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THE COMBINED ADD EFFECTS OF FODDER ADDITIVES (YEA-SACC 1026+ACTIGEN) ON SOME PRODUCTION AND CONSUMPTION INDICES AND ON HEALTH STATUS IN CHICKEN BROILERS

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Abstract

The study followed the effects of combined add of fodder additives (YEA-SACC 1026+Actigen) on production and consumption indices and on health status in broiler chickens. The experiments were done on 50 Ross-308 broiler chickens, grouped in two lots, with 25 capita/lot and during 42 days. In the experimental lot, in the mixed fodder were added YEA-SACC 1026+Actigen in same proportion of 0.1%+0.08% in starter phase 1 (1-14 days), in production phase 2 (15-35 days) and in finishing phase 3 (36-42 days). For the control lot was used only mixed fodder. During the experiments were followed the average body weight, daily body gain and fodder consumption and conversion index, and for the health status were effected blood analyses.
The combined use of probiotic YEA-SACC 1026+prebiotic Actigen in experimental lot determined the increase of body weight with 20.45%, daily body gain with 13.78% and the decrease of fodder conversion index with 7.32% given to control lot. The blood index analysis for glutation peroxidase (GPx) was better in experimental lot with 100.76 U/ml HT given to control one with 74.42 U/ml Ht.

Key words: *meat broilers, YEA-SACC 1026+Actigen, blood indices, production performances.*

INTRODUCTION

Having in view that starting with January 2006, European Union interdicted the use of promoters, basis on antibiotics in farm animal fodder, it became necessary to find some alternatives (EC Regulation No. 1831 2003; De Jong et al., 2012).
Such promoter is the probiotic YEA-SACC 1026 with important role in increasing the fodder assimilation degree and its efficiency.
The living culture of *Saccharomyces cerevisiae* raised on yellow maize, malt and molasses, has subsequent composition: minimum 28% of pure protein, minimum 6% of pure fat, maximum 14% of pure fiber, maximum 8% of dry substance and contains minimum 5 millions of cells/gram. The increased concentration degree of product leads to a reduced daily administration dose, thus in meat chickens and generally in poultry, the administration dose is 1 kg/ton (Mohnl, 2011).
An extremely efficient prebiotic, basis on oligosaccharides, is represented by Actigen product of Alltech Company® from Kentucky (USA), obtained from the cellular walls of *Saccharomyces cerevisiae* yeast, cultured on a complex mixture of sugars. The effected studies on its action manner marked that prebiotic blocks the pathogen bacteria and has immune stimulating characteristics determining the reactivity increase of intestinal lymphocytes as transformation consequence of lymphoblasts and increasing phagocytosis capacity of blood white cells (Nawaz et al., 2016; Patterson and Burkholder, 2003).
Actigen is the second generation of unique bioactive fraction, derived from external cellular wall of a specific yeast strain, *Saccharomyces cerevisiae*, selected by Alltech Company®. Depending on targeted species, their age and selected protocol, the Actigen is included to a rate of 200 to 800 g/ton of poultry fodder.
Concerning the performances of this product, some researches (Paryad and Mahmoudi, 2008) observed that administration of probiotic YEA-SACC 1026 in different doses in meat chickens registered the best results in experimental lots as concerns the their body weight, fodder

conversion index and health status given to control lot.

Gheisari and Kholeghipour (2010), pursuant to living yeast administration in meat chickens (dose of 0.1%), obtained the best results for body weight (2780.87 g given to 2762.179 g), for average daily gain (55.93 g given to 55.57 g) and for fodder conversion index (1.82 given to 1.87) comparatively with the control lot and other experimental ones, in which the living yeast was administered in dose of 0.2% and 0.3%.

Another researchers as Gao et al. (2008), administrating living *Saccharomices cerevisiae* yeast in meat chickens (dose of 2.5%) obtained the best result concerning the body weight (2459 g given to 2378 g in control lot), average daily gain (57.5 g given to 55.6 g in control lot) and fodder conversion index (1.95 given to 2.03 in control lot).

The aim of our study was to follow the effects of combined add of some fodder additives (YEA-SACC 1026+Actigen) on production and consumption indices and on health status expressed by blood indices in chicken broilers.

MATERIALS AND METHODS

The researches was effected during September and October 2016 in the Biobasis of Poultry Farming Discipline from Department 2-Technological Sciences, Faculty of Animal Science and Biotechnologies, UASVM Cluj-Napoca, on a number of 50 meat chickens of (Ross-308 hybrids). Ross-308 is a tetralinear hybrid, created by Ross Breeders Company® from United Kingdom (www.aviagen.com), it is a pretentious hybrid as concerns the fodder quality, but is less pretentious for microclimate conditions (Van et al., 2010). The chickens were distributed in two lots of 25 capita/lot during a time period of 42 days. For the control lot L(M) was administered simple combined fodder having the same protein level as for experimental lot L1(E). The administered combined fodder provided 3030 kcal ME/kg in the first phase, 3134.8 kcal ME/kg in the second phase and 3144 kcal ME/kg in the finishing one. As concerns the level of crude protein, it was of 22.76% in the first phase, 21.31% in the second phase and 19.94% in the finishing one, providing a good biological value according to fodder energetic level.

During 42 days, in lot L1(E) was added in combined fodder the probiotic **YEA-SACC 1026+Actigen** in proportion of 0.1%+0.08% in starter phase 1 (1-14 days), in proportion of 0.1%+0.08% in production phase 2 (15-35 days) and 0.1%+0.08% in finishing phase 3 (36-42 days). The fodder and water were *ad libitum*.

For the control lot L(M) was used only mixed fodder. The chicken broilers benefited of the same breeding system and identical microclimate and feeding conditions. The experiment was done having into consideration all attendance and feeding rules specific for Ross-308 hybrid (www.aviagen.com).

During the experiment period, no vaccines or medication were done.

The chickens of two lots were weighed at the experiment start and further weekly, having in view the body weight, daily gain, fodder consumption and fodder conversion index.

After 42 days, from each lot were collected 5 blood samples for health status parameters' analysis. The blood analyses were effected with Spectrofotometer UV-VIS Screen Master Touch (Medical Lab of Veterinary Medicine Faculty). The experimental data were statistically analyzed with Student test by GraphPad InStat ver.3.10 program.

RESULTS AND DISCUSSIONS

The average values and variability of ***body weight*** in meat broilers on ***starter phase 1*** (1-14 days) are presented in Table 1.

Table 1. Average values and variability of body weight in broiler chickens on starter phase 1 (1-14 days) (g/capita)

Age (days)	L(M) n=25		L1(E) n=25 YEA-SACC 1026 0.1% +Actigen 0.08%	
	$X \pm S_x$	V%	$X \pm S_x$	V%
1 day	44.64±0.58	6.58	44.52±0.58	6.60
7 days	152.20±3.27	9.55	165.40**±3.54	10.13
14 days	363.60±12.82	11.62	473.32***±12.98	13.71

X=average; s_x=standard error of average; V%=variation coefficient;
*p<0.05 significant differences;
**p<0.01 distinct significant differences;
***p<0.001 very significant differences

Analyzing the data presented in Table 1 comes out that there are not significant differences for body weight between the lots at age of 1 day old of broiler chickens. At 7 day from the beginning, were observed distinct significant values (165.40±3.54 g given to 152.20±3.27 g), but at 14 days between broiler lots appear very significant differences (473.32±12.98 g given to 363.60±12.82 g). Sarangi et al. (2016) reported at 14 days a body average weight of 422.43±4.46 g in Vencobb broiler chickens fed with basal diet and probiotic 100g/ton and 404.79±5.30 g in Vencobb broiler chickens fed with basal diet and prebiotic 400 g/ton.

The ***body weight gain*** realized in ***starter phase 1*** (1-14 days) is presented in Table 2.

Table 2. Evolution of average gain on starter phase 1 (1-14 days)

Age (days)		UM	L(M) n=25	L1(E) n=25 YEA-SACC 1026 0.1% +Actigen 0.08%
Phase 1 (1-14 days)	At 7 days	g	107.56	120.88
		%	100	112,38
	At 14 days	g	211.40	269.04
		%	100	127.26

The average gain difference, realized during 14 days, was greater in experimental lot given to control one, in L1(E) being observed after the phase 1 a difference of 9.18% given to L(M). These obtained values were greater than those of Saiyed et al. (2015), which reported at 7 days only 110.10±3.62 g in experimental lots fed with basal diet and probiotic 100g/ton and only 103.74±3.06 g in broilers fed with basal diet and probiotic 50 g/ton+prebiotic 250 g/ton.

Related to ***body weight average values and variability*** in broiler chickens, obtained on ***production phase 2*** (15-35 days), there are presented in Table 3.

Table 3. Body weight average values and variability in broiler chickens during production phase 2 (15-35 days) (g/capita)

Age (days)	L(M) n=25		L1(E) n=25 YEA-SACC 1026 0.1% +Actigen 0.08%	
	$X \pm S_x$	V%	$X \pm S_x$	V%
At 14 days	363.60±12.82	11.62	473.32***±12.98	13.71
At 21 days	644.80±17.62	13.66	787.96***±23.84	15.12
At 28 days	1039.64±23.29	11.20	1255.60***±36.53	14.54
At 35 days	1483.84±65.17	14.62	1882.72***±44.91	11.92

X=average; s_x=standard error of average; V%=variation coefficient; *p<0.05 significant differences; **p<0.01 distinct significant differences; ***p<0.001 very significant differences

From this table data, it can be observed that at 28 days there are distinct significant differences between lots L1(E) and L(M).

Comparing with our data, Sarangi et al. (2016) obtained at 21 days only 698.86±8.98 g in Vencobb broilers fed with basal diet and probiotic 100g/ton that means with 11.30% more reduced values.

The ***average body weight gain*** realized in this production phase is presented in Table 4.

Table 4. Evolution of average gain on production phase 2

Age (days)		UM	L(M) n=25	L1(E) n=25 YEA-SACC 1026 0.1%+Actigen 0.08%
Phase 2 (15-35 days)	At 21 days	g	281.2	307.92
		%	100	109.50
	At 28 days	g	394.84	467.64
		%	100	118.43
	At 35 days	g	444.2	627.12
		%	100	141.17

From these data can be observed that in lot L1(E) was an increase of average body weight gain until 28 days with +18.43%, and at 35 days with +41.17% given to lot L(M).

Saiyed et al. (2015) obtained at 35 days only 515.35±7.23 g in broiler chickens fed with basal diet and probiotic 100 g/ton+prebiotic 500 g/ton.

In the ***finishing phase 3***, from 36 days to 42 days, the evolution of ***average body weight*** is presented in Table 5.

Table 5. Body weight average values and variability in broiler chickens on finishing phase 3 (36-42 days)

Age (days)	L(M) n=25		L1(E) n=25 YEA-SACC 1026 0.1% +Actigen 0.08%	
	$X \pm S_x$	V%	$X \pm S_x$	V%
At 35 days	1483.84±65.17	14.62	1882.72***±44.91	11.92
At 42 days	2070.84±30.47	7.35	2494.4***±22.41	4.49

X=average; s_x=standard error of average; V%=variation coefficient;
*p<0.05 significant differences;
**p<0.01 distinct significant differences;
***p<0.001 very significant differences

From the presented data, there are observed that differences values are very significant between the experimental and control lots, and these values are greater than those reported by Sarangi et al. (2016) at 42 days of 1726.30±25.46 g in broilers fed with basal diet and probiotic 50 g/ton.

The very significant differences during finishing phase 3 could have as cause that from fodder composition was eliminated “the coccidiostatic” and replaced with the probiotic and prebiotic additives.

As concerns the ***body weight gain on finishing phase 3***, the obtained data are presented in Table 6.

Table 6. Evolution of average gain on finishing phase 3 (35-42 days)

Age (days		UM	L(M) n=25	L1(E) n=25 YEA-SACC 1026 0.1% +Actigen 0.08%
Phase 3 (35-42 days)	At 35 days	g	444.2	627.12
		%	100	141.17
	At 42 days	g	587	611.68
		%	100	104.20

From the table data can be observed that during finishing phase 3 the average body weight gain in experimental lot L1(E) was greater with +4.20% given to control lot L(M). Saiyed et al. (2015) reported at 42 days values of 499.40±21.42 g when the broilers were fed with basal diet and probiotic 100 g/ton +prebiotic 500g/ton and 535.58±4.00 g when the broilers were fed with basal diet and prebiotic 500 g/ton.

As concerns the ***average fodder consumption*** during the experiment, the data are presented in Table 7.

Table 7. Evolution of fodder consumption in broiler chickens' lots during the study (1-42 days)

Age (days)		UM	L(M) n=25	L1(E) n=25 YEA-SACC 1026 0.1%+Actigen 0.08%
Starter phase 1 (1-14 days)	At 7 days	g	34.03	36.28
	At 14 days	g	36.05	37.77
	Average consumption phase 1	g	35.04	37.25
Production phase 2 (15-35 days)	At 21 days	g	63.15	68.96
	At 28 days	g	116.22	122.14
	At 35 days	g	159.55	149.75
	Average consumption phase 2	g	112.97	113.61
Finishing phase 3 (36-42 days)	At 42 days	g	188.71	199.62
Average daily consumption on entire period	Average consumption/ day/capita	g	X± 99.61±	102.42±
			s_x 24.37	26.92
			s 59.43	67.25

X=average; s_x=standard error of average; s=standard deviation

From the presented data can be observed that even the average fodder consumption in experimental lot was greater than control one, there not existed statistical differences between the two lots. Compared to our data, Saiyed et al. (2015) reported more reduces values on entire period of 83.80±1.21 g/bird/day in broiler lots fed with basal diet and probiotic 100 g/ton+prebiotic 500 g/ton.

The ***fodder conversion index*** data during the experimental period are presented in Table 8.

Table 8. Evolution of fodder conversion index during entire experimental period

Age (days)	UM	L(M) n=25	L1(E) n=25 YEA-SACC 1026 0.1% +Actigen 0.08%
Phase 1 (1-14 days)	Kg/Kg	1.53	1.33
		100	86.92
Phase 2 (15-35 days)	Kg/Kg	2.11	1.70
		100	80.56
Phase 3 (36-42 days)	Kg/Kg	2.25	2.28
		100	101.33
Final average on entire period	Kg/Kg	1.96	1.77
	%	100	90.30

The fodder conversion index was reduced with –9.70% in experimental lot L1(E) given to control one L(M). The analysis of these fodder conversion indices explain the efficiency of probiotic **YEA-SACC 1026** combined with prebiotic ***Actigen***, resulting that they reduced the index value in experimental lot given to control one. Sarangi et al. (2016) reported on entire period (0-42 days) an average value of 1.72±0.02 in broiler lots fed with basal diet and probiotic 100/50 g/ton, and Gheisari and Kholeghipour (2010) reported an average value of 1.87 in broilers fed with basal diet and prebiotic 0.3% powder of *Saccharomices cerevisiae*.

As concerns the ***health status***, expressed by blood indices GPx (glutation peroxidase), Hct (hematocrit), Hb (hemoglobin) and Ery (erythrocytes), the obtained results were different for the two studied lots.

The obtained ***GPx*** values are presented in Table 9.

Table 9. Values of GPx U/ml Ht (glutation peroxidase)

Samples	L(M) n=5	L3(E) n=5 YEA-SACC 1026 0.1% +Actigen 0.08%
1	72.4	96.7
2	70.9	100.00
3	75.61	90.3
4	75.61	112.1
5	77.6	104.7
X±s_x	74.42±1.21	100.76±3.67
S	2.71	8.22
V(%)	3.64	8.15

X=average; s_x=standard error of average; s=standard deviation; V%=variation coefficient.

For this index, were not observed statistical differences between the two lots, but analyzing these values (GPx) comparing with those ones obtained by other authors (Anderson et al., 1978; Ammerman et al., 1980) cited by

Ashayerizadeh et al. (2009), there were proper in lot L1(E) (Yea Sacc 1026) with 100.76 U/ml Ht (maximum value permitted of 144.74 U/ml Ht) and reduced in control lot L(M) with values of 74.42 U/ml Ht.

In this way, comes out that prebiotic and probiotic had positive influence on health status of broiler chickens.

The values of ***blood count*** (Hct, Hb, Ery) are presented in Table 10.

Table 10. Values of blood count (Hct-%, Hb-g/dl, Ery-mill/mm^3)

Specification	UM	Parameters	L(M)	L1(E)
		n	5	5
Hct	%	$X \pm s_x$	28.88±0.52	29.8±0.72
		S	1.16	1.62
		V%	4.01	5.43
Hb	g/dl	$X \pm s_x$	9.93±0.24	9.93±0.17
		S	0.55	0.17
		V%	5.53	1.71
Ery	millions/mm^3	$X \pm s_x$	2.42±0.11	2.21±0.16
		S	0.26	0.23
		V%	10.74	10.40

X=average; s_x=standard error of average; s=standard deviation; V%=variation coefficient.

Citing the specialty literature, in meat broiler chickens the normal blood count values are: Hct-% is between 25.7 and 31.5%; Hb-g/dl is between 7.65 and 10.6 g/dl; Ery-mill/mm^3 is between 1.7 and 2.7 mill/mm^3 (Ashayerizadeh et al., 2009). From our data comes out that these values are inside the normal limit parameters.

CONCLUSIONS

1. After we presented the obtained data comes out that the use of probiotic YEA-SACC 1026 combined with Actigen in fodder of broiler chickens determined a substantial improvement of production and consumption indices.
2. The body weight at 42 days in experimental lot L1(E) was superior with 20.45% given to control lot L(M).
3. The average daily gain on entire experimental period was superior in experimental lot L1(E) with 18.82% given to control lot L(M).
4. Even the fodder consumption was greater with 2.81% in experimental lot L1(E) given to control one L(M), the fodder conversion index was more reduced with 9.70% in experimental lot L1(E) than in control one L(M).
5. The health status was positively influenced in experimental lot and the values of blood count were in normal parameters.
6. The use of probiotic YEA-SACC 1026 combined with prebiotic Actigen in broiler chickens' fodder with the two mentioned doses is recommended because they have positive effects on all production indices and also on health status.

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