

## Comparison of the Emanox and Sulfacox coccidiostats in broiler rabbit farming

Martin Fik\*, Róbert Chlebo, Henrieta Arpášová, Jaroslav Andreji

*Slovak University of Agriculture in Nitra, Slovak Republic*

The aim of the study was to analyze the effect of two different preparations against rabbit's coccidiosis – naturally based preparation Emanox and conventional preparation Sulfacox – on selected production indicators. Preparations against coccidiosis were administered in the form of a beverage from weaning (42 days old) until the 60 days old. In the period of 84 days of rabbit's age average body weight in the Emanox group reached 2673.40 g, while in the Sulfacox group live weight was 2704.73 g. In the Emanox group 4 cases of death was recorded during the fattening, which has occurred within 51 to 66 days of age. In the Sulfacox group only two cases of death were registered at age 53 and 57 days, both caused by rabbit's constipation. Total feed consumption over the fattening period in the Emanox group was 121.99 kg and the average consumption of the complete feed mixture per 1 kg of body weight gain was 3.52 kg. In the Sulfacox group the total consumption of 122.56 kg of feed during fattening period was recorded and average consumption of complete feed mixture per 1 kg of body weight gain was 3.21 kg. Preparation Emanox PMX is a suitable alternative to conventional chemical preparations.

**Keywords:** Emanox PMX, rabbit's coccidiosis, coccidiostats, rabbits fattening

### 1. Introduction

Large-scale farming practices in animal husbandry with high concentrations of kept individuals often require the use of medication in nutrition, which ultimately reduces the safety of food production, and also invalidates the opinion of the consumer on the quality of commodities produced. In the past, feed antibiotics were widely used, which eliminated the negative effect of high concentrations of farm animals, by influencing production and animal health. Currently 70 % of all diseases in rabbits are caused by infectious diseases of the digestive tract (Carabano et al., 2008). Digestive disorders cause high morbidity of rabbits, which is associated with growth depression, impaired feed conversion, and thus often results in an economic loss greater than mortality itself (Licois, 2004).

In rabbits, in addition to other pathogens, parasites with broad generic representation occurs quite oftenly coccidia. The addition of chemical coccidiostats in compound feed mixtures has a variety of drawbacks: loss of appetite accompanied by growth depression, the possibility of residues in meat and undesirable resistance of coccidia (Mach et al., 2012). Ondruška et al. (2011) and Simonová et al. (2007) emphasizes the positive relationship of probiotics on the rabbit's health, reducing

mortality and improving intensity of growth. Pakandl (2013) argues that the pathogenicity of these species is different and probably depends on the type and location of the coccidia.

Mach et al. (2012) and Dokoupilová et al. (2012) state that effects of naturally based coccidiostats is comparable with chemical ones. Haviarová et al. (2006) describes how to use *Eleutherococcus senticosus* plant, commonly known as Siberian ginseng, to support the immune system of rabbits. Vasilková et al. (2008) reported positive results of rabbit's coccidiosis control by use sage-based preparations. Effect of sage (*Salvia aetheroleum*) extract administered in dosage 10 µl per head and day during 21 days was investigated also by Szabóová et al. (2006). The authors report that the antimicrobial activity of the sage herbal extract reduces the germs of *Escherichia coli*, *Staphylococcus aureus* and coagulase-positive *Staphylococci* compared with the control group where conventional anticoccidials were used (robenidine 66 mg per kg of body weight. Lower mortality of animals in the experimental group with sage addition versus group with conventional product Xtract usage was recorded as well. The better body weight gain, however, reached animals within the Xtract group. Authors note that the sage plant extract showed significant antimicrobial activity

\***Correspondence:** Martin Fik, Slovak University of Agriculture in Nitra, Faculty of Agrobiolgy and Food Resources, Department of Poultry Science and Small Animal Husbandry, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovakia, e-mail: martin.fik@uniag.sk

in rabbits and the reduction of potentially pathogenic microorganisms of the gastrointestinal tract.

Erdelyi et al. (2008) tested the effect of rosemary (*Rosmarinus officinalis*) and garlic in the form of oil extracts, however a relatively high mortality rate in the treatment groups has occurred. Dokoupilová et al. (2012) describe and compare the effects of chemical and natural coccidiostats in broiler fattening rabbits. Naturally based coccidiostat Adicox, especially in combination with the Probiostan probiotic, has reached in this study comparable results on broiler rabbit's health as the commonly used chemical coccidiostat Robenidin.

The use of coccidiostats – in contrast to feed antibiotics – is not yet legislatively banned, but it is expected that EU legislation will prohibits the use of chemical coccidiostats in farm animal nutrition in the near future. Kritas et al. (2008) and Wang et al. (2008) shows a better weight gain, better conversions and lower mortality in rabbits fed with added probiotics. Chrastinová et al. (2007) shows probiotics as a substitute for antibiotics. Wang et al. (2014) showed effects of compound probiotics on growth performance, intestinal microflora and immune function of broilers.

To alternative antibiotics include Mannan, organic acids, plant extracts and enzymes (Marounek et al., 2005).

This study is aimed to compare effects of conventional chemical preparation Sulfacox, widely used by breeders for weaned rabbits to eliminate parasites of the *Coccidia* genus, with naturally based preparation Emanox PMX.

## 2. Materials and methods

Broiler rabbits maternally belonged to the original parent line Hycole, males were of the original paternal lines Zica. Weaning from their mothers was conducted at age 42 days.

The cages were placed in the hall, where the microclimate was only partially controlled. In winter, the hall temperature was above 0 °C. The experiment was realized in production farm conditions (West Slovakia).

Rabbits feeding was ensured *ad libitum* through by granulated complete feed mixture with the declared content of nutrients and alfalfa hay. The experiment was starting in 42. day of age and was ending in 84 day of age. Rabbits after weaning (day 42) were moved to fattening cages (4 pcs per cage) and divided into two groups (S, E).

Group S – (25 rabbits) From weaning until the 60<sup>th</sup> day of rabbits lives commercial formulation Sulfacox was added into water in concentrations of 10 ml of Sulfacox per 8 liters of water. After 60 days of life rabbits received only drink water.

Group E – (25 rabbits) Emanox was add into drinking water in concentration of 0.25 ml per 1 liter of water and served from weaning (day 42) until day 60 of age.

All rabbits in both groups were labelled with numbers in both pinnae. Rabbits were individually weighed once a week, in order to survey the intensity of growth, on the scales with an accuracy of 1 g.

Monitored indicators:

- average daily weight gain in g,
- average weekly gains in g,
- intensity of growth for individual weeks in g,
- changes in health condition,
- mortality,
- cause of death of individuals,
- pathological changes in the liver of rabbits (observed following slaughter and carcass processing),
- feed conversion ratio in kg.

## 3. Results and discussion

On the basis of the rabbit's growth intensity monitoring in both groups with a different form of medication against coccidiosis only minimum differences were recorded, no statistically significant differences between groups were recorded ( $P > 0.05$ ).

Growth intensity of rabbits within both groups studied is shown in Table 1.

Summary of average daily body gains (ADG) in the both monitored groups is shown in Table 2.

**Table 1** Summary of growth intensity in the observed groups in g

Age in days	Group E				Group S			
	<i>n</i>	$\bar{x}$	$x_{max}$	$x_{min}$	<i>n</i>	$\bar{x}$	$x_{max}$	$x_{min}$
42	25	1020.13	1126	759	25	1043.33	1135	879
49	23	1229.45	1369	1058	24	1231.74	1351	1071
56	22	1427.10	1524	1869	23	1453.60	1658	1273
63	21	1701.65	1869	1523	23	1712.91	1954	1456
70	21	2038.05	2301	1856	23	2044.41	2357	1862
77	21	2390.00	2719	2198	23	2395.59	2746	2141
84	21	2673.40	3154	2348	23	2704.73	3210	2345

**Table 2** Summary of average daily body weight gains (ADG) in g

Age in days	Group E				Group S			
	<i>n</i>	$\bar{x}$	$x_{\max}$	$x_{\min}$	<i>n</i>	$\bar{x}$	$x_{\max}$	$x_{\min}$
42	25	–	–	–	25	–	–	–
49	23	29.91	38	18	24	26.91	36	21
56	22	28.22	41	22	23	31.69	44	26
63	21	39.22	48	20	23	37.05	51	28
70	21	47.20	59	31	23	47.36	62	27
77	21	51.14	78	35	23	50.17	73	31
84	21	40.49	65	32	23	44.16	72	33

**Table 3** Summary of average weekly body weight gains (AWG) in g

Age in days	Group E				Group S			
	<i>n</i>	$\bar{x}$	$x_{\max}$	$x_{\min}$	<i>n</i>	$\bar{x}$	$x_{\max}$	$x_{\min}$
42	25	–	–	–	25	–	–	–
49	23	209.42	270	126	24	188.41	252	147
56	22	197.55	287	154	23	221.85	308	182
63	21	274.55	336	140	23	259.32	357	196
70	21	330.40	413	217	23	331.50	434	189
77	21	351.95	546	245	23	351.18	511	217
84	21	283.40	455	224	23	309.14	504	231

**Table 4** Overview of selected production indicators in g

Monitored indicators	Group E		Group S		Statistical level
	<i>n</i>	$\bar{x}$	<i>n</i>	$\bar{x}$	
Weight in 84 days	21	2673.40	23	2704.73	$P > 0.05$
Weaning weight	25	1020.13	25	1043.33	$P > 0.05$
Weight increase during fattening (42–84 days)	21	1653.27	23	1661.40	$P > 0.05$
ADG to 84 <sup>th</sup> day	21	31.83	23	32.20	$P > 0.05$
ADG during fattening (42–84 days)	21	39.36	23	39.55	$P > 0.05$

After the analysis of the average weekly increments during fattening, we noted some differences that were not statistically significant ( $P > 0.05$ ).

Summary of average weekly gains (AWG) in the both monitored groups is shown in Table 3.

In the E group eight cases of health deterioration was recorded during the fattening. Alimentary indigestion of rabbits manifested by occurrence of constipation, diarrhoea, breathlessness and abdominal distension were recorded. Diarrhoea in two rabbits occurred at age 51 and 52 days. These rabbits were transferred to separate cages and 50 g of feed restriction of complete feed mixture per day were introduced. Rabbits with diarrhoea occurrence got daily Emanox PMX dosage directly into the mouth. Diarrhoea of both rabbits lasted two days, after which physiological consistency of faeces occurred again.

In one case conspicuously enlarged hydrous abdomen occurred on 49 day. The rabbit was transferred to a separate cage and within three days he received 50 g of complete feed mixtures per day, Emanox PMX drops was administered directly into the mouth. Subsequently, he was placed again in cages for fattening rabbits. Two cases of health problems were caused by respiratory diseases, with the typical symptoms such as snorting with typical runny nose and difficult breathing. These cases resulted in mortality. In total, 4 mortality cases were recorded within the E group, in addition to respiratory problems one case was caused by enteritis, diagnosed on the basis of typical clinical symptoms as malaise, weight loss, gnashing of teeth and mucous diarrhoea and the last case was caused by constipation.

**Table 5** Assessment of selected production indicators in both treated groups

Indicator	Unit	Group E	Group S
Total live weight of broilers produced	kg	56.14	62.21
Number of broilers produced	pcs	21	23
Average body weight	g	2673.40	2704.73
Average body weight gain of 1 broiler during fattening	g	1653.27	1661.40
Total consumption of feed mixture during fattening	kg	121.99	122.56
Feed conversion ratio	kg	3.52	3.21

In the S group, seven cases of adverse changes in health condition of fattening rabbits were recorded. Constipation occurred in four cases in age from 44 to 53 days, symptoms such malaise, weight loss, and hardened colon was diagnosed. Two of these cases resulted in mortality, the first case was aged 53 days and the second one 57 days. Only these two cases of mortality within the S group were recorded. In one case, diarrhoea was recorded at age 48 days. It was a diarrheal disorder without bloating intestines. The rabbit was transferred to a separate cage, three days of feeding restriction in dose 50 g of complete feed mixture per day was applied, Sulfacox was administered directly into the mouth at a dose of 0.75 ml during subsequent three days. On the third day the rabbit has excreted faeces of physiological consistency and was again transferred to fattening cage. During the fattening period two cases of respiratory diseases were recorded, accompanied by difficult breathing, sizzle and weak runny nose.

The occurrence of pathological changes in the rabbit's liver in the form of whitish nodules is a typical symptom of the liver forms of coccidiosis, which, although it does not increase mortality significantly, reduces the intensity of fattened rabbit's growth. A symptom on live rabbits is markedly enlarged abdominal area.

Monitoring of pathological changes in the liver was performed after rabbits slaughter and dissection of the carcass of slaughtered rabbits. We recorded no incidence of pathological changes occurrence in the liver neither in group E neither in group S.

The results obtained are consistent with the conclusions of Mach et al. (2012) and Dokoupilova et al. (2012) who state that naturally based coccidiostats are equally effective to chemical ones. Vasilková et al. (2008) also reports positive results by using herbal preparations against coccidiosis in rabbits. Dokoupilová et al. (2012) reported that natural coccidiostats had even better effects, even not statistically significant, for increments, feed consumption and carcass value compared with chemical coccidiostat Robenidin. Ondruška et al. (2011) reached better results in the second half of the fattening period in the rabbits group administered with naturally

base coccidiostats, compared with chemical ones, but our results cannot confirm these findings.

#### 4. Conclusions

The results of monitoring Emanox PMX preparation indicate that this product is comparable to chemical ones for the prevention of intestinal diseases in rabbits. Performance parameters did not shown statistically significant differences of the indicators closely related with utilitarian performance and efficiency of broiler rabbits keeping among monitored two groups. Mortality in group E accounted 16.00 % (8 % alimentary cause; 8 % respiratory cause), while in the S group 8% (alimentary cause). The average feed conversion ratio in group E 3.52 kg, and 3.21 kg in S group. In both groups, no case of liver forms of coccidiosis has appeared. Based on the observed production indicators and mortality status we can state, that the commercial formulation Emanox PMX has reached comparable results against coccidiosis as the chemically based preparation.

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