USE OF ELECTROLYZED WATER FOR INACTIVATION OF ESCHERICHIA COLI, STAPHYLOCOCCUS AUREUS, SALMONELLA TIPHYMURIUM AND PSEUDOMONAS AERUGINOSA FROM POULTRY FARMS

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Birds are exposed to numerous opportunities for contamination and infection from the egg incubator, floor, leather, bird feces, food, drinking water, etc.

Electrolyzed water (ANK) use has proved effective in poultry farms by destroying the pathogenic bacteria present on the surface of eggs (*Salmonella tiphymurium, Staphylococcus aureus, Listeria monocytogenes, Escherichia coli*).

Electrolyzed water (ANK) is an environmentally friendly disinfectant characterized by their high efficiency, broad spectrum, and without side effects.

Electrolyzed water is recommended to improve health, detoxify the body, extend the absorption of nutrients and body to help fight the aging process. By using water electrolysis plant metabolic waste dissolution occurs so that some experts recommend it for human consumption: Fungal diseases, skin condition, blood pressure, digestive problems, acidity, arthritis and osteoporosis.

This paper reports the effect of electrolyzed water on different microorganisms present in poultry farms on the surface of the eggs.

The encountered pathogens in poultry in order of their frequency are: *Salmonella tiphymurium, Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa.*

MATERIALS AND METHODS

To evaluate the effect of ANK on pathogens a working protocol was established, as follows:

1. Three areas were selected for experiments: ceramic, steel and plastic;
2. The micro-organisms used to prepare the Control strains:

- *Stafilococcus Aureus* – ATCC 2 5923,
- *Salmonella tiphymurium* ATCC –14028,
- *Escherichia coli* –25922,
- *Pseudomonas aeruginosa* ATCC–27853.

3. Use of ANK (32, 50, 100, 200 si 400 mg active chlorine

The electrolyzed water is produced by passing an electric current through a dilute solution of salts in water.

Anolit neutral electrolyzed water was produced using a generator EL400 (provided by I. Envirolyte Td.)

A salt solution with 25% concentration and drinking water were pumped in generator achieving anolit neutral electrolyzed water with the following characteristics:

- pH =7,8;
- ORP (redox potential) = 743 mV;
- active chlorine = 32mg/l, 50mg/l, 100mg/l, 200mg/l, 400mg/l

Procedure:

- Areas selected for experiments were inoculated with microorganisms and taken as trial witnesses while other surfaces were inoculated with these strains + ANK;
- Contact time 15 minutes;
- Samples were sown on those specific areas, were selected and analyzed after the incubation period of 48 hours at 37 ^{o}C.

RESULTS AND DISCUSSIONS

Table 1 : Effect of electrolyzed water on the tested microorganisms

Nr. Crt.	Microorganisms	Selected areas	Results (colony number)					
			Control sample	ANK 32mg	ANK 50mg	ANK 100 mg	ANK 200 mg	ANK 400 mg
1	*Stafilococcus aureus*	Ceramic Steel Plastic	>1500	22 15 25	0	0	0	0
2	*Escherichia coli*	Ceramic Steel Plastic	>1500	549 434 657	281 234 322	7 5 9	0	0
3	*Salmonella tiphymurium*	Ceramic Steel Plastic	163	72 67 81	12 6 8	0	0	0
4	*Pseudomonas aeruginosa*	Ceramic Steel Plastic	>1500	9 5 2	0	0	0	0

The analysis of the table shows that on the surfaces contaminated with strain + ANK:

Staphylococcus aureus was 87% inhibited at concentration of 32 mg active chlorine.

Starting with 50 mg of active chlorine, the electrolyzed water has a total bactericidal effect on *Staphylococcus aureus.*

- *Escherichia coli* was 50% inhibited at concentration of 32 mg active chlorine, 75% at concentration of 50 mg active chlorine, and did not develop at 200 and 400 mg concentration of active chlorine (figure 1).

Left: 32 mg active chlorine **Right:** Luria Bertani medium

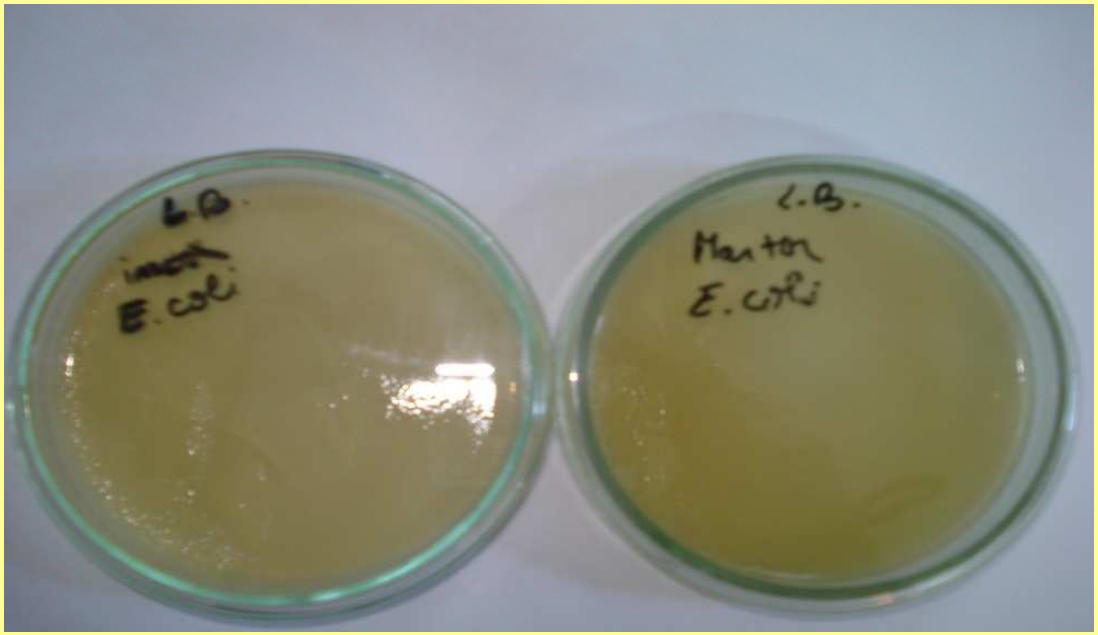

Figure 1. Aspect of *Escherichia coli*

- *Pseudomonas aeruginosa* was inhibited in proportion of 90% at the concentration of 32 mg active chlorine and did not develop for the other concentrations (fig.2).

Left: 32 mg active chlorine **Right**: Luria Bertani medium

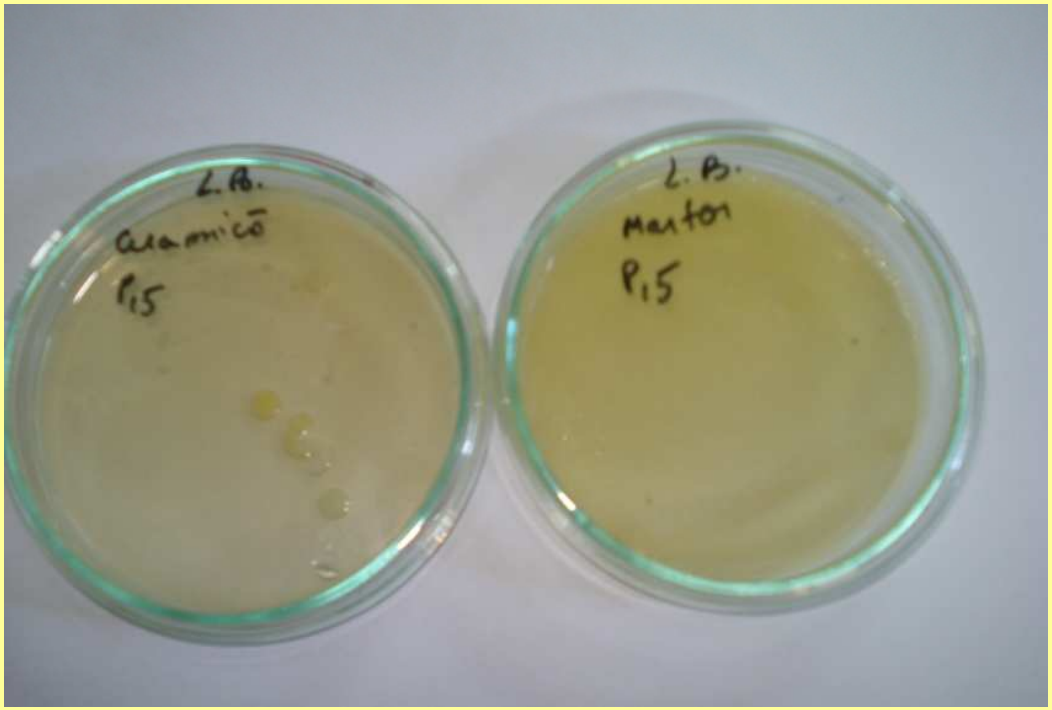

Figure 2. Aspect of *Pseudomonas aeruginosa*

- *Salmonella tiphymurium* was 50% inhibited at concentration of 32mg active chlorine, 95% at 50 mg active chlorine and did not develop for the other concentrations (figure 3).

Left: 32 mg active chlorine **Right:** Luria Bertani medium

Figure 3. Aspect of *Salmonella tiphymurium*

CONCLUSIONS

- Starting with 50 mg of active chlorine, the electrolyzed water has a total bactericidal effect on *Staphylococcus aureus* and *Pseudomonas aeruginosa.*
- For *Escherichia coli* and *Salmonella tiphymurium* the electrolyzed water has a total bactericidal effect starting with 100 mg of active chlorine.
- The experimental results showed that electrolyzed water (ANK) has a bactericidal role on some microorganisms, being an effective bactericidal agent which can be used in poultry farms.

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