

Short communication

EFFECT OF *YUCCA SCHIDIGERA* HERBAL EXTRACT IN DIET ON WEIGHT GAINS OF RABBIT DOES (PRELIMINARY RESULTS)

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ABSTRACT

The aim of the study was to evaluate the effect of the addition of different concentrations of yucca herbal powder additive to the diet on weight gain of rabbit does.

Three months old rabbit does (n=45) of New Zealand White line were used in the experiment. The does in the control group (C; n=15) were fed with commercially available diet and in the experimental groups the diet was enriched with 5 g (E1; n=15) or 20 g (E2; n=15) of yucca (*Yucca schidigera*) powder extract added to the 100 kg of the diet.

We found out statistically significant difference (p<0.05) in total average weight gains in the experimental group 1 (E1; 1427.9±51.02 g) compared to the control group (C; 1285.9±35.09 g) and experimental group 2 (E2; 1252±46.24 g).

The highest (but not significant) total weight gains per week were observed in the experimental group 1 (E1; 203.99±40.62 g). Lower total weight gains per week were found in the experimental group 2 (E2) compared to the control group (C) (178.85±38.40 and 183.8±40.6 g respectively).

In conclusion, addition of lower (5 g/100 kg diet) concentration of *Yucca schidigera* plant extract to the commercially used diet had positive effects on rabbit doe weight gains, but more experiments are needed to prove this assumption.

Key words: rabbit does; yucca; weight gains

INTRODUCTION

Rabbit is considered a temporary biological model among laboratory and domestic animals. It is the most fertile mammal which is able of reproduction at the age of 17-19 weeks of life. Many environmental factors can influence quality of rabbit life (Krohn *et al.*, 1999).

Farmed rabbits have to be supplied sufficiently with all life-essentials (feedstuffs, fluids, fresh air and hygienic unobjectionable quantity and quality). The health and uninjuriousness of animals has to be promoted in every suitable way and controlled regularly. The housing systems for rabbits must guarantee their protection against climatic adversities and natural

enemies, but also exclude behavioural damages of body and body parts (Löfliger, 1996).

There are countless of feed additives that are added to food or water in various forms. These additives are intended for livestock but also for humans. Their role is to enrich feed and supply missing components in the feed mixture. Several teams of scientists studied the effect of herbal plants on animal organism. Their effect on the organism of consumer is considerably scientifically proven and these extracts are already a common part of daily or intermittent feed consumption. Authors examined effect of these additives on weight gains, reproduction, growth, health and other (Durmic and Blache, 2012; Kumar *et al.*, 2012; Krishnaiah *et al.*, 2011). However,

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their results are controversial.

Mojave yucca (*Yucca schidigera*) is a flowering plant native to Mojave, Sonoran and Great Basin deserts that are found in the south-western USA and north-western Mexico. *Yucca schidigera* extract contains a number of steroidal saponins that, because of their biological activity, have attracted attention from the livestock industry for many years. Saponins in general are common in a large number of plants and are identified by their ability to form stable soap-like foams (Francis *et al.*, 2002). Some of the physical and chemical properties of these compounds (e.g., surface active properties and ammonia binding capacity) have sparked research into their use in livestock production applications (Hristov *et al.*, 1999). The plant contains several physiologically active phytochemicals too. For example, yucca is a rich source of polyphenols, including resveratrol and a number of other stilbenes (yuccaols A-E) (Cheeke *et al.*, 2006). It also improves performance and health of the livestock in addition to feed in various concentrations. Two versions of yucca preparations are available on the market - yucca powder and yucca extract (Piacente *et al.*, 2005).

This product is on the list of certified biotechnological preparations used for reduction of ammonia emissions and odour and it serves the same purpose when applied to feed, to deep litter, screens, dump excrement etc. (Tyl *et al.*, 2010).

The effect of yucca or sarsaponin preparations has been studied on different species of farm animals such as ruminants (Goodall *et al.*, 1982; Hristov *et al.*, 1999, Liu *et al.*, 2009), pigs (Duffy and Brooks, 2007) and rabbits (Amber *et al.*, 2004; Chrenková *et al.*, 2012) too.

The objective of this study was to evaluate the effect of different concentration of herbal additive yucca powder to the diet on rabbit does weight gains.

MATERIALS AND METHODS

Three months old clinically health rabbit does of the New Zealand White line were used in our experiments. The animals were housed in individual cages, under a constant photoperiod of 14 hours of light day. Temperature and humidity in the building were recorded continuously by means of a thermograph positioned at the same level as the cages (average relative humidity and temperature during the year was maintained at 60±5 % and 17±3°C). The rabbits were fed *ad libitum* and water was provided *ad libitum* with nipple drinkers.

Rabbit does (n=45) were divided into three groups: control (C; n=15) and two experimental groups (E1; n=15 and E2; n=15). The does in the control group were fed with a commercially available diet. In the

experimental group E1 5 g of a powder of plant *Yucca schidigera* was added to the 100 kg of the diet. In the second experimental group (E2) 20 g of a powder of *Yucca schidigera* was added to the 100 kg of the diet. The animals were fed for 50 days and weighed weekly.

The data were analyzed using t-test using SigmaPlot statistical package (Systat Software Inc., Germany).

RESULTS AND DISCUSSION

The highest average weight gain per week was in the first experimental group (E1; 203.99±40.62 g) compared to the control (C; 183.8±40.6 g) and the second experimental group (E2; 178.85±38.40 g) (Table 1).

The highest total average increases of weight were observed in the first experimental group (E1; 1427.9±51.02 g). Weight gains obtained in the other two groups (C, E2), had statistically significant ($p<0.05$) lower values (1285.9±35.09 g and 1252±46.24 g respectively) compared to the experimental group E1 (Figure 1).

The positive effect of the addition of *Yucca schidigera* on growth, health and reproductive activity of animals was pointed out by several authors (Anthony *et al.*, 1994; Amber *et al.*, 2004; Duffy and Brooks, 2007).

Anthony *et al.* (2004) examined effect of feeding diets containing yucca extract and probiotics on growth, digestibility, nitrogen balance and caecal microbial activity of growing New Zealand White rabbits. The authors observed that the supplementation of the diet with yucca extract or probiotics significantly ($p<0.05$) affected the growth performance. Average daily weight gain increased ($p<0.05$) by 12.1 and 9.6 % for rabbits feed with diets enriched with yucca extract or probiotics respectively, when compared to the control diet.

In our study, we found out that weight gains were increased when feed mixture enriched with the lower concentration of 5 g of *Yucca schidigera* plant was fed. Higher concentration (20 g) of *Yucca schidigera* plant extract in the experimental group 2 has no positive effect.

It was proposed that the *Yucca schidigera* plant extract has the ability to increase performance of animals. Feeding of young chickens with plant preparation containing *Yucca schidigera* extract increased ($p<0.05$) the average weight gains of chicks (Giffard *et al.*, 2001). In our experiments with rabbits we determined statistically significant ($p<0.05$) increase in total weight gains in the experimental group 1 (E1). Positive influence in the case of the highest apparent protein and fat digestibility coefficient was also observed by Chrenková *et al.*, (2012) when 5 g of yucca extract was added to the 100 kg of rabbit feed mixture.

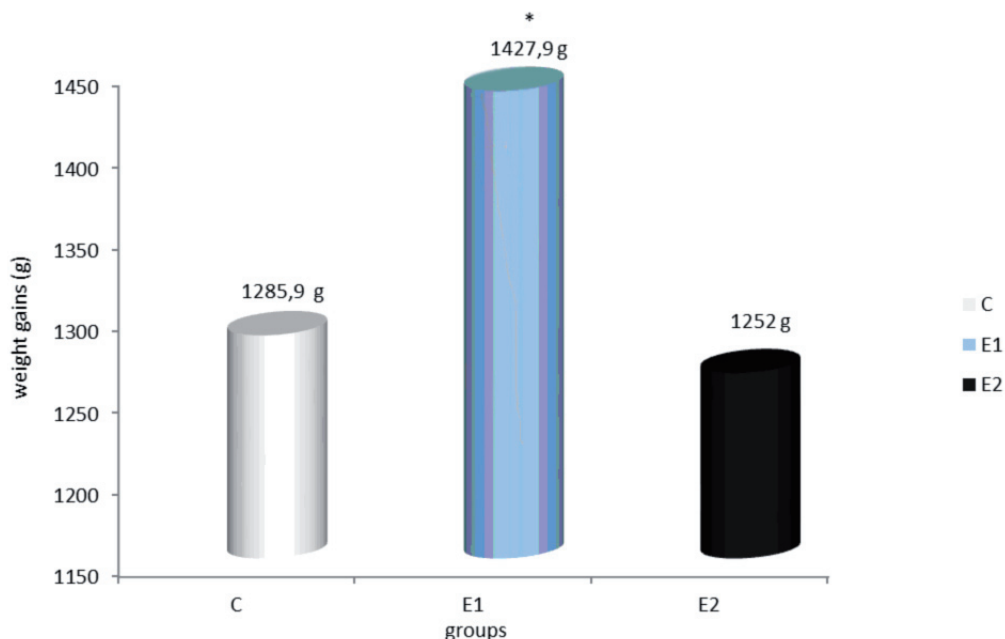
Positive effect of *Yucca schidigera* extract addition to the diet was documented also in pigs. Daily average weight gains in the group fed with diet enriched with *Yucca schidigera* were significantly higher when compared to the control group and the number of days required for supplemented animals to reach slaughter weight was reduced by 7 days when compared to control animals (Duffy and Brooks, 2007).

On the other hand, Ocak *et al.* (2008) published no differences in growth performance in broilers who were fed with herbal feed containing peppermint and thyme, but peppermint leaves had a higher growth promoter effect compared to the thyme at an early stage of the broilers.

Table 1: Weight gains (g) per week of analyzed rabbit does fed with *Yucca schidigera* plant extract from the 1st to the 49th experimental day

Groups	Weight gains per week (g)						
	1. week	2. week	3. week	4. week	5. week	6. week	7. week
C (n=15)	72.0±23.1	170.6±17.0	208.0±12.8	116.7±14.0	152.0±21.4	403.3±37.0	163.3±17.0
E1 (n=15)	129.3±16.1	210.0±16.9	148.0±17.8	191.3±10.2	144.0±15.5	439.3±40.8	166.0±21.1
E2 (n=15)	82.7±19.6	182.0±8.0	257.3±69.3	92.0±64.8	175.3±38.3	360.7±45.3	102.0±23.5

C – control group; normal diet, E1 – 5 g of *Yucca schidigera* added to 100 kg of normal diet, E2 – 20 g of *Yucca schidigera* added to 100 kg of normal diet



C – control group; normal diet, E1 - 5 g of *Yucca schidigera* added to 100 kg of normal diet, E2 - 20 g of *Yucca schidigera* added to 100 kg of normal diet

- Differences in values are statistically significant at $p < 0.05$.

Fig. 1: Total average weight gains (g) of analyzed rabbit does fed with *Yucca schidigera* plant extract from the 1st to the 49th experimental day

Also Hernández *et al.*, (2004) reported that *Labiatae* extract (LE) from sage, thyme and rosemary had no positive effects on weight gains as well. No differences in feed intake or feed conversion were observed. Only from 14 to 21 days of age, broilers fed with the LE diet grew faster than the broilers fed with the control or EOE (essential oil extract) feeds (68.8 vs. 63.9 and 61.6 g/d, respectively).

Based on our preliminary results, we can agree with the conclusions of the authors mentioned above that the feed with the addition of *Yucca schidigera* plant extract significantly affected weight gains in the experimental animals. In case of the total average weight gains, the differences between the control group (C), the experimental group 1 (E1) and the experimental group 2 (E2) were statistically significant and the best results were obtained in the experimental group 1 (E1).

CONCLUSION

The addition of the lower concentration (approximately 5 g) of a dry powder of *Yucca schidigera* plant into the normal feed for small livestock animals, rabbits, had a positive effect on their weight gains.

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