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EFFECT OF FLAVOMYCIN SUPPLEMENTATION ON NUTRIA (*MYOCASTOR COYPUS* MOL.) WEIGHT GAINS IN THE FINISHING PERIOD

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Abstract. The study was carried out using a herd of standard nutria. Animals were fed with feeds with various flavomycin supplements depending on the group (gr. I – control; gr. II – 3 mg; gr. III – 4 mg; gr. IV – 5 mg). Animals in each group were weighed once a week. The data obtained were used to calculate weight gains and growth rate in particular weeks. Results were analysed using three-way analysis of variance (time, ration and sex). Body weight of individuals of each sex differed highly significantly from the beginning of the experiment. The increase in nutria body weight at 7 months of age was highly significant ($p \leq 0.01$). The final means of body weight in particular group were not statistically significant (gr. I – 4401 g, SD=585; gr. II – 4904 g, SD = 875; gr. III – 5021 g, SD = 1134; gr. IV – 4593 g, SD = 645). The data obtained did not show statistically significant differences in the body weight gains of nutrias from 7 to 8.5 months of age. The data obtained did not show statistically significant differences in the growth rate of animals receiving different flavomycin supplements.

Key words: antibiotic growth promoters, flavomycin, *Myocastor coypus,* Nutria

INTRODUCTION

The nutria (*Myocastor coypus* Mol.) is one of the more important fur animals. This species originally lived in South America, from southern regions of Brazil to Patagonia and Tierra del Fuego. Nutrias were imported to Europe in the early 20th century, but intensive breeding really developed after World War II. By the 1970s and 1980s, nutria farming in Europe flourished. During this period Poland produced 1–3 million skins per year [Cholewa et al. 2000]. In addition to Poland, other major centres of nutria farming were the former Russia, West Germany, East Germany and Czechoslovakia, where several hundred thousand skins were produced per year [Tocka 1984, Wenzel 1985].

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In spite of the marked decrease in the nutria population observed in recent years and the decrease in skin prices, due to the inflow of material from South America, they are still valued and highly demanded by the fur industry. Good economic results depend on whether animal breeding is modern and new technologies and solutions are introduced [Cholewa et al. 2000].

One of the factors influencing production results is animal nutrition. However, farm-produced feeds are mostly used in practice. Productive results can be improved by applying different types of feed additives, such as antibiotic growth stimulants. They are applied to improve weight gains and thus to reduce production costs. Antibiotic growth stimulants prevent bacterial infections in the digestive tract as they reduce the number of pathogenic microorganisms [Barabasz 2005]. One of the more common growth stimulants is flavomycin, which is a glycolipid antibiotic promoting growth in different groups of animals [Bahrecke et al. 1982]. Antibiotic growth stimulants are phased out from the nutrition of animals, the products of which are consumed by humans, but in the case of fur animals they could contribute to achieving better economic results.

The aim of the investigations was to estimate the effect of flavomycin on the body weight gains of nutrias.

MATERIAL AND METHODS

The study was carried out at the Research Station of the Department of Small Animal Breeding, the Agricultural University of Cracow, using a herd of standard nutria in the period from 3 March to 14 April 2005. A total of 23 animals aged 7 months were divided into 4 groups. The average initial body weight in individual experimental groups did not differ statistically.

Animals were fed according to standards recommended for this species [Kopański 1977] based on farm-produced feeds (sugar mangold, carrot, steamed potatoes and hay) and concentrate for porkers (15% protein) with various flavomycin supplements depending on the group (Table 1).

Table 1. Experimental groups
Tabela 1. Układ doświadczenia

Group number Numer grupy	I (control) I (kontrolna)	II	III	IV
No. of individuals Liczba osobników	6 (4 ♂, 2 ♀)	5 (3 ♂, 2 ♀)	6 (4 ♂, 2 ♀)	6 (4 ♂, 2 ♀)
Flavomycin supplement Dodatek flawomycyny	0 mg·kg^{-1}	3 mg·kg^{-1}	4 mg·kg^{-1}	5 mg·kg^{-1}

Animals in each group were weighed once a week. The data obtained were used to calculate weight gains and growth rate in particular weeks. Results were analysed using three-way analysis of variance (time, ration and sex). The significance of differences among the groups was

determined using the Tukey test. Results were analysed using the statistical packet Statistica® 6.0 [StatSoft 2004]. In all tables, differences between the studied groups were marked using the standardized method. Values bearing the same letters differ significantly: small letters indicate significant differences ($p \leq 0.05$), and capital letters indicate highly significant differences ($p \leq 0.01$). Phenotypic correlations estimated in the experiment were low and not significant.

RESULTS

At the beginning of the experiment, the weight of animals assigned to particular experimental groups did not differ significantly. The lack of significant differences in body weight between the experimental groups persisted throughout the experiment. Body weight of individuals of each sex differed highly significantly from the beginning of the experiment. A highly significantly higher body weight of males persisted in successive weeks throughout the experiment (Table 2).

Table 2. Overall means, means for individual experimental groups and depending on sex for absolute body weight (g) at particular weeks of experiment, together with respective standard deviations

Tabela 2. Średnia ogólna, średnia dla poszczególnych grup doświadczalnych i z uwzględnieniem płci dla całkowitej masy ciała (g) w odpowiednim tygodniu badań, łącznie z odchyleniem standardowym

Week of experiment Tydzień badań	Overall mean Średnia ogólna (SD)	Body weight depending on experimental group Masa ciała z uwzględnieniem grupy doświadczalnej				Body weight depending on sex Masa ciała z uwzględnieniem płci	
		I	II	III	IV	male samce	female samice
0	3646 (605)	3383^{B} (401)	3805 (497)	3838^{B} (938)	3584^{b} (464)	3876 ^{A} (570)	3215 ^{A} (418)
1	3796 (627)	3513^{C} (383)	3949 (561)	4011^{C} (938)	3737^{c} (523)	4058 ^{A} (570)	3306 ^{A} (407)
2	4016 (701)	3749^{D} (358)	4154 (656)	4292^{D} (1084)	3893^{d} (552)	4337 ^{A} (592)	3415 ^{A} (462)
3	4169 (669)	3958^{E} (409)	4307 (695)	4379^{E} (1004)	4054 (515)	4466 ^{A} (554)	3611 ^{A} (498)
4	4347 (721)	4062^{G} (451)	4537 (743)	4618^{G} (1019)	4202^{g} (597)	4659 ^{A} (625)	3763 ^{A} (503)
5	4495 (752)	4227^{H} (521)	4673 (842)	4726^{H} (1034)	4385 (618)	4821 ^{A} (637)	3884 ^{A} (557)
6	4722 (817)	4401^{J} (585)	4904 (875)	5021^{J} (1134)	4593 (645)	5067 ^{A} (708)	4075 ^{A} (603)

Large letters indicate statistically significant differences $p \leq 0.01$.
Small letters indicate statistically significant differences $p \leq 0.05$.
Wielkie litery oznaczają statystycznie istotne różnice $p \leq 0{,}01$.
Małe litery oznaczają statystycznie istotne różnice $p \leq 0{,}05$.

The increase in nutria body weight at 7 months of age was highly significant ($p < 0.001$). This clearly shows the possibility of analysing the influence of various factors on the parameters of nutria growth at this age. The statistical analysis showed that changes in the body weight of nutrias, measured at weekly intervals, were non-significant, but already 2-week intervals had a highly significant effect on differences in body weight.

Results of weekly increases in the body weight of animals from particular experimental groups and depending on sex are given in Table 3. The data obtained did not show statistically significant differences in the body weight gains of nutrias from 7 to 8.5 months of age. During the experiment, steady increases in body weight were observed in all experimental groups and were independent of sex.

Table 3. Overall means, means for individual experimental groups and depending on sex for body weight gains (g) at weekly periods, together with respective standard deviations

Tabela 3. Średnia ogólna, średnia dla poszczególnych grup badawczych i odpowiednio według płci dla przyrostów masy ciała (g) w okresach tygodniowych, łącznie z odchyleniem standardowym

Week of experiment Tydzień badań	Overall mean Średnia ogólna (SD)	Body weight gains depending on experimental group Średnie przyrosty masy ciała z uwzględnieniem grupy doświadczalnej				Body weight gains depending on sex Przyrosty masy ciała z uwzględnieniem płci	
		I	II	III	IV	male samce	female samice
0	–	–	–	–	–	–	–
1	150 (103)	130 (107)	144 (93)	172 (78)	153 (146)	182 (85)	91 (113)
2	220 (136)	236 (159)	205 (150)	282 (162)	156 (51)	279 [A] (116)	109 [A] (101)
3	152 (86)	209 (63)	153 (45)	87 (103)	161 (83)	129 (83)	196 (78)
4	178 (83)	104 (58)	230 (62)	239 (38)	148 (86)	192 (84)	152 (79)
5	298 (89)	164 (116)	136 (114)	107 (42)	182 (73)	162 (86)	121 (94)
6	227 (97)	174 (103)	231 (71)	295 (117)	208 (64)	246 (102)	191 (80)

Growth rate results of animals belonging to particular experimental groups as well as depending on sex in particular weeks of the experiment are given in Table 4. The data obtained did not show statistically significant differences in the growth rate of animals receiving different flavomycin supplements. No significant differences were affirmed between animals of different sexes.

Table 4. Overall means and means of particular experimental groups and depending on sex for growth rate (%) at successive weeks of experiment, together with respective standard deviations
Tabela 4. Średnia ogólna i średnia poszczególnych grup doświadczalnych oraz z zróżnicowaniem płci dla tempa przyrostów (%) w kolejnych tygodniach badań, łącznie z odchyleniem standardowym

Week of experiment Tydzień badań	Overall mean Średnia ogólna (SD)	Rate of growth depending on experimental group Tempo przyrostów z uwzględnieniem grupy doświadczalnej				Rate of growth depending on sex Tempo przyrostów z uwzględnieniem płci	
		I	II	III	IV	male samce	female samice
0	–	–	–	–	–	–	–
1	4.18 (2.98)	3.99 (3.13)	3.67 (2.26)	4.80 (2.63)	4.19 (4.18)	3.00 (3.64)	4.81 (2.47)
2	5.69 (3.49)	6.94 (4.95)	5.00 (3.54)	6.56 (3.42)	4.14 (1.17)	3.22 (2.76)	7.00 (3.17)
3	4.05 (2.41)	5.52 (1.25)	3.63 (0.68)	2.64 (3.37)	4.36 (2.65)	5.73 (2.12)	3.16 (2.11)
4	4.21 (1.90)	2.57 (1.29)	5.31 (1.12)	5.67 (1.41)	3.48 (1.87)	4.29 (2.49)	4.17 (1.60)
5	3.38 (2.09)	3.94 (2.76)	2.76 (2.37)	2.36 (1.08)	4.36 (1.68)	3.14 (2.34)	3.51 (2.03)
6	4.97 (1.80)	4.05 (2.17)	4.99 (1.65)	6.08 (1.80)	4.76 (1.28)	4.87 (1.82)	5.02 (1.86)

DISCUSION

In the present experiment, the flavomycin supplement had no significant effect on differences in the body weight of nutrias. These results differ from those of other authors for slaughter cattle (bulls) and chickens, which showed a positive influence of flavomycin on daily gains and feed utilization [Harenza et al. 1990, Jamroz et al. 1992, Wawrzyńczak et al. 1992]. It should be noted, however, that in the present experiment, supplemental flavomycin was given to 7-month-old animals, whereas other studies showed that the influence of antibiotic growth stimulants is more pronounced in young individuals [Barabasz 2005]. In group III receiving a supplement of 4 µg flavomycin per g of feed, higher weight gains and body weights were obtained than in the control group, possibly indicating a positive influence of flavomycin. However, this increase was statistically non-significant and the increased dose of the antibiotic in feed did not improve the coefficients of nutria growth, because in group IV, receiving the highest dose of the antibiotic, the increases were lower, although the average body weight was slightly greater than in the control group. These findings can result from the use of relatively small doses of flavomycin, as possibly indicated by the studies with weaners receiving a diet with flavomycin supplement (20 $mg \cdot kg^{-1}$) [Korniewicz et al. 1990]. They grew better than individuals from

the control group. However, earlier investigations of this author with the use of 10 mg flavomycin per kg did not improve the productive results. The author also points to the great influence of the breeding environment on the magnitude of weight gains, with the application of the same types and doses of stimulants in diets for young animals. This is confirmed by the investigations of Ziółkiewski et al. [1990], who used 3 feeds with flavomycin supplement added at 3, 5 and 10 $mg \cdot kg^{-1}$ of feed. The effect of the stimulants was manifested in the second stage of fattening. The best gains were obtained by porkers from the group fed with 3 $mg \cdot kg^{-1}$ of feed. However, for the whole period of fattening the differences among groups were not statistically significant. Our own observations made outside this experiment on the same herd (Niedbała P.) show that the influence of flavomycin supplement in nutria breeding is positive. It was found that the use of feed with flavomycin supplement in offspring-rearing mothers reduces mortality of the young in comparison with the results obtained before the antibiotic was used.

Considering the results of studies with other species, it is suggested that the extended use of larger flavomycin doses, starting from weaning, will produce better weight gains in animals receiving feed with this antibiotic. However, this needs to be confirmed by further studies.

CONCLUSIONS

The flavomycin supplement had no significant effect on differences in the body weight of nutrias in final period of fatten.

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WPŁYW PASZY Z DODATKIEM FLAWOMYCYNY NA PRZYROSTY MASY CIAŁA NUTRII W KOŃCOWYM ETAPIE TUCZU

Streszczenie. Badania przeprowadzono na 23 nutriach odmiany standard. Zwierzęta żywiono paszą, o zróżnicowanym dodatku flawomycyny w zależności od grupy (gr. I – kontrolna; gr. II – 3 mg; gr. III – 4 mg; gr. IV – 5 mg). Zwierzęta ważono raz w tygodniu. Uzyskane wyniki opracowano statystycznie obliczając przyrosty masy ciała i tempo wzrostu w każdym tygodniu. Wyniki analizowano wykorzystując trójczynnikową analizę wariancji (czas, dawka, płeć). Masa ciała samców i samic na początku doświadczenia była zróżnicowana statystycznie istotnie ($p < 0,01$). Końcowa średnia masa ciała zwierząt w kolejnych grupach nie różniła się jednak statystycznie istotne (gr. I – 4401 g, SD – 585; gr. II – 4904 g, SD – 875; gr. III – 5021 g, SD – 1134; gr. IV – 4593 g, SD – 645). Analiza wyników nie wykazała istotnych różnic w przyrostach masy ciała nutrii w wieku od 7. do 8,5. miesiąca. Nie wykazano także różnic statystycznych w tempie przyrostów zwierząt otrzymujących zróżnicowany dodatek flavomycyny.

Słowa kluczowe: antybiotykowy stymulator wzrostu, flawomycina, Myocastor coypus, nutrie

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