



### STUDY OF MEASURABLE PARAMETERS OF BROILER WELFARE UNDER THE DIFFERENT ECOLOGICAL AND MAINTENANCE CONDITIONS (GEORGIA - TELETI; SWEDEN - SÖDERTÄLJE) USING WITH PHYTOADDITIVE (“VITLÖKSFLÖRTE”)

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#### ABSTRACT

The article discusses the ways of replacing synthetic antibiotics and stimulants with natural phyto-genetic supplements in accordance with the modern requirements of broiler welfare and the principle of unified health. For the study of the issue, the Swedish-made phyto additive “Vitlöksflörte” has been selected, which was tested in two different environmental and maintenance conditions, namely in Sweden

(Södertälje) and Georgia (Kvemo Kartli, Teleti). It has been studies Chick pulse, body temperature, heart rate, live weight gain at the age of 1, 14, 28 and 42 days. It has been studied also fresh meat yield of chicken. At the end of the study, microbiological studies of the raw chicken meat were carried out, in order to determine the food suitability of the obtained products. Based on the obtained materials, the conclusion has been made on the effectiveness of the phytoadditive (“Vitlöksflörte”) in both northern (Sweden- Södertälje) and dry subtropical air (Kvemo Kartli-Teleti) ecological zones.

**KEYWORDS:** Broiler, Welfare, Unified Health, Phytoadditive, Meat Productivity.

#### INTRODUCTION

The European Union is one of the largest producers of poultry meat in the world. About 6 billion chickens are raised for meat each year, resulting in 13.3 million tons of poultry meat is produced. Overall, poultry industry in the European Union, and broiler production more

specifically, is characterized by high intensification. Most birds are raised in conditions of high density, which negatively affects their welfare.

Selective breeding has traditionally focused on economic traits such as high growth rates, which lead to significant welfare problems. The welfare assessment consists of two components

- The negative impact of welfare on birds and humans, which are united in one principle of health;
- Assessing benefits by identifying positive welfare outcomes.

In the context of animal welfare assessment, the scientific literature on chicken welfare often refers to the chicken's behavioral needs and preferences (needs). These terms are defined by Rowe and Mullan (2022) and are used in medical terms. Behavioral needs are associated with behaviors that are an outgrowth of the natural repertoire and are primarily motivated by internal causal factors. Birds will attempt these behaviors even in the absence of the optimal environment or required resources.

Thus, the welfare of animals and birds can be considered as two main parameters:

- Non-measurable - includes behavioral characteristics (ethology);
- Measurable - directly related to the physiological health of the individual and his productivity.

Both parameters are very important for the principle of unified health, since a healthy animal gives a healthy product and directly affects human health.

Nowadays, world's leading countries refuse to use synthetic antibiotics or other growth stimulants in the animal and poultry feed. At the same time, it is necessary to produce high-quality food raw materials from the farm animals and birds and fill the ration with its staples depending on the human well-being.

Thus, the possibility of replacing synthetic antibiotics and other growth stimulants with natural and bio-components is actively being studied, for which one of the important directions is use of phyto-genetic resources.

## MATERIALS AND METHODS

Based on all of the above, we set out to study the effect of “Vitlöksflörte”, a phytoadditive manufactured in Sweden and used in the human food chain, in broiler nutrition instead of antibiotics and other synthetic stimulants. This phytoadditive has been selected for the purpose that since it is used in human nutrition based on the principle of unified health, it would be important to study its effect on raising animals, in our case broilers.

Based on the purpose of the research, it has been planned to study the effect of phytoadditive “Vitlöksflörte” on the growth - development, meat productivity and general health of broiler chicks.

Research methodology. Based on the research objectives, we studied the following parameters

1. Body temperature is one of the physiological parameters that should be evaluated during the continuous monitoring of broiler health. In this regard, cloacal thermometry is a standard method (DTt cloacal).

A standard veterinary digital thermometer DT has been used to measure temperature. The measurement range and DT resolution were 30.0-43.9°C and 0.1°C, respectively. Body temperature has been measured on the first day and then every 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> week, on 5-5 wings in each group.

Before taking the temperature, the bird was restrained (Nash, 1976) and then a thermometer was inserted approximately 2 cm deep into the cloaca, gently at a slight angle dorsal to the cloacal wall. The thermometer has been properly disinfected with isopropyl alcohol before taking the temperature in the free-ranging chicken to avoid cross-contamination and/or disease transmission.

2. The poultry weighing method has been developed according to the Aviagen guideline, which recommended manual weighing with an electric scale. Broiler chicks has been weighed at the same time in all groups, from three locations in each group. An electric balance (with an accuracy of  $\pm 1$  gram) has been used, which was regularly calibrated for accuracy and repeatability.

Weighing of 0-21 days was done by determining the single mass of broiler individually in each group.

From the 21<sup>st</sup> to the 28<sup>th</sup> day, it took place in each group with individual weighing.

Each time five wings were weighed in each group.

3. The pulse rate has been measured by the model proposed by E.W.HENDERSON and H.E.HATHAWAY.

4. Laboratory diagnostics has been carried out according to ISO 7218, which describes the methods of laboratory research in detail.

(<https://cdn.standards.iteh.ai/samples/36534/dd625da88e864144bda5bb7cb12037e7/ISO-7218-2007.pdf>)

Laboratory studies has been carried out using the following proven methods:

5. Pathogenic microorganisms, including Salmonella in 25 g of the product, ISO 6579-1:2017/2019

6. E.coli 1g; ISO 16649-1:2001

7. Aero. micro Col. <100 000; 8000 ; ISO 4933; 2013/15

## RESULT AND DISCUSSION

To conduct the research, 150 chicks has been separated into three equal groups: T control, T1 experimental and T2 experimental. All three groups were kept under identical maintenance conditions characteristic of the farm. In addition, T control received only on-farm feed, T1 experimental supplemented with 0.5% (11.76g/kg), and T2 experimental 1.5% (36.11g/kg) phytoadditive.

Research Results. Before moving on to the obtained research results, we would like to discuss the composition of the phytoadditive “Vitlöksflörte” that we used.

It is significant that garlic powder has a substantial share in the content of this phytoadditive and it is 43%. In addition, the phytoadditive contained basil, rosemary, oregano, thyme, lemon zest, the total amount of which was 23%.

To determine the dosage of the phytoadditive, we studied the studies conducted by other scientists. Since the phytoadditive used by us contains garlic powder to a significant extent, it was considered the leading component when selecting the dosage, and the dosage was selected accordingly.

We would like to point out that research on the use of useful plants in animal husbandry and poultry farming is being carried out all over the world. Among them, at the Georgian

Technical University, we are actively studying and using the country's endemic and aboriginal phylogenetic resource potential and ethnobotanical skills.

As can be seen from the results of the experiments, the unified health of the bird under observation has been satisfactory throughout the trial period. Table 1 data shows that the body temperature of the broiler in both climatic zones of the test was within the physiological norm and was 39 °C when the chick was hatched, and it was 41 °C in the later periods of the test.

**Table 1: Broiler Body Temperature (°C) in the Period of 1-42 Days.**

	Sweden			Georgia		
	T(control)	T1 (0.5%)	T2 (1.5%)	T(control)	T1 (0.5%)	T2 (1.5%)
1 day	39°C	39°C	39°C	39°C	39°C	39°C
14 days	41.1°C	41.1°C	41.1°C	41.1°C	41.1°C	41.1°C
28 days	41.1°C	41.1°C	41.1°C	41.1°C	41.1°C	41.1°C
42 days	41.1°C	41.1°C	41.1°C	41.1°C	41.1°C	41.1°C

The satisfactory health status of the broiler chicks under the test is also shown by their pulse and respiration rates, which are given in the Table 2.

**Table 2: Broiler pulse frequency by age and groups.**

	Sweden			Georgia		
	T(control)	T1 (0.5%)	T2(1.5%)	T(control)	T1 (0.5%)	T2(1.5%)
1 day	240 beats per second	240 beats per second	240 beats per second	240 beats per second	240 beats per second	240 beats per second
14 days	295 beats per second	295 beats per second	295 beats per second	295 beats per second	295 beats per second	295 beats per second
28 days	295 beats per second	295 beats per second	295 beats per second	295 beats per second	295 beats per second	295 beats per second
42 days	300 beats per second	300 beats per second	300 beats per second	300 beats per second	300 beats per second	300 beats per second

As can be seen from the obtained data in the both climatic zones, the pulse frequency of all test groups did not differ from each other. It was 240 beats per second at the age of 1 day. It has been increased with the age of individuals and by 42 days it was 300 beats per second, which is within the physiological norm.

As can be seen from the reviewed data, the unified health status of the broiler chicks in the trial has been quite satisfactory, which indicates their satisfactory welfare parameters and the presence of low stress factors.

As it is known, the welfare of animal directly determines on its productivity and the production of high-quality food raw materials, which is the primary task of the principle of unified health.

Since our task was to study the influence of different concentrations of the phytoadditive “Vitlöksflörte”, according to the principles of broiler welfare and unified health, it is very interesting to discuss the data on the growth and development of the test chicks and the variation in live weight.

As can be seen from the data in Table 3, during the entire observation period, in the results of the experiment conducted in Sweden and Georgia, T2 (1.5%) has been characterized by the highest data. Thus, at the age of 14 days in the control group in Södertälje (Sweden), the increase in live weight was 401, T1 (0.5%) – 372 and T2 (1.5%) – 407 grams. The same data for Teleti (Georgia) farm has been respectively: T - 508, T1 (0.5%) - 518 and T2 (1.5%) - 558 g. It should be noted that by 42 days, a significant increase in live weight has been observed in all groups. At the same time, the T2 (1.5%) experimental group prevailed over the others both in Södertälje and Teleti farm.

The live weight of 42-day-old broilers in Södertälje has been 46 g in the T1 (0.5%) group, and 374 g in the T2 (1.5%) group. It has been more than in the T control group. In the Teleti farm, the same data has been obtained in T1 (0.5%) group, 100, and T2 (1.5%) – 300 g.

Also, compared to the control group, the pre-slaughter live weight was higher. In Södertälje, in the T1 (0.5%) group it was 50, and in the T2 (1.5%) group - 374 g. reached. The same indicators has been in Teleti farm: 220 g in T1 (0.5%) group, and 450 g in T2 (1.5%), which we can consider a rather high indicator.

**Table 3: Live weight gain and meat productivity of broiler chicks.**

	Sweden			Georgia		
	T(control)	T1 (0.5%)	T2(1.5%)	T(control)	T1 (0.5%)	T2(1.5%)
	<b>Broiler body weight (g)</b>					
1 day	42	42	42	42	42	42
14 days	403	414	449	550	560	600
28 days	1230	1276	1268	1700	2000	2100
42 days	1946	1992	2320	2900	3000	3200
	Live weight before slaughter (g), 49 days					
	2436	2486	2810	3350	3570	3800
	Gain of the slaughtering					

	1776.81	1810.37	2049.61	2850	3000	3800
	Pure meat					
	1350.27	1375.77	1557.50	2500	2600	2700
	Offal					
	194.63	198.31	224.51	250	290	320
	Food offal					
	161.99	165.05	186.86	100	120	170
	Other (feathers, blood, dirt)					
	302.57	308.27	349.02	500	570	610

As Table 3 shows, a significant difference between the control and experimental groups was also revealed in the output of slaughter and pure meat. In Södertälje, this difference has been 33.56 in the T1 (0.5%) and 272.8 g in the T2 (1.5%). 150.0 g in the T1 (0.5%) group, and 950.0 g in the T2 (1.5%) group, respectively, in the Teleti farm.

As for the net yield of meat in the slaughterhouse compared to the control in the T1 (0.5%) group, 150.0, and T2 (1.5%) – 950.0 g. in Södertälje. In the Teleti farm, the same data has been obtained in T1 (0.5%) 100.0, and T2 (1.5%) – 200.0 g.

In order to evaluate the obtained productivity results, the welfare of the bird and the principle of unified health, study of some biochemical parameters of the research chicken slaughtering (raw chicken) has been conducted at the end of the study, which directly indicate the food suitability of the obtained raw chicken (Table 4).

**Table 4: Microbiological parameters of raw chicken meat (for all three groups).**

Study rate	Permissible norm	Result	Test method
Pathogenic microorganisms, including Salmonella in 25g of the product	Not allowed	Not found	GSM ISO 6579-1:2017/2019
E.coli 1g	Not allowed	Revealed	GSM ISO 16649-1:2001
Ammount of aero. micro col	<100 000	8000	GSM ISO 4933;2013/15

As can be seen from the data in Table 4, studied parameters corresponded to the norms established by ISO standards, which indicates the food suitability of the obtained raw materials.

## CONCLUSIONS

1. As can be seen from the above data, in both farms, despite the different climatic conditions, the effectiveness of the phytoaddition "Vitlöksflörte" has been quite high.

2. Physiological and laboratory studies have confirmed that the unified health of the broiler as a result of use of phytoadditive “Vitlöksflörte” from the beginning of the testing to its end was satisfactory, and the obtained data (body temperature, heart and pulse rate, blood serology and bacteriology) ranged within the physiological norm typical for birds.
3. Using the above-mentioned phytoadditive, relatively high growth intensity of broiler chicks has been observed, which is confirmed by the obtained data. At the same time, it has been more for the T2 (1.5%) test group at all stages.
4. Phytoadditive “Vitlöksflörte” had a positive effect on the meat productivity of broiler chickens, as indicated by their live weight before slaughter, slaughtered and pure meat yield. The obtained data show that compared to the control group, the rates of meat yielding has been higher in both experimental groups. This is especially noted in the T2 (1.5%) test group.
5. Use of phytoadditive “Vitlöksflörte” in the growth of broiler chicks has been shown to be highly effective, which is generally a prerequisite for the production of high-quality food raw materials and food under the conditions of using properly selected phytogenetic resource compositions. Also, the creation and wide use of such compositions is an important direction for the implementation of the principles of animal and bird welfare and unified health and modern requirements.

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