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Effect of probiotic Vebac on the growth of broilers

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ABSTRACT

Eighty Avian 24K broilers were randomly divided in 2 groups, 40 birds each. Each group had 4 subgroups of 10 birds. First group was control (without VEBAC in drinking water), while second was experimental (with addition of VEBAC - 3 g/100 l water). Average live weights of Avian 24K chicken in age of 42 days were for 10.8% higher in 2nd group (3 g/100 l VEBAC) compared to the 1st group without probiotic in drinking water (2.19 kg : 1.96 kg; P<0.01). Growth curve showed that addition of VEBAC in drinking water enhances progressive stage of growth.

$1^{st}\ group \quad y = \frac{4000}{(1 + 0.04695 \cdot e^{-31.12577 \cdot 0.01t})^{1/0.01}}$; $2^{nd}\ group \quad y = \frac{4000}{(1 + 0.04952 \cdot e^{-34.53264 \cdot 0.01t})^{1/0.01}}$

Probiotic addition resulted in more efficient conversion of food into live weight gain of chicken for 6.44% in 2nd group of chicken compared to the 1st group. Addition of VEBAC in drinking water had positive effect on performances of broilers. Usage of VEBAC shortened fattening for 0,6 weeks.

(Keywords: broiler, probiotic, growth, feed conversion)

ZUSAMMENFASSUNG

Der Effekt von Probiotikum VEBAC auf das Wachstum von Broilern

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Achtzig Avian 24K Hühner wurden zufällig in 2 Gruppen mit jeweils 40 Hühnern aufgeteilt. In jeder Gruppe gab es 4 Untergruppen mit je 10 Hühnern. Die erste Hühnergruppe bildete die Kontrollgruppe (ohne VEBAC im Trinkwasser), die zweite Hühnergruppe war die Behandlungsgruppe (mit VEBAC Zusatz 3g/100 L Wasser). Das Durchschnittsgewicht der behandelten Avian 24K Broilern im Alter von 42 Tagen war 10,8% höher im Vergleich zur Kontrollgruppe. Die Wachstumskurve zeigt, daß man durch VEBAC Zusatz im Trinkwasser ein progressives Wachstum erreicht.

1. Gruppe $y = \frac{4000}{(1 + 0.04695 \cdot e^{-31.12577 \cdot 0.01t})^{1/0.01}}$; *2. Gruppe* $y = \frac{4000}{(1 + 0.04952 \cdot e^{-34.53264 \cdot 0.01t})^{1/0.01}}$

Das Ergebnis des Probiotikum-Zusatzes bei Hühnern ist eine bessere Futterumsetzung in Lebendgewicht, das dadurch 6,44% höher war als in der Kontrollgruppe. Dem Trinkwasser zugegebenes VEBAC hatte also einen positiven Effekt auf die Entwicklung der Broiler und verkürzte die Mastzeit um 0,6 Wochen.

(Schlüsselwörter: Broiler, Probiotik, Wachstum, Futterkonversion)

INTRODUCTION

In intensive conditions of poultry rearing, different additives are often used in feeding. Useful effect on productivity, health of animals and humans as well as their economical effect have to be considered before decision on their usage is made. The usage of additives in animal nutrition is primarily aimed on the elimination of pathogenic microbes such as Salmonella, Clostridium, Campylobacter, Yersinia and Escherichia coli; all present in digestive tract of animals. Researches of *Hinton et al.* (1991), *Nuoti et al.* (1992), *Corrier et al.* (1992), *Cox et al.* (1992) and *Schnitetz* and *Nuoti* (1992) proved that colonization of salmonella servor was significantly lowered by usage of different probiotic microflora. *Kumprecht at al.* (1983) investigated effect of probiotic Streptococcus faecium M-74 on gain, consumption of feed, content of lactic bacteria and Escherichia coli in intestine himus. After 49 days of fattening live weight of the chicken in experimental group was higher for 49 g or 3.05% than in control. Feed conversion for 1 kg of gain was 2.35 kg in control group while 2.38 kg in experimental. Authors stated that Streptococcus faecium M-74 significantly influenced increase in number of Lactobacilus streptococcus and decrease of Escherichia coli in content of intestines. By this fact was explained better gain of chicken in experimental group. On the basis of the research *Kumprecht et al.* (1984) found that addition of bacteria Streptococcus faecium M-74 in the diet for chicken cellulolitic enzymes were activated which resulted in higher gain and better utilization of food. Authors also found that content of lactic acid in intestinal himus of experimental group of chicken was for 34.8% higher than in control group fed diet without probiotic K*oudela* (1995) investigated influence of Ecovit preparation (which contains Enterococcus faecium M-74) in feeding diets for Japanese quail on gain, laying intensity, egg weight and content of hemoglobin in erythrocytes. Added preparation significantly influenced increase of gain for 17% and enhancement of feed conversion efficiency for 9% compared to control group. According to this author Japanese quail laid 10.69% heavier eggs, and laying intensity was 94% compared to control group. It is important to emphasize that addition of this probiotic in the diet reduced hemoglobin content in erythrocytes for 43.8% compared to control. *Kumprecht et al.* (1994b) researched influence of different probiotics on gain and feed conversion efficiency. Chicken from 1st group were fed diet with addition of yeast Saccharomyces cerevisiae var. ovalis, in 2nd experimental group in the diet was added Streptococcus faecium M-74, while chicken from 3rd group were given equal amount of Saccharomyces cerevisiae var. ovalis and Streptococcus faecium M-74. Authors found that chicken from experimental groups were 5% heavier at the end of the fattening while feed conversion efficiency was 7% better. *Koudela* (1995) investigated application of probiotic preparation Lactiferem (with Streptococcus faecium M-74) in production conditions on 127,043 laying hens and 155,538 broilers. Feed consumption per egg was lower for 12.60 g in groups with probiotic addition than in control group. Egg quality indicators in control groups showed higher total weight, heavier and firmer shell and heavier yolk and albumen. Comparing the results of the research in broilers author found that addition of probiotics yield in feed saving of 70.9 g per kg of gain.

MATERIALS AND METHODS

Eighty Avian 24K broilers were randomly divided in 2 groups, 40 birds each. Each group had 4 subgroups of 10 birds. First group was control (without VEBAC in drinking

water), while second was experimental (with addition of VEBAC - 3 g/100 l water). From the first until 21st day of the experiment chicken were fed ST_1 starter diet containing 22.18% crude proteins and 12.30 MJ/kg ME; and from 22nd until 42nd day the chicken were fed ST_2 diet containing 18.66% crude protein and 12.10 MJ/kg ME.

Each week chicken were individualy weighted. Feed consumption and feed conversion into live weight are shown per weeks of fattening and for total fattening duration. Estimation of inflection point and separate growth stages were performed by asymetric S-function (*Kralik* and *Scitovski*, 1993) using following formulas:

$$f(t) = \frac{A}{(1+be^{-c\gamma t})^{1/\gamma}}, \quad \text{A}, \qquad \gamma>0$$

$$t_B = \frac{1}{c\gamma}\ln\frac{2b}{\gamma(\gamma+3)+\gamma\sqrt{(\gamma+1)(\gamma+5)}}$$

$$t_C = \frac{1}{c\gamma}\ln\frac{2b}{\gamma(\gamma+3)-\gamma\sqrt{(\gamma+1)(\gamma+5)}}$$

Asymetric S-function with one inflection point is strictly increasing in the whole range of definition. Parameters of this function b and c are defined on the basis of experimental data by least squares method while biological maximum A and asymetry coefficient are predetermined on the basis of experience. Point B is maximal point in region of intensive growth (convex region) while C is point of minimum in region of depressive growth (concave region). Interval $t \leq t_B$ is stage of forming the growth, interval $t_B \leq t \leq t_C$ is the stage of intensive growth and interval $t \geq t_C$ is the stage of growth retardation (*Scitovski*, 1993).

RESULTS

It is obvious from *Table 1* that chicken with VEBAC added in drinking water had higher average live weights than chicken from 1st group, without probiotics in drinking water, during whole fattening period. Chicken from 2nd had 15 g, 44 g, 127 g, 163 g and 212 g higher average weight in period from 2nd to 6th week compared to chicken from 1st group. Differences in reached live weights between 1st and 2nd group of chicken were statistically highly significant ($P<0.01$).

Live weights of chicken from 2nd group with probiotic in drinking water are in accordance with results found by *Kumprecht et al.* (1991, 1994a, b) and *Kumprecht* and *Zoba~* (1992), which confirms that addition of probiotics during fattening enhances performances of broilers. While stated authors pointed out that it is possible to reach live weights higher for 3.4%-6.3% by usage of antibiotics in fattening, in our research enhancement of live weights at the end of 6th week was 10.8%.

Correlation between age and average live weights in chicken involved in the research are expressed as correlation and regression coefficients (*Table 2*). Results show that there is very high, positive and very significant ($P<0.01$) correlation between examined fattening indicators.

Table 1

Average weights of chicken in fattening

Age (weeks)(1)	Statistical Parameters (2)	Groups of chicken(3)		Significance of differences(4)
		1st	2nd	1st : 2nd
1st day	$\bar{x}$	43	43	n.s.
	s	0.68	0.49	
1st	$\bar{x}$	133	136	n.s.
	s	4.79	3.72	
2nd	$\bar{x}$	344	359	**
	s	3.60	5.19	
3rd	$\bar{x}$	642	686	**
	s	16.01	12.79	
4th	$\bar{x}$	1042	1169	**
	s	29.92	19.50	
5th	$\bar{x}$	1477	1640	**
	s	25.22	30.06	
6th	$\bar{x}$	1956	2168	**
	s	15.03	54.24	

*n.s.= No significancy. (*Nicht significant*.) P>0.05, **P<0.01*

1. Tabelle: Durchschnittsgewicht von Broilerküken

Alter(1), Statistische Parameter(2), Kükengruppen(3), Signifikante Differenz(4)

Table 2

Indicators of correlation between age and average live weights of chicken

Group of chicken(1)	Coefficient (r)	Equation of regression(2)
1st	0.999**	$y' = -44.678 + 133.273x + 33.657x^2$
2nd	0.999**	$y' = -72.041 + 151.278x + 37.512x^2$

** P<0.01

2. Tabelle: Korrelation zwischen Alter und durchschnittlichem Lebendgewicht der Küken

Kükengruppen(1), Regressionsgleichung(2)

Parameters of asymmetric S-function used in modeling of the growth of the chicken are presented on *Table 3*. Results show that addition of VEBAC preparation in drinking water enhances progressive stage of growth (2nd group 1.83-7.34 weeks, 1st group 1.86-8.07 weeks). Phase of intensifying came in some earlier period (1.83 weeks) in chicken which received water with VEBAC preparation than in control group (1.86 weeks). However, period of intensive growth lasted shorter in chicken given water with VEBAC. Hence, usage of VEBAC shortened fattening for 0.6 weeks. This conclusion is supported by different positions of inflection points

(t_I=4.633 for chicken from 1st group and t_I=4.968 for chicken from 2nd group). Growth curves modeled by asymmetric S-function are shown on *Figures 1 and 2*.

1st group $y = \frac{4000}{(1 + 0.04695 \cdot e^{-31.12577 \cdot 0.01t})^{1/0.01}}$ 2nd group $y = \frac{4000}{(1 + 0.04952 \cdot e^{-34.53264 \cdot 0.01t})^{1/0.01}}$

Table 3

Parameters of functions - growth models of chicken

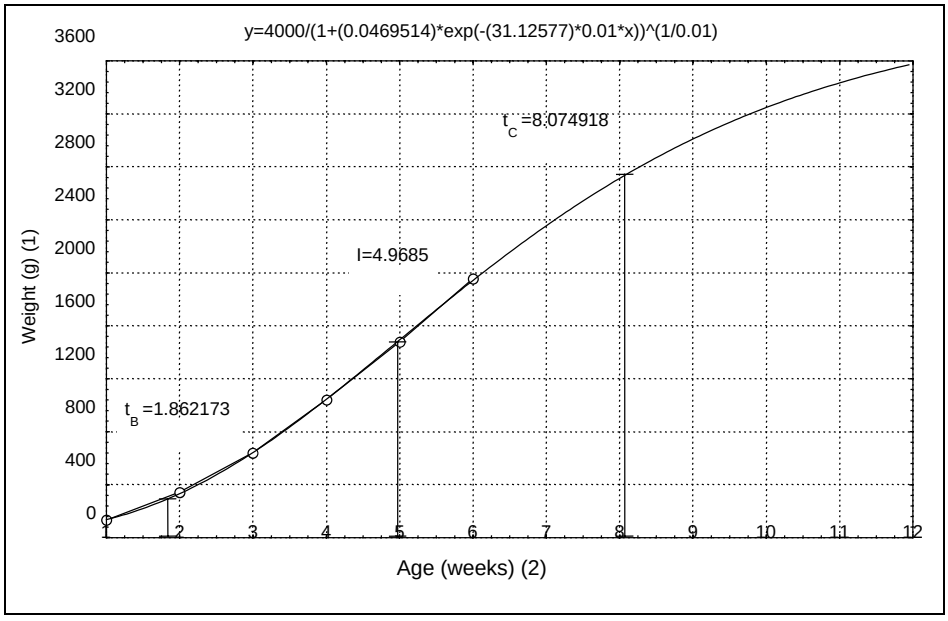
Parameter(1)	Group of chicken(2)	
	1st	2nd
b	0.04695	0.04952
c	31.12577	34.53264
γ	0.01	0.01
T_I	4.9685; 1478.78	4.632576; 1478.85
t_B	1.862173; 298.34	1.832668; 298.36
t_C	8.074918; 2736.66	7.432485; 2736.69

3. Tabelle: Parameter – Wachstumsmodell von Küken

Parameter(1), Kükengruppen(2)

Figure 1

Growth curve of 1st chicken group

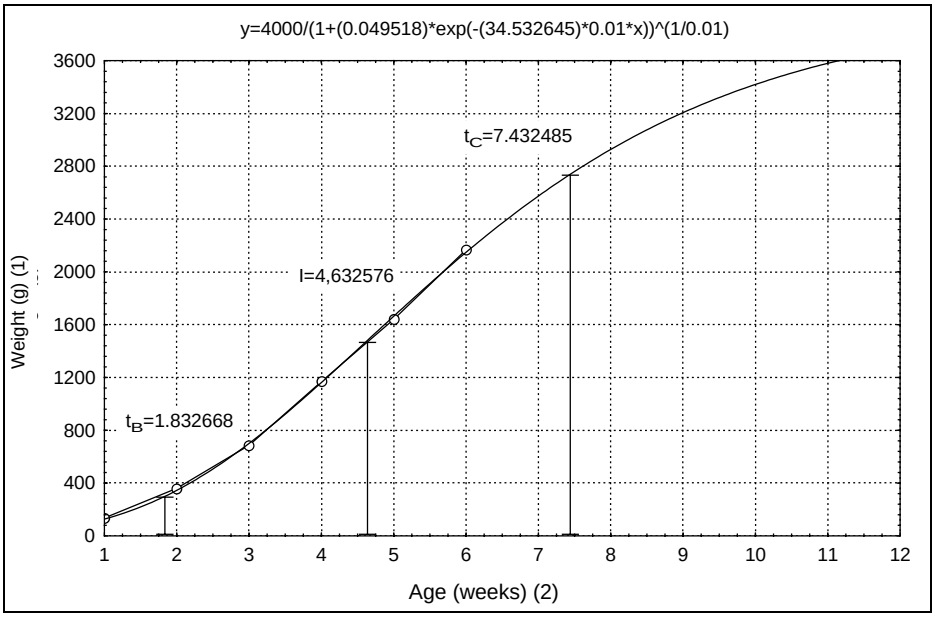


1. Abbildung: Wachstumskurve der ersten Kükengruppe

Gewicht(1), Alter (Wochen)(2)

Figure 2

Growth curve of 2nd chicken group



2. Abbildung: Wachstumskurve der zweiten Kükengruppe

Gewicht(1), Alter (Wochen)(2)

Cumulative indicators of feed consumption and conversion from 1st to 6th week of fattening are presented on *Table 4.* Chicken from 2nd group with VEBAC in drinking water took averagely 162 g or 3.93% more food than chicken from 1st group. It is also obvious that chicken from 2nd group had better conversion of food (2.02 g/g of gain) compared to chicken from 1st group (2.15 g/g of gain).

Table 4

Consumation and conversion of food per weeks

Week (1)	1st group(2)			2nd group		
	Consumation g(3)	Gain g(4)	Conversion g/g(5)	Consumation g	Gain g	Conversion g/g
1	116	90	1.29	123	93	1.32
2	375	212	1.77	358	223	1.60
3	550	298	1.84	561	326	1.72
4	810	399	2.03	892	483	1.85
5	1051	435	2.42	1091	471	2.32
6	1223	478	2.58	1262	528	2.39
Total	4125	1914		4287	2125	
$\bar{x}$			2.15			2.02

4. Tabelle: Futterverbrauch und Futterverwertung pro Woche

Woche(1),Gruppe(2), Futterverbrauch(3), Zunahme(4), Futterverwertung(5)

More efficient food conversion of chicken from 2nd group which were given VEBAC in drinking water for 6.05% is in accordance with results obtained by *Kumprecht et al*. (1994a) and *Kumprecht* and *Zobac* (1998b).

CONCLUSIONS

The research on influence of VEBAC probiotic addition in drinking water on the growth was performed on Avian 24K chicken. First group of chicken was given water without VEBAC probiotic throughout the whole fattening period (42 days), while 2nd group of chicken received VEBAC added in drinking water in amounts of 3g/100 liters. On the basis of the research, following conclusions can be formed:

- Average live weights of Avian 24K chicken in age of 42 days were for 10.8% higher in 2nd group (3 g/100 l VEBAC) compared to the 1st group without probiotic in drinking water (2.19 kg : 1.96 kg; $P<0.01$).
- Growth curve showed that addition of VEBAC in drinking water enhances progressive stage of growth.
- Probiotic addition resulted in more efficient conversion of food into live weight gain of chicken for 6.44% in 2nd group of chicken compared to the 1st group (2.02 kg : 2.15 kg) Chicken from 2nd group consumed until 6th week averagely 3.93% more food than chicken from the 1st group.
- Addition of VEBAC in drinking water had positive effect on performances of broilers. Usage of VEBAC shortened fattening for 0,6 weeks.

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