THE EFFECTS OF NATURAL BIOSTIMULANTS ON THE PRODUCTIVE PERFORMANCE OF BROILER CHICKENS

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Abstract

The study aimed to assess the effect of natural biostimulants on production indicators in broiler chickens fed with compound feeds of different qualitative characteristics. The research was conducted on 9,000 Ross-308 chicks, divided into two growth series (Series A - slow-growth feed; Series B - fast-growth feed); each series included a control group (without biostimulants), two groups supplemented with Esstence (8 ml/litre of water for 15 days), and two groups treated with Herba Safe (2 ml/litre of water for 10 days). In the control groups, the slaughter weights were 6.01-1.31% lower than those of the chicks treated with Herba Safe and 6.70-2.36% lower than those that received Esstence. The feed conversion ratio was 5.38-7.71% higher compared to the Herba Safe groups and 9.06-11.88% higher compared to the Esstence groups, while mortality rates were higher by 0.86% and 1.68-1.66%, respectively. The conclusion of the study was that the Esstence preparation, administered in the first 15 days of life (8 ml/litre), ensures the best performance in Ross-308 hybrids, regardless of the quality of the compound feeds used.

Key words: *biostimulants, broiler chicken, productive performance, health*

INTRODUCTION

Poultry meat production follows an upward trend worldwide, in line with the existing demand for this type of meat [1]. This situation has compelled the poultry sector to adopt the necessary measures to ensure timely production and in the required quantities of constant meat output [2, 3].

Bird productivity is influenced by a wide range of factors [4], but particular interest lies in the use of products with a biostimulant role [5], aimed at enhancing growth performance and improving feed conversion in broiler chickens [6, 7], as well as preserving their health status [8] and obtaining high-quality carcasses.

For instance, the effect of essential oregano oil and alpha-tocopheryl acetate on the performance and susceptibility of meat to lipid oxidation has been studied in broiler chickens [9]. Additionally, the effects of mixtures of plant extracts on performance parameters, carcass characteristics, and protein digestibility have been investigated [10], as well as the effects of Borago officinalis extract on growth rate and immune response [11].

Furthermore, the effect of dietary fructans on digestive indicators and performance parameters has been researched [12], along with the impact of Sauropus androgynus leaf extract on broilers fed low-protein diets [13]. The influence of fermented Ginkgo biloba leaves (FGBL) on serum biochemistry and antioxidant capacity has also been tested [14].

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There is also a viewpoint that the use of biostimulants may pose chemical or biological risks through the accumulation of heavy metals, mycotoxins, pesticides, endotoxins, and even antibiotics, as a result of the use of fertilizers on the crops from which the by-products are derived [15]. Moreover, phenomena of bacterial population adaptation to protective molecules in plant extracts have been identified, especially when used excessively, a phenomenon known as phytobiotic resistance [16].

The use of biostimulants in poultry requires the correct identification of active components (essential oils, organic acids, probiotics, etc.), knowing that some phytobiotic compounds can exhibit toxicity in excessive concentrations or in combinations that produce derivatives with high toxic potential, through interactions with certain intracellular metabolic pathways in the digestive system [17].

Based on the aforementioned points, this study aimed to evaluate the effects of certain natural preparations with a biostimulant role on the growth performance of broiler chickens.

MATERIAL AND METHOD

The research was conducted on Ross-308 chickens raised under production conditions, in identical-sized halls with the same technological equipment. The 9,000 chickens included in the study were divided into two growth series (4,500 chickens per series), with the first series receiving slow-growth feed (series A) and the second series receiving fast-growth feed (series B).

Each growth series was organized into three batches (1,500 chickens per batch), consisting of one control batch (A-M and B-M) and two experimental batches: one received the product Esstence (A-E and B-E), while the other received the product Herba Safe (A-HS and B-HS). The Esstence preparation was administered at a dose of 8.0 ml/liter of water during the first 15 days of the chickens' lives, while the dose of Herba Safe was 2.0 ml/liter of water, administered during the first 10 days of life.

Throughout the 42 days of growth of the studied chickens, several indicators were monitored, namely:

- *Body weight* - measured by individually weighing the chickens at stocking (one day old) and then every 7 days; weighing was conducted using an electronic scale in the morning, before feed administration.
- *Weight gain* - the difference between the weight of the chickens at the beginning of the period and that at the end of the period, reported per day of the period.
- *Mortality rate* - *daily* losses were accumulated for each week of the chickens' lives and reported to the initial stock for that week.
- *Feed consumption*—average daily consumption (g feed per head per day), total consumption (g feed per head for the period), and feed conversion index (g feed per kg weight gain) were calculated.
- *European Efficiency Index (EEI)* - according to the relationship:

$$IEE = \frac{\text{Viability (\%) x live weight (kg)}}{\text{Age (days) x Conversion Index (kg feed/kg gain)}} \times 100$$

- *European Broiler Index (IEB) - with the help of the formula:*

$$IEB = \frac{\text{Viability (\%) x average daily gain (g/chicken/day)}}{\text{Conversion index (kg feed/kg gain) x 10}} \times 100$$

RESULTS

Body Weight: At the time of slaughter, the body weight was lower in chickens from series A, specifically those *fed with slow-growth feed* (1,647.68 g in batch A-M; 1,758.05 g in batch A-E; 1,746.75 g in batch A-HS) and higher in those from series B, who received *fast-growth feed* (2,720.20 g in batch B-M; 2,784.28 g in batch B-E; 2,755.71 g in batch B-HS) (Tables 1 and 2).

Table 1 Dynamics of body weight in chickens from the A series (slow growth feed)

Age of chicken (days)	Standard weight (g)	Experience batch:		
		A-M	A-E	A-HS
1	42	40,07	40,08	40.05
7	185	128.44	135.57	131.35
14	473	316.82	342.27	334.94
21	916	511.77	559.95	552.24
28	1479	757.68	848.05	839.72
35	2113	1197.61	1298.07	1289.74
42	2768	1647.68	1758.05	1746.75

Table 2 Dynamics of body weight in chickens from the B series (fast growth feed)

Age of chicken (days)	Standard weight (g)	Experience batch:		
		B-M	B-E	B-HS
1	42	40.02	40.02	40.04
7	185	143.81	186.15	183.62
14	473	432.99	494.70	491.83
21	916	886.78	949.38	945.72
28	1479	1421.64	1484.38	1479.91
35	2113	2066.32	2129.60	2125.01
42	2768	2720.20	2784.28	2755.71

Weight Gain: Calculated for the entire studied period, the average daily gain ranged from 38.28 g per head per day (batch A-M) to 40.90 g per head per day (batch A-E) for the specimens fed with *slow-growth feed*, and between 63.81 g per head per day (batch B-M) and 65.34 g per head per day (batch B-E) for those receiving *fast-growth feed* (Tables 3 and 4).

Table 3 Dynamics of increased weight gain in chickens from the A series (slow growth feed)

Age range (days)	Specification	Experience batch:		
		A-M	A-E	A-HS
1-7	Initial weight (g)	40.07	40.08	40.05
	Final weight (g)	128.44	135.57	131.35
	A.D.G. (g/head/day)	*12.62*	*13.64*	*13.04*
7-14	Initial weight (g)	128.44	135.57	131.35
	Final weight (g)	316.82	342.27	334.94
	A.D.G. (g/head/day)	*26.91*	*29.53*	*29.08*
14-21	Initial weight (g)	316.82	342.27	334.94
	Final weight (g)	511.77	559.95	552.24
	A.D.G. (g/head/day)	*27.85*	*31.09*	*31.04*
21-28	Initial weight (g)	511.77	559.95	552.24
	Final weight (g)	757.68	848.05	839.72
	A.D.G. (g/head/day)	*35.13*	*41.16*	*41.07*
28-35	Initial weight (g)	757.68	848.05	839.72
	Final weight (g)	1197.61	1298.07	1289.74
	A.D.G. (g/head/day)	*62.85*	*64.29*	*64.29*
35-42	Initial weight (g)	1197.61	1298.07	1289.74
	Final weight (g)	1647.68	1758.05	1746.75
	A.D.G. (g/head/day)	*64.30*	*65.71*	*65.29*
1-42	Initial weight (g)	40.07	40.08	40.05
	Final weight (g)	1647.68	1758.05	1746.75
	A.D.G. (g/head/day)	***38.28***	***40.90***	***40.64***

Table 4 The dynamics of weight gain in chickens from the B series (fast growing feed)

Age range (days)	Specification	Experience batch:		
		B-M	B-E	B-HS
1-7	Initial weight (g)	40.02	40.02	40.04
	Final weight (g)	143.81	186.15	183.62
	A.D.G. (g/head/day)	*14.83*	*20.86*	*20.51*
7-14	Initial weight (g)	143.81	186.15	183.62
	Final weight (g)	432.99	494.70	491.83
	A.D.G. (g/head/day)	*41.31*	*44.08*	*44.03*
14-21	Initial weight (g)	432.99	494.70	491.83
	Final weight (g)	886.78	949.38	945.72
	A.D.G. (g/head/day)	*64.83*	*64.95*	*64.84*
21-28	Initial weight (g)	886.78	949.38	945.72
	Final weight (g)	1421.64	1484.38	1479.91
	A.D.G. (g/head/day)	*76.41*	*76.43*	*76.31*
28-35	Initial weight (g)	1421.64	1484.38	1479.91
	Final weight (g)	2066.32	2129.60	2125.01
	A.D.G. (g/head/day)	*92.10*	*92.17*	*92.16*
35-42	Initial weight (g)	2066.32	2129.60	2125.01
	Final weight (g)	2720.20	2784.28	2755.71
	A.D.G. (g/head/day)	*93.41*	*93.53*	*90.10*
1-42	Initial weight (g)	40.02	40.02	40.04
	Final weight (g)	2720.20	2784.28	2755.71
	A.D.G. (g/head/day)	***63.81***	***65.34***	***64.66***

3. Departures from the stock: The highest losses were observed in the chickens that did not receive biostimulators (4.73% in group A-M and 3.93% in group B-M), followed by those treated with Herba Safe (3.87% in group A-HS and 3.07% in group B-HS), and the chickens that were administered Esstence (3.05% in group A-E and 2.27% in group B-E) (Tables 5 and 6).

Table 5 Exits from the herd in chickens from the A series (slow growth feed)

Age range (days)	Specification	Experience batch:		
		A-M	A-E	A-HS
1-7	Initial flock (head)	1500	1500	1500
	Final flock (head)	1488	1491	1490
	Death chickens (head)	*12*	*9*	*10*
7-14	Initial flock (head)	1488	1491	1490
	Final flock (head)	1478	1486	1483
	Death chickens (head)	*10*	*5*	*7*
14-21	Initial flock (head)	1478	1486	1483
	Final flock (head)	1467	1480	1475
	Death chickens (head)	*11*	*6*	*8*
21-28	Initial flock (head)	1467	1480	1475
	Final flock (head)	1455	1472	1465
	Death chickens (head)	*12*	*8*	*10*
28-35	Initial flock (head)	1455	1472	1465
	Final flock (head)	1442	1463	1454
	Death chickens (head)	*13*	*9*	*11*
35-42	Initial flock (head)	1442	1463	1454
	Final flock (head)	1429	1451	1442
	Death rate (head)	*13*	*9*	*12*
1-42	Initial flock (head)	1500	1500	1500
	Final flock (head)	1429	1454	1442
	Death chickens (head/%)	***71 / 4.73***	***46 / 3.05***	***58 / 3.87***

Table 6 Exits from the herd for chickens in the B series (fast growth feed)

Age range (days)	Specification	Experience batch:		
		B-M	B-E	B-HS
1-7	Initial flock (head)	1500	1500	1500
	Final flock (head)	1490	1493	1492
	Death chickens (head)	*10*	*7*	*8*
7-14	Initial flock (head)	1490	1493	1492
	Final flock (head)	1480	1490	1487
	Death chickens (head)	*10*	*3*	*5*
14-21	Initial flock (head)	1480	1490	1487
	Final flock (head)	1472	1485	1480
	Death chickens (head)	*8*	*5*	*7*
21-28	Initial flock (head)	1472	1485	1480
	Final flock (head)	1463	1479	1472
	Death chickens (head)	*9*	*6*	*8*
28-35	Initial flock (head)	1463	1479	1472
	Final flock (head)	1453	1473	1464
	Death chickens (head)	*10*	*6*	*8*
35-42	Initial flock (head)	1453	1473	1464
	Final flock (head)	1441	1466	1454
	Death rate (head)	*12*	*7*	*10*
1-42	Initial flock (head)	1500	1500	1500
	Final flock (head)	1441	1466	1454
	Death chickens (head/%)	***59 / 3.93***	***34 / 2.27***	***46 / 3.07***

4. Feed consumption: For the chicks that received slow-growth feed, the total consumption ranged between 5140.17 g feed intake/head (group A-E) and 5312.96 g feed intake/head (group A-HS), whereas for those that benefited from rapid-growth feed, the limits were between 4986.32 g feed intake/head (group B-E) and 5526.53 g feed intake/head (group B-M) (Tables 7 and 8).

Table 7 Consumption of compound feeds in A-series chickens (slow growth feed)

Age range (weeks)	Batch	Average flock (head./week)	Combined fodder recipe	Total consumption (kg/week/batch)	Individual consumption	
					daily average (g/head)	cumulative (g/head)
1	A-M	1494.0	Starter	388.62	37.26	260.84
2		1483.0	Starter	729.89	70.31	753.04
3		1472.5	Growth	1045.59	101.44	1463.12
4		1461.0	Growth	1291.47	126.28	2347.11
5		1448.5	Growth	2110.44	208.14	3804.07
6		1435.5	Finishing	2131.69	212.14	**5289.04**
1	A-E	1495.5	Starter	428.89	40.96	286.75
2		1488.5	Starter	689.15	66.14	749.73
3		1483.0	Growth	996.99	96.04	1422.02
4		1476.0	Growth	1289.43	124.80	2295.63
5		1467.5	Growth	2037.34	198.33	3683.96
6		1457.0	Finishing	2121.70	208.03	**5140.17**
1	A-HS	1495.0	Starter	430.95	41.18	288.29
2		1486.5	Starter	692.90	66.59	754.42
3		1479.0	Growth	1020.91	98.61	1444.69
4		1470.0	Growth	1335.02	129.74	2352.87
5		1495.5	Growth	2146.36	205.03	3788.08
6		1448.0	Finishing	2208.03	217.84	**5312.96**

Table 8 Consumption of compound feeds in B-series chickens (fast growth feed)

Age range (weeks)	Batch	Average flock (head./week)	Combined fodder recipe	Total consumption (kg/week/batch)	Individual consumption	
					daily average (g/head)	daily average (g/head)
1	B-M	1495.0	Starter	458.16	43.78	306.44
2		1485.0	Starter	793.03	76.29	840.49
3		1476.0	Growth	1270.11	122.93	1701.02
4		1467.5	Growth	1610.93	156.82	2798.78
5		1458.0	Growth	1895.36	185.71	4098,73
6		1447.0	Finishing	2066.01	203.97	**5526.53**
1	B-E	1496.5	Starter	414.52	39.57	277.02
2		1491.5	Starter	726.45	69.58	764.05
3		1487.5	Growth	1167.66	112.14	1549.03
4		1482.0	Growth	1375.28	132.57	2477.02
5		1476.0	Growth	1800.76	174.29	3697.02
6		1469.5	Finishing	1894.67	184.19	**4986.32**
1	B-HS	1496.0	Starter	422.55	40.35	282.44
2		1489.5	Starter	730.17	70.03	772.65
3		1483.5	Growth	1189.65	114.56	1574.57
4		1476.0	Growth	1388.21	134.36	2515.09
5		1468.0	Growth	1877.63	182.72	3794.13
6		1459.0	Finishing	2004.40	196.26	**5167.92**

5. Feed conversion: The chicks in the control groups recorded the highest feed conversion ratios (3.290 kg feed intake/kg weight gain in series A and 2.062 kg feed intake/kg weight gain in series B), while those treated with Esstence had the lowest conversion ratios (2.992 kg feed intake/kg weight gain in series A and 1.817 kg feed intake/kg weight gain in series B) (Tables 9 and 10).

Table 9 Feed conversion index in A-series chicks (slow growth feed)

Batch	Period (days)	Individual consumption (g n.c./head/period)	Weight gain (g/head/period)	Conversion rate (kg n.c./kg gain)
A-M	1-14	753.04	276.75	2.721
	14-35	3051.03	880.79	3.464
	35-42	1484.97	450.07	3.299
	1-42	5289.04	1607.61	***3.290***
A-E	1-14	749.73	302.19	2.481
	14-35	2934.23	955.80	3.070
	35-42	1456.21	459.98	3.166
	1-42	5140.17	1717.97	***2.992***
A-HS	1-14	754.42	294.89	2.558
	14-35	3033.66	954.80	3.177
	35-42	1524.088	457.01	3.337
	1-42	5312.96	1706.70	***3.113***

Table 10 Feed conversion index in B-series chicks (fast growth feed)

Batch	Period (days)	Individual consumption (g n.c./head/period)	Weight gain (g/head/period)	Conversion rate (kg n.c./kg gain)
B-M	1-14	840.49	392.97	2.139
	14-35	3258.24	1633.33	1.995
	35-42	1427.80	653.88	2.184
	1-42	5526.53	2680.18	***2.062***
B-E	1-14	764.05	454.68	1.680
	14-35	2932.97	1634.90	1.794
	35-42	1289.30	654.68	1.969
	1-42	4986.32	2744.26	***1.817***
B-HS	1-14	772.65	451.79	1.710
	14-35	3021.48	1633.18	1.850
	35-42	1373.79	630.70	2.178
	1-42	5167.92	2715.67	***1.903***

6. European growth factors: In the groups where slow-growth feed was used, the European Efficiency Index showed values ranging from 113.6 points (group A-M) to 135.64 points (group A-E), while the European Broiler Index ranged from 110.85 points (A-M) to 132.53 points (A-E) (Tables 11 and 12).

Table 11 European Index of Efficiency in chickens from the A series (slow growth feed)

Specification	Experience batch:		
	A-M	A-E	A-HS
Viabilitaty (%)	95.27	96.95	96.13
Body weight (g)	1647.68	1758.05	1746.75
Age at slaughter (days)	42	42	42
Conversion index (kg d.c./kg gain)	3.290	2.992	3.113
European Efficiency Index	113.60	135.64	128.42

Table 12 European Broiler Index in chickens of the A series (slow growth feed)

Specification	Experience batch:		
	A-M	A-E	A-HS
Viabilitaty (%)	95.27	96.95	96.13
Average daily gain (g/head/day)	38.28	40.90	40.64
Conversion index (kg d.c./kg gain)	3.290	2.992	3.113
European Broiler Index	110.85	132.53	125.50

In the case of chicks fed with rapid-growth feed (series B), the calculated values for the European Efficiency Index (EEI) ranged from 301.77 points (group B-M) to 356.58 points (group B-E), while the values for the European Broiler Index (EBI) ranged from 297.30 points (B-M) to 351.44 points (B-E) (Tables 13 and 14)

Table 13 European Index of Efficiency in chickens from the B series (fast growing feed)

Specification	Experience batch:		
	B-M	B-E	B-HS
Viabilitaty (%)	96.07	97.73	96.93
Body weight (g)	2720.20	2784.28	2755.71
Age at slaughter (days)	42	42	42
Conversion index (kg d.c./kg gain)	2.062	1.817	1.903
European Efficiency Index	301.77	356.58	334.18

Table 14 European Broiler Index in B series chickens (fast growing feed)

Specification	Experience batch:		
	B-M	B-E	B-HS
Viabilitaty (%)	96.07	97.73	96.93
Average daily gain (g/head/day)	63.81	65.34	64.66
Conversion index (kg d.c./kg gain)	2.062	1.817	1.903
European Broiler Index	297.30	351.44	329.35

DISCUSSIONS

1. Dynamics of body weight: At the time of populating the hall where the chicks fed with slow-growth feed (series A) were housed, their initial weight was very similar (40.05-40.08 g). However, differences emerged later due to the type of biostimulator administered.

In the control group (A-M), the lowest body weights were observed: 316.82 g at 14 days old, 757.68 g at 28 days, and 1647.68 g on day 42. These were followed by the chicks that received 2.0 ml of Herba Safe/liter of water (group A-HS), with weights of 334.94 g, 839.72 g, and 1746.75 g, respectively. The best results were seen in the chicks that received 8.0 ml of Esstence (group A-E), whose body weights reached 342.27 g on day 14, 848.05 g on day 28, and 1758.05 g on day 42 (Table 1).

Administering rapid-growth feed (series B) resulted in higher body weights, although the chicks' initial weight was very similar to the previous series (40.02-40.04 g). In this regard, the chicks treated with Esstence (group B-E) stood out, achieving body weights of 494.70 g at 14 days old, 1484.38 g at 28 days, and 2784.28 g at 42 days.

Next were the chicks that received Herba Safe (group B-HS), with average weights of 491.83 g on day 14, 1479.91 g on day 28, and 2755.71 g on day 42, while the lowest weights were recorded in the control group (B-M), with weights of 432.99 g, 1421.64 g, and 2720.20 g, respectively (Table 2).

Administering biostimulators (neutral water; a compound based on probiotics and prebiotics; extracts from chicory, oregano, anise, seaweed, and milk thistle; essential oils of thymol, carvacrol, anethole, and limonene; a combination of organic and inorganic acids) to broiler chickens led to a body weight increase of 4-8% compared to the control group [18].

Arbor Acres chicks that received chestnut wood extract (standard diet + 1000 mg/kg) had a significantly higher final body weight ($P<0.05$) and daily weight gain ($P<0.05$) compared to the control chicks [19].

Using conventional feed in combination with probiotics (550 g/ton) allowed for a body weight of 2908.2 g at 42 days old [20].

Administering grape seed (5 g/kg) to Cobb 500 chicks resulted in significantly higher body weights ($P<0.01$) than the control group, even by the end of the first week of life [21].

2. Dynamics of weight gain: This productive indicator was influenced by both the quality of the feed administered during growth and the type of biostimulator used.

Using slow-growth feed (series A) led to the lowest weight gains, both weekly and over the entire period. For example, the chicks in the control group (A-M) recorded average daily gains ranging from 12.62 g/head/day (in the first week of life) to 64.30 g/head/day (in the last week).

Chicks that received Herba Safe (group A-HS) showed better average daily gains, ranging from 13.04 g/head/day (days 1-7) to 65.29 g/head/day (days 35-42). However, the best weight gains were seen in the chicks treated with Esstence (group A-E), with gains ranging from 13.64 g/head/day (days 1-7) to 65.71 g/head/day (days 35-42). Over the entire study period (1-42

days), the average daily gains were 38.28 g/head/day for the chicks in group A-M, 40.90 g/head/day for those in group A-E, and 40.64 g/head/day for those in group A-HS (Table 3).

As expected, the chicks that received rapid-growth feed (series B) achieved higher weight gains than those in the previous series. The group that received Esstence (group B-E) recorded the best results, both weekly, with gains between 20.86 g/head/day (week 1) and 93.53 g/head/day (week 6), and over the entire growth period, with an average of 65.34 g/head/day.

Chicks treated with Herba Safe (group B-HS) achieved average daily gains ranging from 20.51 g/head/day (days 1-7) to 90.10 g/head/day (days 35-42), resulting in an average gain of 64.66 g/head/day over the entire period.

The control group chicks (B-M) had weight gains ranging from 14.83 g/head/day (minimum) to 93.41 g/head/day (maximum), surpassing group B-HS in the last week of life. Over the total study period, the average daily gain in this group was 63.81 g/head/day (Table 4).

The effect of apilarnil on Ross-308 broiler chicks (4 g/head/day, during days 22-42) resulted in significant decreases in weight gain and feed consumption between days 29-35. However, the growth rate showed a significant increase during days 36-42 [22].

3. Exit rates from the population: The chicks in the study did not receive any medication during the growth period (except for the two mandatory PPA vaccinations), and thus, the obtained mortality rates can be considered very good, including those fed with slow-growth feed. The superior results in the experimental groups are a consequence of the curative effects generated by the administered preparations.

In the growth series where slow-growth feed was used (series A), the weekly number of dead chicks varied between 10 (week II) and 13 (weeks V and VI) in the control group (A-M), between 5 (week II) and 9 (weeks I, V, and VI) in the Esstence group (A-E), and between 7 (week II) and 12 (week VI) in the Herba Safe group (A-HS). The higher mortality in the first week of life was due to lower post-hatch viability, while the mortality in the last week was caused by heart issues in chicks with high body weights.

Over the entire study period (1-42 days), the mortality rate was 4.73% in the control group (71 dead chicks out of the initial 1500), 3.87% in the Herba Safe group (58 dead chicks), and 3.05% in the Esstence group (46 dead chicks) (Table 5).

Chicks fed with rapid-growth feed (series B) had a better survival rate, although mortality was still higher in the first and last week of life for the same reasons as described earlier. In the control group (B-M), the weekly number of chicks exiting the population ranged from 8 (days 14-21) to 12 (days 35-42), with a total of 59 dead chicks out of the initial 1500 (3.93% mortality).

In the Herba Safe group (B-HS), the number of dead chicks ranged from 5 (week II) to 10 (week VI), totaling 46 dead chicks (3.07% mortality). The best survival rate was recorded in the Esstence group (B-E), where the weekly exit rate ranged from 3 (week II) to 7 (weeks I and VI), resulting in a total of 34 dead chicks (2.27% mortality) (Table 6).

In a study that examined the influence of probiotics on the performance of chicks fed a three-phase diet, a mortality rate of only 1.912% was recorded [20].

4. Combined feed consumption: The amount of feed consumed followed an upward trend from one control week to the next, in line with the growing ingestion capacity of the chicks. However, there were differences between the series due to the quality of the feed administered.

In the case of the groups fed with slow-growth feed (series A), the highest feed

consumption was observed in the chicks without a biostimulator (group A-M). Their average daily consumption ranged between 37.26 g feed/head/day (week I) and 212.14 g feed/head/day (week VI), resulting in a total consumption of 5289.04 g feed/head.

Next were the chicks in group A-HS (Herba Safe), where the average daily consumption ranged from 41.18 g feed/head/day (first week) to 217.84 g feed/head/day (last week), with a total feed consumption of 5312.96 g feed/head.

The lowest average daily consumption was recorded in the chicks from group A-E (Esstence), with values between 40.96 g feed/head/day (week I) and 208.03 g feed/head/day (week VI), resulting in the lowest total combined feed consumption of 5140.17 g feed/head (Table 7).

The growth series in which rapid-growth feed was used (series B) was characterized by total feed consumption of 5526.53 g feed/head in the group without a biostimulator (group B-M), 4986.32 g feed/head in the Esstence-treated group (B-E), and 5167.92 g feed/head in the Herba Safe-treated group (B-HS).

Regarding the average daily consumption calculated across the weeks of life, the values recorded in the control group were the highest, ranging between 43.78 g feed/head/day (week I) and 203.97 g feed/head/day (week VI).

The situation was slightly better in the chicks from group B-HS (Herba Safe), with daily consumption values ranging from 40.35 g feed/head/day (week I) to 196.26 g feed/head/day (week VI). The lowest average daily consumption was observed in the chicks from group B-E (Esstence), with values ranging from 39.57 g feed/head/day (week I) to 184.19 g feed/head/day (week VI) (Table 8).

5. Feed conversion ratio (FCR): The quality of the administered feed influenced the growth rate and feed intake of the chicks, resulting in differences in the feed conversion ratio (FCR) between the growth series. Additionally, the digestive effects of certain components in the tested products positively impacted the utilization of the feed, leading to lower specific feed consumption compared to the chicks without biostimulators.

In the chicks fed with slow-growth feed (series A), the highest FCR was observed in the control group (3.290 kg feed/kg weight gain), compared to 3.113 kg feed/kg weight gain in the A-HS group (Herba Safe) and especially 2.992 kg feed/kg weight gain in the A-E group (Esstence) (Table 9).

In the chicks that received rapid-growth feed (series B), better FCR values were recorded, with 2.062 kg feed/kg weight gain in the control group and even better results in the experimental groups: 1.817 kg feed/kg weight gain in the Esstence group (B-E) and 1.903 kg feed/kg weight gain in the Herba Safe group (B-HS) (Table 10).

The use of probiotics (550 g/ton) in broiler chickens achieved a feed conversion ratio of 1596.98 g/kg [20]. Administering chestnut wood extract to Arbor Acres chicks resulted in a lower feed conversion ratio ($P < 0.05$) compared to chicks fed with antibiotics [19]. Cobb 500 chicks, which were administered grape seeds (5 and 10 g/kg feed) or grape pomace (20 g/kg feed), achieved a feed conversion ratio improvement of 1.78-2.11% compared to the control group [21].

6. European growth factors: The productive performance of the broiler chicks was influenced by both the quality of the feed administered and the type of biostimulator used. This resulted in notable differences in the global assessment of their productivity, as measured by European indicators, both between and within the two growth series.

As expected, the use of *slow-growth feed (series A)* led to relatively low scores for both European indicators used to assess broiler productivity. The European Efficiency Index (EEI) was 113.60 points in the control group (A-M, without biostimulator), 128.42 points in the A-HS group (Herba Safe), and 135.64 points in the A-E group (Esstence) (Table 11). The European Broiler Index (EBI) scored

110.85 points in the control group (A-M), 125.50 points in the A-HS group, and 132.53 points in the A-E group (Table 12).

In contrast, the administration of *rapid-growth feed (series B)* led to better productivity results than those in the previous series, leading to higher levels of both European growth factors. The European Efficiency Index reached 301.77 points in the control group (B-M), 334.18 points in the B-HS group (Herba Safe), and 356.58 points in the B-E group (Esstence) (Table 13). Similarly, the European Broiler Index values were 329.35 points in the B-M group, 329.35 points in the B-HS group, and 351.44 points in the B-E group (Table 14).

CONCLUSIONS

From the general analysis of the production performances of Ross-308 chickens treated with natural biostimulants (Esstence and Herba Safe), the following aspects emerged:

- *The slaughter* weights of the chickens in the control groups were 1647.68 g (slow growth feed) and 2720.20 g (fast growth feed), which were lower by 6.01-1.31% compared to chickens treated with Herba Safe and by 6.70-2.36% compared to those that received Esstence.
- *The average daily gain* was influenced by the quality of the feed administered, being only 38.28 g/head/day (slow growth feed) and 63.81 g/head/day (fast growth feed) in the control groups, values that were 6.17-1.33% lower than those that received Herba Safe and 6.84-2.40% lower compared to those treated with Esstence.
- *The weakest feed conversion rate* was observed in chickens without biostimulants (3.290 kg feed/kg gain in the slow growth feed series and 2.062 kg feed/kg gain in the fast growth feed series), while chickens treated with Herba Safe had a conversion rate that was 5.38-7.71% lower, and those receiving Esstence had a rate that was 9.06-11.88% lower.
- In the control groups, *mortality* was 4.73% in the slow growth feed series and 3.93% in the fast growth feed series. In both cases, this was higher by 0.86% compared to the mortality of chickens that received Herba Safe and by 1.68-1.66% compared to the situation in groups that used Esstence.
- *The analysis of the European indicators* for assessing meat production highlighted that the best performances were in the groups where chickens benefited from the Esstence preparation, regardless of the type of feed administered. The difference between these groups and those treated with Herba Safe was 5.32-6.28% for the European Efficiency Index and 5.30-6.29% for the European Broiler Index, while the difference compared to the control groups was 15.37-16.25% for the European Efficiency Index and 15.41-16.36% for the European Broiler Index.

The conclusion of this study was that the administration of the product Esstence to broiler chickens (8 ml/liter of water in the first 15 days of life) ensures good health of the flock and superior productive results, regardless of the quality of the combined feed used, and especially without the use of other veterinary preparations.

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