

## THE INFLUENCE OF ACID PAK 4 -WAY ADDITION, ON TECHNOLOGICAL AND BIOCHEMICAL PARAMETERS AQUIRED AT BROILERS

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**Abstract.** The studies have been made on 41000 broiler chicks, divided in groups. The addition of Acid Pak 4 –Way via drinking water had as a purpose the achievement of superior rezults concerning the breeding and fattening the birds. Birds were weighed every week and monitored until the day of slaughter (40 days). The final average weight of the test group was with 118% greater than that of the control group. The daily weight gain reached 57g in comparison with the value recorded at controls ( 47,77g) and feed intake was lower. The test group had a superior uniformity and the mortality rate was reduced with 1.4%. Final rezult: more birds processed. The cost for the treatement days was 0,33 lei/chick, while the reward of the investment was 1,5 lei / chick. That is why, the use of this product is recommended from the first day.

### INTRODUCTION

The natural microflora of the meal serves at the inoculation of birds' digestive tract. The time and the way the feed is stocked up ( humidity, temperature, abundant nutrients ), allow a rapid multiplication of microbial cultures.

Usually, the pH of the crop decreases after swallowing, from neuter to 4,9. At this value, the acid producing organisms multiply competing with the microbes which better develop close to a neutral pH.

This essential process depends on the number of acid producing bacteria and their ability to compete. Organic acidifiers and lactic acid bacteria added to drinking water may quicken the decrease of the pH from the meal through direct effects on it, and by facilitating acid producing bacteria's growth and development.

### THE AIM OF THE STUDY

The purpose of adding Acid Pak 4- Way to drinking water is to bring pH below, preferably in the range of pH 3 to 3,5.

Acid Pak 4 –Way reduces water pH by means of an organic acid buffer (citric acid and sodium citrate). Reducing water pH aids the bird in bringing pH of crop contents down quickly into the range that favours activity of lactic acid producing organisms while discouraging pathogen growth.

## MATERIAL AND METHOD

The biological material was represented by 41,000 broilers belonging to Hybro PN hybrid, equally separated into two houses, having the same conditions concerning accommodation, attendance, environment, feed and water supplies.

The test group received Acid Pak 4-Way 2x via drinking water, without dextrose, at 0, 5 g/l during the first five days, then once a week until the day of slaughter. The control group received only fresh water.

Both groups have been monitored to record the chicks' behaviour, daily weight gain, feed intake, mortality rate and biochemical index values at sacrifice. There have been analysed water quality indicators by periodically taking samples.

Body weights were obtained by weighing the both groups of birds every week, after 12 hours fast.

The obtained data were statistically processed. The observations and determinations have been made through usual methods.

## RESULTS AND DISCUSSIONS

The purpose of using natural acidifiers, is to ensure the acid pH, which facilitates the lactic acid bacteria's multiplication in the crop, proventricullus, gizzard and intestine.

The electrolytes coming from acidifier, help at the water balance maintainance and the digestive enzymes in the product, supplement the ones secreted by the bird to optimize the digestion.

Water used in the farm has a raised ability to buffer the pH, which is 6,4 to 6,6. The great quantity of calcium and magnesium bicarbonates in water help that it's pH in a bird's crop to decrease very slow; The acidification is also made slow.

The high pH slows down the speed of metabolic process; to grow their intensity, it is recommended the use of some combinations ( acidifiers ).

Initially, the chicken's intestine is sterile; it gets the flora from the environment and through contact with the other birds.

The chickens bred in farms, do not have natural ways of exposure, so there cannot appear other organisms.

Acid pak 4-Way does not modify the balance of the electrolytes. Lactic acid producing bacteria, found in Acid Pak 4 way, are an alimentary source of favourable bacteria which have to exist in drinking water as soon as possible. The containing components are easily transformed into energy and the other components determine a quicker metabolization of the feed.

The quantity and the quality of the water, have a major role in breeding and fattening, that is why, table 1 presents water modification after adding Acid Pak 4-Way.

Table 1

Water indicators analysed with and without Acid Pak 4- Way

No.	Analyzed indicator	Obtained value		Analyzing method
		Fresh water	Fresh water +Acid Pak 4 W	
1	pH( pH units)	6.44	3.40	SR ISO 10523 /1997
2	Electric conductivity (ms/cm)	237.0	649.0	SR EN 27888/1997
3	Alkalinity /HCO <sub>3</sub> <sup>-</sup> (m vali/mg/l)	1.15/70	-	SR ISO 9963/1997
4	Total tartness / real tartness mvali/l	-	6.0/1.5	SR ISO 9963/1997
5	Total toughness °D	4.2	8.4	STAS 3026 /1976
6	Temporary toughness °D	3.22	-	STAS 3026 /1976
7	Permanent toughness °D	0.98	8.4	STAS 3026 /1976
8	Calcium(Ca 2+)mg/l	23.0	24.0	SR ISO 7980 /1997
9	Magnesium(Mg2+)mg/l	4.26	21.9	SR ISO 7980 /1997
10	Chlorides (Cl-) mg/l	24.8	213.0	SR ISO 9297 /2001
11	Sulfates (SO <sub>4</sub> <sup>2-</sup> ) mg/l	16.4	24.8	STAS 8601 /1970
12	Fluorides (F-)mg/l	0.0563	0.00996	SR ISO 10359/2001
13	Azotes(NO <sub>3</sub> <sup>-</sup> )mg/l	1.67	1.75	SR ISO 7890 /1996
14	Azotes(NO <sub>2</sub> <sup>-</sup> )mg/l	0.005	0.008	SR ISO 6777 /1996
15	Phosphates (PO <sub>4</sub> <sup>3-</sup> )mg/l	0.010	0.015	SR EN 1189 /2000
16	Sodium (Na+)mg/l	16.3	53.6	STAS 8295 /1969
17	Potassium (K+)mg/l	2.75	24.0	STAS 8295 /1969
18	OS (CCO-Mn)mg/l O <sub>2</sub>	2.3	232.0	SR EN ISO 8467/2001
19	Iron mg/l	0.456	2.75	SR ISO 6332/1996
20	Manganese mg/l	0.019	0.036	SR ISO 6333/1997
21	Zinc(Zn <sup>2+</sup> )mg/l	0.004	0.085	SR ISO 8288/2001

We can remark that pH decreases at 3.4. Electric conductivity is almost three times greater. Total toughness and permanent toughness are also doubled. There can be seen significant incresements at magnesium, chlorides, phosphates, sulfates, fluorides, sodium, potassium organical substances, iron, manganese, zinc, with favourable effects on the chickens' growth and development.

At 1-5 days, there can be seen a body weight raising tendency, of about 114 %, in comparison with the control group. During the experimental period, the weight difference was approximate 370g at the control group. Daily weight gain recorded at the test group was 57.0g, while the control group had 47.7g. There are significant differences concerning the feed intake; lower values were registered at the test group, in comparison with the control and also a diminution of morbidity and mortality rates (table 2) .

The test group had a quick start, a 2,8 % mortality rate and a weight uniformity in comparison with the control group which recorded 4,2% mortality rate. Body weight growing and high efficiency, bring down the price of the feed.

The biochemical index comparative estimation on groups is presented on tables 3, 4, 5, 6.

Total protein has almost the same values as the referring ones. A higher uric acid value recorded at the control group may indicate a uricolitical function disturbance.

Table 2

Technological parameters achieved at both groups

Age-days	Average weight(g)		Daily weight gain (g)		Feed intake kg/kg gain	
	Control	Test	Control	Test	Control	Test
0	39	40	-	-	-	-
7	140	160	14.42	17.14	1.03	0.90
14	351	395	22.28	25.35	1.24	1.11
21	725	780	32.66	35.23	1.33	1.34
28	1195	1270	41.28	43.92	1.49	1.44
35	1743	1820	48.68	50.85	1.63	1.59
40	1950	2320	47.77	57.00	1.90	1.75

Table 3

The proteic profile values recorded at broilers

Parameter	U/M	Group		Reference values
		Control	Test	
Total protein	g/dl	3.92	3.73	3.36
Uric acid	g/dl	8.91	4.10	5.05
Urea	g/dl	4.90	5.50	3.90

Table 4

The values of enzymatic profile recorded at chickens

Parameter	U/M	Group		Reference values
		Control	Test	
GOT	U/I	70	71	70
GPT	U/I	12	11	12
GGT	U/I	23	21	10
PA	U/I	580	570	620

These values do not outnumber the reference limits in literature of speciality.

Table 5

Energetical profile values recorded at broilers

	U/M	Group		Reference values
		Control	Test	
Glucose	U/I	194	205	130
Total lipids	U/I	650	645	620
Cholesterol	U/I	109	117	105
Triglycerides	U/I	70	60	60

The values found are characteristical for the reference values at broilers

Table 6

The values of mineral profile

Parameter	U/M	Group		Reference values
		Control	Test	
Calcium	mg/dl	8.10	8.65	8.8

Phosphor	mg/dl	2.15	2.35	6.9
Magnesium	mg/dl	0.81	0.93	1.8

## CONCLUSIONS AND RECOMMENDATIONS

1. Acid Pak 4 –Way added to drinking water favours : the feed acidification, the stabilization of acid producing bacteria cultures, the decrease of pathogen organism's ability to compete.
2. It ensures a better uniformity of the group.
3. It quickens the growth rate, the test group has a speedy start. The acidification of digestive duct raises the chicken's capacity to defend from pathogen germs by facilitating the lactic acid producing bacteria's multiplication.
4. It almost halves the mortality rate.
5. Acid Pak 4 – Way is recommended to be added to drinking water from the first day because it improves the maintainance of a specific intestinal environment during the accomodation period .

## BIBLIOGRAPHY

1. Adams, Charlie *Effect of AP 4W in drinking water on chick mortality days 1-7 and performance in commercial pullet and broiler units*. 1990., Alltech Inc.
2. Ciurdaru, V. ( 1997 ): *Biochemistry – Metabolic processes in animal organisms* , Blue Printing Press, Cluj-Napoca.
3. Gergariu, S. și col. ( 1985 ): : *Clinical veterinary laboratory guide*., Ceres Printing house, Bucharest.
4. Ghergariu, S. și Baba, A. I. (1990 ): : *Nutritional and metabolic pathology of animals*, Romanian Academy Printing house , Bucharest. Naoum, PC. ( 1990 ): *Electroforese técnicas e diagnosticos*, São Paulo: Santos.
5. HA, Jorgen *Performance of commercial broilers on a wheat-based diet given Acid-Pak 4-Way: Results of trials in Denmark*. 1989., National Association for Poultry.
6. Pârvu, G. ( 1992 ): *Nutritional metabolic surveillance of the animals*, Ceres Printing house, Bucharest.
7. Spano, JS. Și col. ( 1988 ): *Comparative albumin determinations in ducks, chickens, and turkeys by electrophoretic and dye-bindings methods*. *American Journal of Veterinary Research*.