

STUDY ON PHYSICAL AND CHEMICAL ASSIMILATION WATER IN A HOLDING ANIMAL

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Abstract

The health of animals raised in intensive system is influenced by many factors, including, most can be directed and controlled by man. Among these factors, water quality plays a very important. The paper presents results of studies of physical-chemical parameters of drinking water in poultry farm SC Bio-Top-Ovo Ltd. Lipova, Vaslui. Each analysis must match a STAS, according to Laws 458/2002 and 311/2004 on drinking water quality, such as:

- Ammonium determination is made that Stas 6328-85*
- Determination of nitrites meet Stas 3048/2-96*
- Assessment of water conductivity is that Stas ISO 7722-84 and 7888-1983.*

Under current rules have taken water samples from source water supply basin and watered. Following tests carried out to constat that a number of physico-chemical parameters of water holding not correspond to the MAC (the concentration) of Laws 458/2002 and 311/2004 on drinking water quality. Thus, supply basin, following the results of two determinations were made for:

- Fixed residue 807 mg / l - 840 mg / l, compared with 800 mg / l CMA*
- Ammonia 3.15 mg / L, 3.11 mg / l to 0.50 mg / l CMA*
- Phosphates 0.986 mg / l 0.900 mg / l to 0.5 mg / l APC.*

Based on these results lead farmers must implement measures to improve drinking water quality, such as filtering water, checking and possibly changing the waste pipe, cleaning the basin of accumulation and eventually replace the concrete floor of the basin.

Key words: health, law, standard water, analysis

INTRODUCTION

Water is a substance absolutely indispensable for life, whatever form, is one of the most universal solvent. In terms of biological, water has many essential properties of proliferation of life, which differ from other substances. Water fulfills this role by allowing organic compounds to react in ways that ultimately allow replication.

Being used both for human consumption and that of animals, water is a vector of transmission of various diseases. Infectious diseases transmitted by water can take in terms of number of cases of disease and mode of occurrence and development of several forms. The quality of drinking water to avoid diseases transmitted by water, is obtained by application of stringent hygiene of the source to the place of use.

Physical - chemical water is to determine the organoleptic and physical properties and chemical composition.

Analysis of running water after a well-established, taking into account the sensitivity higher or lower water properties and constituents. In this regard, some determinations are made at harvest, thus: determining organoleptic (taste, smell), determination of temperature, dissolved oxygen and determining the hydrogen sulphide, the determination of residual chlorine, carbon dioxide free and aggressive, the determination of pH.

Other determinations are made within 4 hours of harvesting, where waters have been preserved: the determination of turbidity, suspension, fixed residue determination, the determination of phosphates, the oxidability,

forms of nitrogen, iron determination, the temporary hardness (carbonated), manganese.

Another series of determinations are made within 24 hours of sample collection: determining alkalinity and acidity, determination of total hardness, calcium and magnesium, fluorine determination.

MATERIAL AND METHOD

The research was conducted in farm poultry SC Bio-Top-Ovo Ltd. Lipova, Vaslui, has conducted a series of tests to determine the organoleptic and physico-chemical properties of water used for watering of broiler chickens reared on the ground.

In this respect, the growing-finishing phase pups were samples of water in the days of April 14 to April 30, 2009, both the source (a well located at about 30 meters away from the farm) and collection basin of the farm and watered. Reviews were conducted at the National Administration "Romanian Waters" - The Water Management Vaslui.

For collection of samples and conduct tests were used laboratory tools and equipment according to standard working methods and procedures for determining the force. Each analysis or experiment must correspond to a particular work STAS or provisions, for example:

- Ammonium determination is made in accordance mg/dm³ effect STAS 6328-85;

- Nitrites determination is made in accordance mg/dm³ STAS 3048/2-96.

Determination of physical or chemical properties such as pH, turbidity, conductivity, dissolved oxygen, cyanide distillation of measuring devices are controlled and others are calculated by titration, spectrometric methods [1].

Water samples were collected in sterile glass vials, plugged with glass stoppers. The vials were filled up to 2-3 cm below the closures and were transported to the National Administration "Romanian Waters" - Vaslui Water Management System with a freezer boxes do not change the physico-chemical composition.

Determination of water temperature was directly at the source with normal ala

thermometer whose tank was wrapped in gauze and placed in water for 10 minutes. Drinking water to satisfy thirst sensation of temperature should be between 5-17°C (STAS 1342/1991).

pH was determined using the method electrometry. Determination electrometry is an accurate method, which uses electric pH meter.

To determine the total suspension do the following:

Sample for analysis was centrifuged at 2500-3000 rpm. and the supernatant was decanted. The deposit was taken with distilled water in a porcelain capsule. Evaporated to dryness, was dried in oven at 105° C, was cooled in exicator and was weighed, resulting in total suspension, which relate to a liter of water.

Determination of Turbidity turbidity was made.

Measuring water conductivity is governed by STAS 7722-84, and ISO 7888-1983.

Conductivity measurement is used for illustration kit consisting of conductometric cell, measuring transducer, measuring device and set of solutions of potassium chloride with known values of conductivity and sample cups.

To determine the fixed residue use the following method:

Take a share of water for analysis (50-500 ml) filtered in advance if not perfectly clear, is placed in a porcelain capsule husk. Evaporate on water bath until dry. Water is inserted in the capsule in small quantities (not to fill the capsule more than half) and measured water balloon that is rinsed 2-3 times with distilled water plus capsule also.

After evaporation, the residue is dried at 105°C for 2 hours and after cooling exicator, weigh. Drying and weighing operation is repeated until constant weight.

Determination of permanganate index

Permanganate index of water is a mass concentration of oxygen ions equivalent to the amount of permanganate consumed when a water sample is treated with permanganate under defined conditions.

Equipment and solutions used

- Bidistilator GFL 2104, Fridge, AB 204 analytical balance, oven UFB Universal model 500, thermostatic water bath GFL 1002.
- Reagents - Sulfuric acid c (H_2SO_4) = 7.5 mol/l sulfuric acid c (H_2SO_4) = 2 mol / l sodium oxalate ($Na_2C_2O_4$) basic solution 0.05 mol/l ($Na_2C_2O_4$) standard solution 5mmol / l potassium permanganate solution base 20 mmol/l potassium permanganat solution titrated 2 mmol / l. All solutions are prepared in water distilled.
- Tube length 150 mm-200 mm, glasses Erlenmayer 50 ml graduated pipettes listed and Class A, of 1 ml, 5 ml, 1000 ml class A volumetric flasks 100 ml, 250, 500 and 1000 ml burettes with 10 ml, graduated exactly about. 0.02 ml.

Procedure

Measure by pipette listed with a volume of 25ml of sample tested (or diluted sample) in a glass test tube or Erlenmeyer flask. Add 5 ml \pm 0.5 ml H_2SO_4 2 mol / l and shake gently. Place the tube in a water bath heated to 96°C-98°C for 10 min + 2 min. Add 5 ml \pm 0.5 ml potassium permanganate solution titrated, 2 mmol/l. After 10 min \pm 15 sec are added. 5 ml \pm 0.5 ml sodium oxalate ($Na_2C_2O_4$) standard solution, 5mmol / l and is expected to be discolored. Hot solution is titrated with potassium permanganate solution titrated, 2mmol / l to pale pink persistent 30 sec.

- In parallel a blank is made using the same method of working, try replacing the water sample, in line entered the titration volume usually does not exceed 0.1 ml.
- Determination of ammonia nitrogen
- UV-VIS Spectrometer Helios. Alpha Analytical balance type 204 and type AB Adventurer Pro AV264CM, cooling incubator FTC 90E.
- Reagents - Sodium salicylate, trisodium citrate dihydrate; nitroprusiat sodium, sodium hydroxide, sodium dicloroisocianurat dihydrate, Merck standard solution with concentration p = 1000 mg + 2 mg NH_4 + / l ammonium chloride.

- Quoted and graduated pipettes, Class A 0.5, 1 ml 2,5,10,25 ml flasks class of 50 ml, 500 ml, 1000 ml, 50 ml burette, glass fiber filter paper.

Procedure

Measure a volume of 40 ml filtered sample tested, and placed in a 50 ml volumetric flask. Add 4.0 ml \pm 0.05 ml of color reagent and homogenize. Then add 4.0 ml \pm 0.05 ml sodium dicloroisocianurat and homogenize. Bring to volume with water, homogenize and entered in the incubator at a temperature of 20°C \pm 10°C for 60 minutes, then read on Spectrometer in the wavelength of 655 nm in the cuvette with optical path length of 10 mm, to bidistilled water. In parallel, prepare a blank using 40 ml of water bidistilled treated the same way as the sample to try. If the amount of NH_4 + concentration exceeds 1.25 mg/l using a smaller volume of sample measured by pipette quoted, brought to 40 ml.

Determination of nitrite

Equipment and solutions used

- VIS Spectrometer type SECOM PRIM C, type AB 204 analytical balance, analytical balance type Adventurer PRO AV264CM, bidistilator type GFL.
- Reagents - orthophosphoric acid solution 15 mol / l (p = 1.70 g / ml), 4-amino benzene sulfonamide ($NH_2C_6H_4SO_2NH_2$), N (1-naphthyl) ethylene diamine dihydrochloride ($C_{10}H_7NH-CH_2-CH_2-NH_2 \cdot 2 HCl$) Hydrochloric acid, Merck standard concentration p = 1001 mg + 5 mg NO_2 -/ l sodium nitrite
- Quoted and graduated pipettes, Class A 1 ml 2,5,10 ml flasks class of 50 ml, 100, 500, 1000 ml glass fiber filter paper.

Procedure

Measure a volume of 40 ml of sample filtered and tested is placed in a 50 ml volumetric flask. If the nitrate concentration exceeds 0.25 mg N / l is taken smaller amounts of sample, making sure that the volume is adjusted to 40 \pm 2 ml to ensure that the proper pH for reaction is reached after adding reagent. With a pipette add 1 ml color reagent. Homogenize immediately by

moving the swing and make the volume of water to the mark. Homogenize and leave the rest. At this point the pH must be $1,9 \pm 0,1$. After 20 minutes of adding reagent solution absorbance is measured at the appropriate wavelength (540 nm) using cuvettes with optical path 10 mm, using water as reference liquid. If color proof is likely to interfere in the absorbance measurement is treated in parallel by replacing a sample with 1 ml color reagent phosphoric acid 1.5 mol / l. In parallel runs by doing a blank as above but replacing the sample tried (40 2) ml of water.

Determination of nitrogen

Equipment and solutions used

- VIS Spectrometer type SECOM PRIM C, analytical balance type 204 and type AB Adventurer Pro AV264CM, bidistillatory type GFL, TW thermostat water bath 20.
- Sulfuric acid, c (H₂SO₄) = 18.0 mol / l, p = 1.84 g / l glacial acetic acid, c (CH₃COOH) = 17 mol / l, p = 1.05 g / l hydroxide sodium, granules, EDTANa₂, sodium azide, sodium salicylate, potassium nitrate, Merck standard solution with concentration up p=1002 mg + 5 mg NO₃⁻/l
- Quoted and graduated pipettes, Class A 1 ml 2,5,10,25 ml flasks class of 25 ml 50,100,250,500,1000 ml porcelain capsule capacity 50 ml, glass fiber filter paper, burette of 25 ml.

Procedure

Measure by pipette quoted a maximum volume of 25 ml sample when tested ready for concentrations up to p = 0.025 mg NO₃⁻, and inserted into capsules porcelain series. In case the nitrogen content is higher than 0.025 mg of sample volumes are taken less than 25 ml. If sample pH is greater than 8, the sample is neutralized with glacial acetic acid. Add 0.5 ml \pm 0.005 ml sodium acide and 0.2 ml \pm 0.002 ml of acetic acid. Wait at least 5 minutes then evaporated to dryness on water bath. After evaporation add 1ml sodium salicylate, prepared, mix and evaporated to dryness on water bath. Remove the capsules from the water bath and cooled to ambient temperature. Add 1 ml concentrated sulfuric acid in porcelain

capsule and dissolve the residue by rotary movements light Allow mixture to stand at least 10 minutes. Add 10 ml 0.1 ml \pm 10 ml water and 0.1 ml alkaline solution prepared. Quantitatively transfer the mixture into a 25 ml volumetric flask but not up to the mark. Is maintained at a temperature of 25°C for 10 \pm 2 min bath thermostat, then bring to volume with water. Measure absorbance of solution at wavelength of 415 nm in cuvettes with optical path 10 mm, with reference to distilled water. Record the absorbance measured with AS.

In parallel a blank run, replacing the sample tested with 25 ml of distilled water. If known or suspected, sample absorbance tried interfering at the wavelength chosen, a sample is treated again tried, without added sodium salicylate solution. Absorbance measured is denoted by At.

Determination of chlorides

Equipment and solutions used

- Type AB 204 analytical balance, and balance type Adventurer Pro AV264CM, bidistillator type GFL 2104
- Reagents - Silver nitrate 0.0282 mol / l potassium chromate-ground indicator 100g / l nitric acid - 0.1 mol/l sodium chloride, 0.0282 mol/l sodium hydroxide - 0.1 mol/l reagent to improve buffering capacity: calcium carbonate (CaCO₃) or sodium hydrogen carbonate (NaHCO₃) powder.
- Biurette of 25 ml, 100 ml pipette rated, class A graduated pipette 1 ml, 250 ml conical flasks, blue band filter paper, glass funnels.

Procedure

Measure a volume of 100 ml sample tested using a pipette listed and placed in a conical flask, placed on a white background. If sample pH is between 5 and 9.5, is adjustment using, as appropriate, or nitric acid solution 0.1 mol/l or sodium hydroxide solution 0.1 mol/l. If the pH is below 5, to improve the buffer capacity may be useful to adjust pH with calcium carbonate or sodium hydrogen carbonate. Add 1 ml potassium chromate indicator and titrate by adding drop by drop of silver nitrate solution 0.0282 mol/l. Adding reagent is under

continuous agitation until the solution becomes reddish brown.

Determination of calcium

Almost all natural waters and rain and most of the waste water containing ions Ca_2^+ , it enters into the composition of mineral water, its hardness and ionic balance calculation analysis. In natural waters, containing calcium compounds from dissolved limestone.

Equipment and solutions used

- Analytical balance type AB 204, bidistillator type GFL 2104, refrigerator
- Reagents - EDTA solution 0.01 mol/l; murexid-indicator mixture of naphthol green B, sodium hydroxide 2 mol / l nitric acid 4%
- Class A Burette with 25 ml capacity, graduated pipettes listed class A and 1 ml, 25 ml volumetric flask 100 ml, 500 ml, 1000 ml conical flasks Erlenmayer of 100, 500 ml, blue band filter paper, glass funnel.

Procedure

Measure a volume of 25 ml sample tested using a pipette quoted and placed in a conical flask, placed on a white background. Add 1 ml of 2m sodium hydroxide solution to $\text{pH} = 12-13$ and add 0.1 g mixed indicator. Stir the solution, titrate by adding drop by drop EDTA solution 0.01 mol / l. Adding reagent is stirring continuously until the color turn from red to purple.

Determination of dissolved oxygen

Dissolved oxygen in water is one of the main gases dissolved in water and element of all living conditions of the various bodies of the earth and water. If natural water comes from dissolved atmospheric air and in the process of photosynthesis.

Equipment and solutions used

- Cooling Incubator FTC 90E, 730, oxigenometru laboratory INOLAB electrode StirrOxG
- Reagents - WTW cleaner RL-G No 205 No 204 and WTW electrolyte ELY / G 205 217

Procedure

Clean and dry sensor is inserted into the sample measured. Start button on the stirrer of the electrode casing. On display is the central temperature and the upper line indicating sample size measured. When the

value displayed only flashes, whichever is displayed. To determine the oxygen saturation is press the [M] until % oxygen saturation appears. Stop the stirrer, remove the sensor from the container sample.

It can move to the next determination.

Determination of phosphorus

Forms of phosphorus from the water, waste water pollution, waste, pesticide, fertilizer and detergents. Natural river eutrophication favors the role they have in algal blooms.

Equipment and solutions used

- Spectrometer Helios Type AB 204 analytical balance and balance Adventurer Pro AV264CM type, type GFL bidistillatory
- Reagents - sulfuric acid conc., Sodium hydroxide, ascorbic acid, ammonium heptamolybdate tetrahydrate; double tartrate of antimony and potassium peroxodisulfat potassium, hydrochloric acid, $p = 1.12 \text{ mg/l}$ standard Merk concentration $p = 1002 + 2 \text{ mg/L PO}_4^{3-}$, Monopotassium phosphate.

Procedure - For determination of the orthophosphate

Measure a volume of 40 ml of sample prepared according to where the concentrations tested up to $\text{pp} = 0.8 \text{ mg/l}$ and placed in a 50 ml volumetric flask. If the concentration is higher orthophosphate taking smaller amounts of sample, making sure that the volume be adjusted to $40 \pm 2 \text{ ml}$. With a pipette add 1 ml ascorbic acid concentration $p = 100 \text{ g / l}$ while stirring, then 2 ml acid molybdate l. Se up to volume with water and homogenize. After 10 minutes but not more than 30 minutes after the addition of reagents, measure the absorbance of the solution at the appropriate wavelength (880 nm) using cuvettes with optical path of 10 mm. In parallel runs by doing a blank as above but replacing the sample tried $40 \pm 2 \text{ ml}$ of water. If the sample tested is cloudy and / or colored, add 3 ml of reagent to compensate for turbidity and color of the chosen sample volume tested. Dilute to 50 ml and measure the absorbance. Absorbance of this solution is subtracted from the measured value of sample work. The result can be

given in milligrams of $PO_4^{3-}P$, taking into account the conversion factor: 1 mg PO_4^{3-} corresponds to 0.3261 mg P.

RESULTS AND DISCUSSION

Table 1
Results of organoleptic and physical-chemical analysis of water samples

Indices of organoleptic and physical-chemical	UM	P 1 – well *	Indices quality – water underground	P 2 - Swimming *	P3 Adapters *	Indices quality – water drinking	CMA (L458 – 2002 and L311-2004)
Odor	organoleptic	a. odorless b. odorless	acceptable to consumers and no abnormal	a. odorless b. very weak	a. odorless b. very weak	acceptable to consumers and no abnormal	acceptable to consumers and no abnormal
Taste	organoleptic	a. acceptable b. acceptable	acceptable to consumers and no abnormal	a. acceptable b. slightly brackish	a. acceptable b. slightly brackish	acceptable to consumers and no abnormal	acceptable to consumers and no abnormal
Color	organoleptic mg Pt/l	a. light gray b. light gray	colorless	a. v. light gray b. v. light gray	a. v. light gray b. v. light	colorless	colorless (0)
Temperature	°C	a.11 b.12	14	a.12 b.12	a.12 b.14	19	5 -17°C
Suspension	mg/l	a.349 b.320	429	a.450 b.500	a.322 b.280	235	800
pH	pH units	a.8,80 b.8,20	7,7	a.8,25 b.8,35	a.8,14 b.7,85	7,7	6,5 - 9,5
Turbidity	degrees SiO_2	a.24,99 b.24,40	0,7	a.3,39 b.3,50	a.3,23 b.3,42	0	≤ 5
Conductivity	μS	a.1219 b.1214	593	a.1261 b.1240	a.1243 b.1419	348	2500
Fixed residue	mg/l	a.780 b.810	429	a.807 b.840	a.796 b.620	235	800
IM_n	mg/l	a.6,11 b.6,20	5	a.7,08 b.7,40	a.8,47 b.8,40	5	5
NH_4^+	mg/l	a.3,11 b.3,20	6,000	a.3,15 b.3,11	a.2,83 b.2,59	0,051	0,50
Nitrate (NO_2^-)	mg/l	a.0,020 b.0,020	0,004	a.0,012 b.0,015	a.0,013 b.0,020	0	0,50
Nitrate (NO_3^-)	mg/l	a.4,44 b.5,00	0,455	a.23,22 b.24,10	a.8,67 b.8,80	2,082	50
Cl^-	mg/l	a.132 b.130	11	a.148 b.148	a.148 b.149	37	250
Ca^{2+}	mg/l	a.6 b.6	39	a.8 b.6	a.8 b.8	48	100
d_T	degrees Ge	a.1,33 b.1,29	11,96	a.1,11 b.1,19	a.1,14 b.1,11	8,40	20
O_2 dissolved	mg/l	a.10,3 b.11,2	1,26	a.8,70 b.8,50	a.7,88 b.8,20	7,20	6
PO_4^{3-}	mg/l	a.1,114 b.1,120	0,250	a.0,986 b.0,900	a.0,730 b.0,710	0,034	0,5

* a.31.03.09 b.14.04.09

Analysis organoleptics and physicochemical characteristics of water from three points of collection highlights some deviations from the standard indicators of drinking water [2], such as:

Water from well light-gray color compared to the requirement to be colorless

A.8 pH, 8 and B.8, 2 - compared to 7.7 allowed

turbidity a.24, 99 b.24, SiO₂-40 degrees compared to 0.7 allowed

A.6 permanganate index, 11, B.6, 20 mg/l - compared with 5 admitted

nitrogen a.0, 020, b.0, 020 compared with 0.004

upheld

Water level adapters

light-gray color compared to the requirement to be colorless

Suspension a.322, b.280 mg/l - compared to 235 admitted

pH a.8, 14 b.7, 85 - compared to 7.7 allowed

fixed residue a.796, b.620 mg/l compared to 235 admitted

nitrogen a.0, 013 b.0, 020,620 mg/l compared with 0 allowed

nitrogen a.8, 67 b.8, 80 compared with 2.082 upheld

CONCLUSIONS

Organoleptic and physico-chemical analysis showed that water from the power supply from the basin and not at adapters characteristics drinkability index allowed by law, but do not reach the accepted threshold of maximum allowable concentration.

Therefore, filtering water is recommended to improve physical and chemical characteristics, checking and possibly changing the waste pipes through which water, clean pool accumulation and eventually replace the basin floor (pelvic wall is concrete) with a neutral surface.

If these changes do not alter the biological value of water, finally recommended changing the water source.

REFERENCES

- [1] Specific procedures in determining the physico-chemical properties of water (Book Work Practice) - The Water Management Vaslui, 2007
- [2] Law. 458/2002 and Law no. 311/2004 Drinking water quality