standard parts (3 meters) are dismantled in the 2 poultry houses, in beginning and end of the distribution network of drinking water (4 parts on the whole). These samples will be photographed and analyzed to highlight the influence of AQUA-4D® treatment on the biofilm.

MICARNA deals with the costs of assembly and disassembling of the system, as well as the replacement of the dismantled parts of the distribution of water.

### 3. Schedule

The physical water AQUA-4D® treatment system provided by PHT was installed by MICARNA on 22/01/2009.

Series 1 began the 30/01/2009 and finished the 16/03/2009 (duration 39 days).

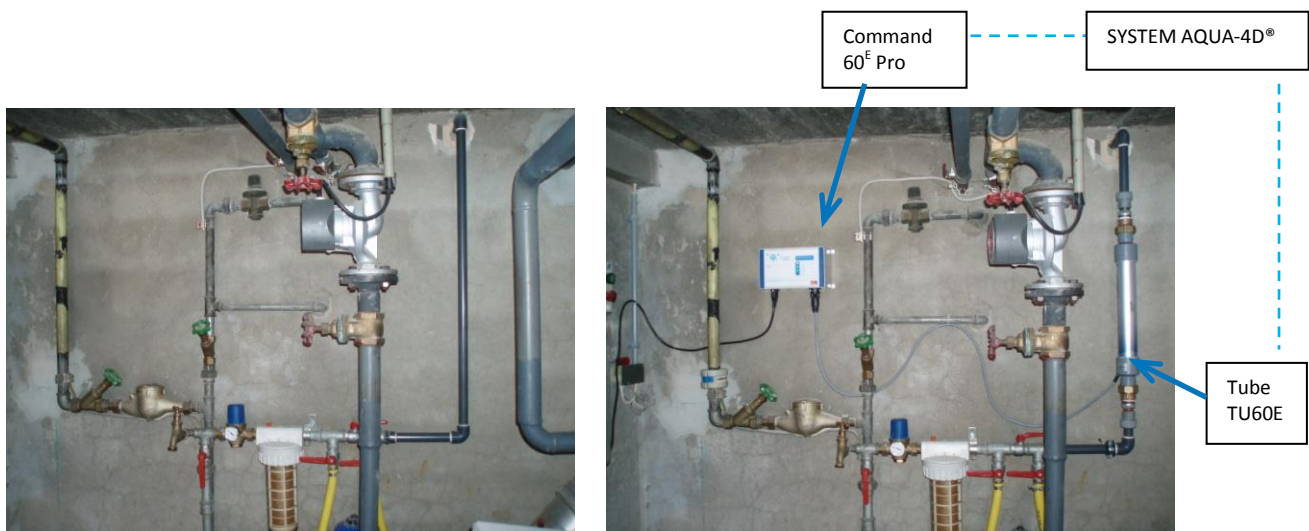
Series 2 began the 26.03.2009 and finished the 01/05/2009 (duration 37 days).

A basic examination of drinking water pipes was carried out on 13/03/2009 between the 2 series at the time of the depopulated period.

The complete examination of drinking water pipes was carried out on 06/05/2009, during the depopulated period that followed the end of the serial 2.

### 4. AQUA-4D® installation

The AQUA-4D® water system treatment was installed on the main cold-water pipe at the inlet of the poultry house after the principal pressure regulator :



Before installation

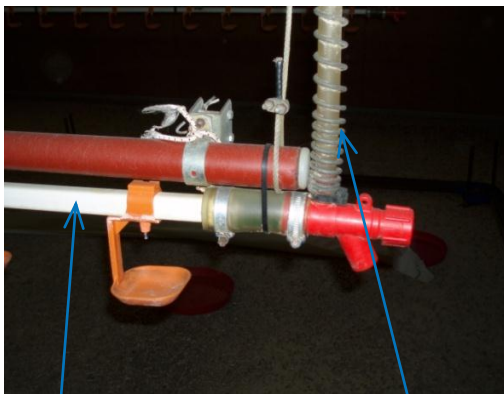
After installation

## POULTRY HOUSE B(PB)

## 5. Results of the examination of drinking water pipes of chickens

### 5.1 Examination points of drinking water pipes

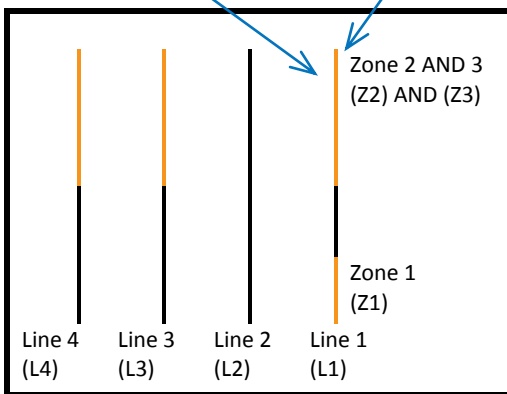
The interior of drinking water pipes was examined on the drink 1 line at the marked points Zone 1, 2 and 3 and on the drink lines 3 and 4 at the marked points Zone 2.



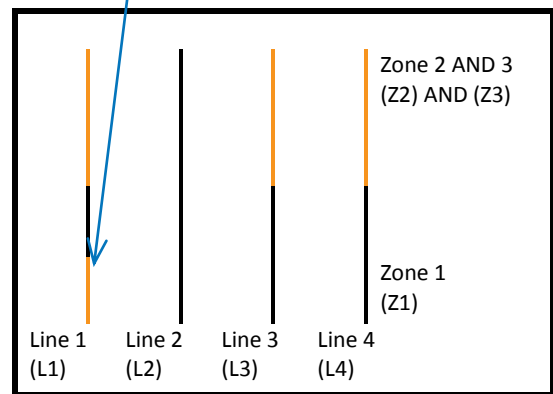
Zone 2                      Zone 3



Zone 1                      Line pipettes



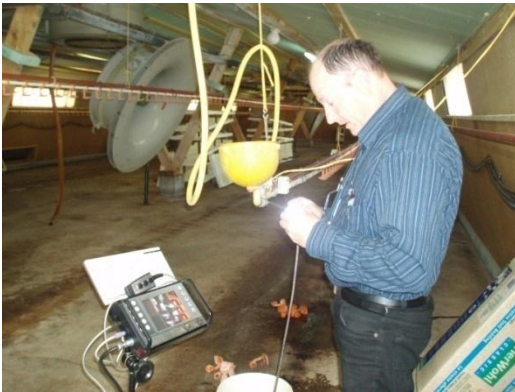
**WITHOUT AQUA-4D® TREATMENT**  
**POULTRY HOUSE A (PA)**



**WITH AQUA-4D® TREATMENT**  
**POULTRY HOUSE B (PB)**

## 5.2 Means of investigation of drinking water pipes

Drinking water pipes was examined using an endoscope. During each examination, photographs and films were recorded :



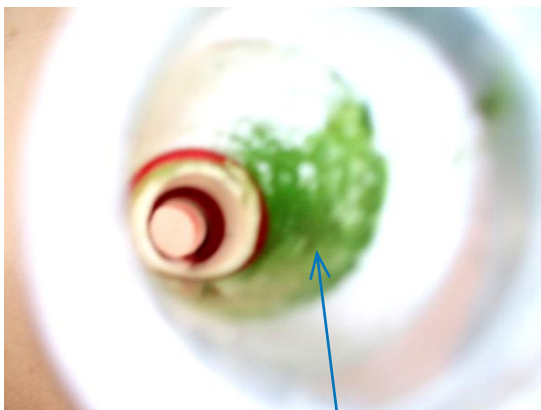
The photographs presented in this document did not undergo any digital processing.

## 5.3 Results of the examinations of the 13/03/2009

### 5.3.1 Line 1 – Zone 2

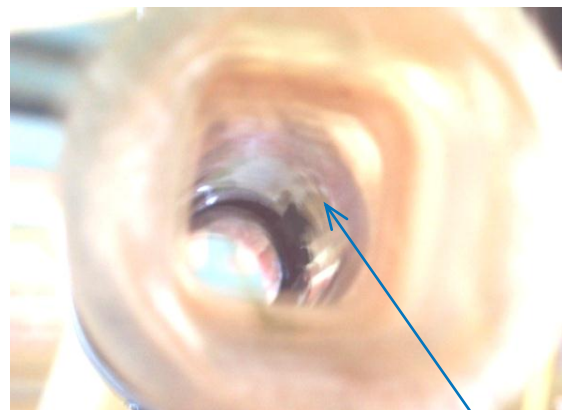
This visual examination was carried out quickly by dismounting only one end of a pipe. The endoscope was not used.

**Poultry house A  
WITHOUT AQUA-4D®**



Algae in transparent part

**Poultry house B  
WITH AQUA-4D®**



Absence of Algae in transparent part



## 5.4 Results of the examinations of the 06/05/2009

### 5.4.1 Line 1 – Zone 1

**Poultry house A  
WITHOUT AQUA-4D®**



presence of deposits and biofilm

**Poultry house B  
WITH AQUA-4D®**



The walls are partly cleaned

### 5.4.2 Line 1 – Zone 2

**Poultry house A  
WITHOUT AQUA-4D®**



Presence of Algae in the transparent part

**Poultry house B  
WITH AQUA-4D®**



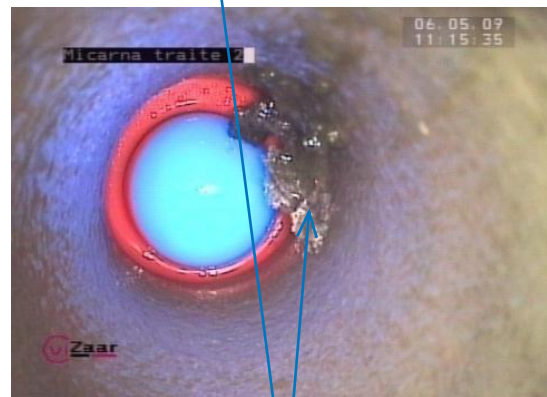
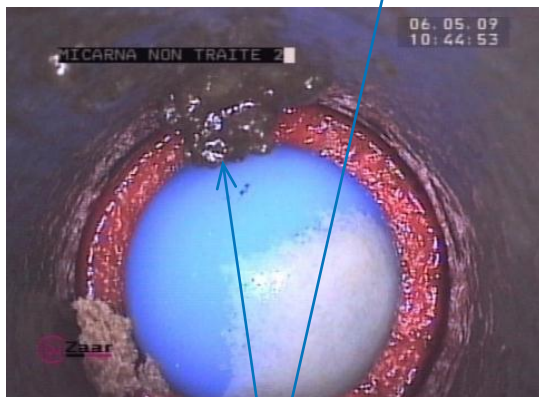
Absence of Algae in the transparent part. Clean surfaces

### 5.4.3 Line 1 – Zone 3

**Poultry house A  
WITHOUT AQUA-4D®**



**Poultry house B  
WITH AQUA-4D®**



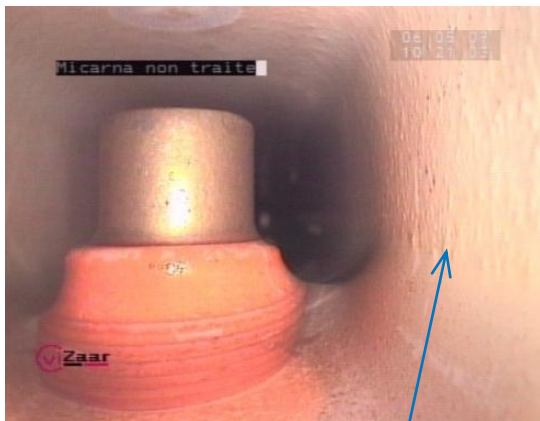
Presence of biofilm and Algae

Presence of biofilm and Algae

The zone observed above is a dead end zone (Zone 3) in which water does not circulate. To remove the detached biofilm, one would need a water circulation to evacuate it. That explains why biofilm and algae are observed in this zone also in the poultry house treated with AQUA-4D®.

#### 5.4.4 Line 2 – Zone 2

**Poultry house A  
WITHOUT AQUA-4D®**



Presence of biofilm

**Poultry house B  
WITH AQUA-4D®**



Cleaned piping. Absence of biofilm

### 5.4.5 Line 2 – Zone 2

**Poultry house A  
WITHOUT AQUA-4D®**



Presence of biofilm

**Poultry house B  
WITH AQUA-4D®**



Cleaned piping. Absence of biofilm

### 5.5 Conclusion

The inspection carried out after 2 series of production according to the installation of the system of water treatment AQUA-4D®, showed that drinking water pipes have much less deposits and biofilm in the poultry house supplied with water treated than in the poultry house supplied with untreated water.

The photographs taken during the inspection show clearly that AQUA-4D® treatment had an unquestionable action in the removal of the deposits (biofilm) on internal surfaces of drinking water pipes.

Treatment AQUA-4D® acts until the complete removal of the biofilm (curative effect) and then in a permanent way to prevent that it is restored again (preventive effect). The pipes remain thus permanently without biofilm.

It should be noted that system AQUA-4D® is very easy to install and does not require any maintenance. It does not modify the chemical composition of water, does not use chemicals, does not have wastes and has very low power consumption.

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