**INTRODUCTION**

In the last years, rabbit production on the commercial level acquired increasing interest due to their prolificacy, rapid growth rate and meat yields (Savietto et al., 2015; Minguez, 2014; Ricke et al., 2012; Gondret et al., 2005). More suitable composition of feed mixture or administration of natural additives at a suitable concentration might be beneficial in livestock farming without negative effect on the environment and the animal as an individual (Wareth et al., 2014; Githiori et al., 2003; Amber et al., 2004; Namkung et al., 2004).

Positive effect of biologically active substances and extracts from *Acacia saligna* (Tamir and Asefa, 2009), *Morus australis* (Wu et al., 2013), *Yucca schidigera* (Földešiová et al., 2013), *Agave tequilana* (Sáyago-Ayerdi et al., 2014), *Saposhnikovia divaricata*, *Lonicera japonica*, *Chelidonium majus* (Park et al., 2014) a. o. on weight gain were observed in lambs, mice, rabbits, rats and broilers.

*Curcuma longa* Linn, a member of *Zingiberaceae* family, commonly known as turmeric, originate in tropical and subtropical regions of India and China. Medicinal properties of *Curcuma longa* have been attributed primarily to curcuminoids, which are located...
in the plant rhizome. Curcumin (diferuloylmethane) is the most important fraction of Curcuma longa (Ararjo and Leon, 2001). Polyphenol curcumin, extracted from dried rhizomes of the plant, acts through inhibition of mitogen-activated protein kinases (Jeon et al., 2013). Although turmeric is consumed every day in Asian countries, no toxic effect on the health of population was found (Ammon and Wahl, 1991).

Beneficial effects of curcuma on the animal liver protection (Deshpande et al., 1998), treatment of the human diabetes (Eshrat and Hussain, 2002), steroidogenesis, proliferation and apoptosis in porcine ovaries (Kádasi et al., 2012) were found.

In particular, yellow rhizome, containing curcumin, is used to treat digestive, neuropsychiatric diseases (Mei et al., 2011) and osteoarthritis in combination with a ginger (Low Dog, 2006).

Furthermore, the plant has also been shown to possess high antioxidant (Maheshwari et al., 2006; Wojdyle et al., 2007) anticarcinogenic (Hatcher et al., 2008), antibacterial (De et al., 2009) and anti-inflammatory (Jurenka, 2009) effect.

The objective of this study was to evaluate the effect of different concentrations of Curcuma longa dried powder as an additive to the diet on the average weight gain (g) per week and the total average weight gain of the rabbit does.

MATERIAL AND METHODS

Animals

Two months old clinically healthy rabbit does of the New Zealand White line (NAFC Nitra, SR) were used in this experiment. The animals were housed in individual cages, under a constant photoperiod of 14 hours of light day, average relative humidity 60 ± 5 % and temperature 17 ± 3 ºC. The rabbits were fed 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 a commercially available complete feed mixture. In experimental groups the complete feed mixture was enriched with Curcuma longa dried powder at the concentrations of 5 g (E1) and 20 g (E2) per 100 kg. The animals were fed for 63 days (9 weeks) and weighted weekly.

The treatment of the animals was approved by the Ministry of Agriculture and Rural Development of the Slovak Republic, no. SK P 28004 and Ro 1488/06-221/3a.

Statistical analysis

The data were analysed by the t-test using Sigma Plot statistical package (Systat Software Inc., Germany).

RESULTS AND DISCUSSION

In our study we tested effect of the addition of Curcuma longa dried powder to the complete feed mixture on the average weight gain (g) per week and the total average weight gain (g) of rabbit does.

The highest average weight gain of rabbit does per week (g) was found in the first experimental group (E1; 235.7 ± 22.35) when compared to the control (C; 216.2 ± 25.59) and the second experimental group (E2; 220.5 ± 31.94) (Table 1).

Total average weight gain (g) was higher in the first experimental group (E1; 2103.3 ± 63.22) compared to the second (E2; 2045 ± 84.36) and control (C; 1950 ± 126.88) groups (Table 2, Figure 1).

In accordance to Holder et al. (1978) we suggest that slightly lower weight gain in the second experimental group compared to the first experimental group might be due to the higher concentration of Curcuma longa in feed mixture, which can cause poor absorption from the intestine.

In our study, we found that the addition of both concentrations (5 g and 20 g kg⁻¹ diet) of Curcuma longa dried powder into rabbit complete feed mixture had a positive effect on average weight gain per week and total average weight gain of analysed rabbit does.

Positive effect of Curcuma longa powder to the diet was also found in broiler chickens. Higher weight gain was observed in the birds fed the diet containing Curcuma longa at level of 0.5 %, compared to the birds receiving 0.25 %, 1 % and control birds (Al-Sultan, 2003). Osava et al., (1995) and Al-Sultan (2003) attributed the increase in the body weight gain to the antioxidant activity of Curcuma longa.

Moreover, Durrani et al. (2006) reported significantly positive effect of curcuma at the level of 0.5 % on weight gain of birds. It was also shown, that curcumin added to the diet of kids during the hot summer months significantly improved the final live body weight and average daily body gain of kids compared to the control (Habeeband and Tarabany, 2012). On the other hand, similarly to our results no significant effect of the supplementation of curcuma powder in the broiler rabbit (Basavaraj et al., 2010) and in the broiler chicks feed a mixture (Mehala and Moorthoy, 2008) were reported.
Table 1: Weight gain (g) per week of analysed rabbit does fed with *Curcuma longa* enriched feed

<table>
<thead>
<tr>
<th>Groups</th>
<th>Weight gain per week (g) Average weight gain per week (g) (Mean ± S.E.M.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st week</td>
</tr>
<tr>
<td>C (n = 15)</td>
<td>286.20 ±</td>
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<tr>
<td></td>
<td>80.77</td>
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<tr>
<td>E1 (n = 15)</td>
<td>258.00 ±</td>
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<td></td>
<td>29.13</td>
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<tr>
<td>E2 (n = 15)</td>
<td>222.86 ±</td>
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<td></td>
<td>27.08</td>
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</tbody>
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C – control group, commercially available diet (normal diet); E1 – 5 g of *Curcuma longa* dried powder added to 100 kg of normal diet; E2 – 20 g of *Curcuma longa* dried powder added to 100 kg of normal diet.

Table 2: Average weight per week (g) and total average weight gain of analysed rabbit does fed with *Curcuma longa* enriched feed

<table>
<thead>
<tr>
<th>Groups</th>
<th>Average weight per week (g) Total average weight gain (g) (Mean ± S.E.M.)</th>
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<tbody>
<tr>
<td></td>
<td>1st week</td>
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<tr>
<td>C (n = 15)</td>
<td>1713.08 ±</td>
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<td></td>
<td>83.30</td>
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<tr>
<td>E1 (n = 15)</td>
<td>1842.67 ±</td>
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<td></td>
<td>44.37</td>
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<tr>
<td>E2 (n = 15)</td>
<td>1818.57 ±</td>
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<td>47.31</td>
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</table>

C – control group, commercially available diet (normal diet); E1 – 5 g of *Curcuma longa* dried powder added to 100 kg of normal diet; E2 – 20 g of *Curcuma longa* dried powder added to 100 kg of normal diet.
CONCLUSION

The supplementation of Curcuma longa plant powder to the commercially available diet for rabbits positively affects weight gains in rabbit does. Therefore, for improving growth performance, further studies are required to define an optimal supplementation of Curcuma longa to the rabbit diet.

ACKNOWLEDGMENT

We thank Mr. Milan Dobiaš for technical support. The research leading to these results has received funding from the European Community under project no 26220220180: Building Research Centre „AgroBioTech“.

REFERENCES


