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**FUR ANIMALS PRODUCTION
AND BREEDING**

Summaries

**Preliminary Investigation on Heavy Metal Content
in Kidneys, Liver and Spleen of Polar Foxes
(*Alopex Lagopus*)**

*P. Niedbala, O. Szeleszczuk, D. Mertin, K. Suvegova,
P. Sviatko*

The aim of the work was to determine a content of 7 heavy metals namely Co, Cu, Mn, Zn, Kd, Fe, and Pb in kidneys, liver and spleen of Polar foxes. The investigation was carried out in 1996, during autumn killing of animals, at 6 farms of Polar foxes localised in the southern part of Poland. Samples of internal organs taken from 3 carcasses were frozen and then dried. The concentration of particular elements was examined in the Institute for Physiology of Farm Animals SAS, Kosice, and Slovak Republic, using atomic spectrophotometer absorption.

The results obtained, due to the lack of reference studies, give only approximate information concerning heavy metal content in the internal organs of Polar foxes.

Mean levels of Co in kidneys ranged from 1,18 to 1,82 mg/kg dry matter, in the liver 0,98-1,82 mg/kg

and in spleen 1,01-1,58 mg/kg. A content of Cu in kidneys (means from particular farms) averaged within a range 12,16 - 36,37 mg/kg, in the liver 5,0 - 47,51 mg/kg and in the spleen 5,01 - 8,14 mg/kg. The concentration of Mn in kidneys was within a range of 2,3 - 3,7 mg/kg, in the liver 2,01 - 3,12 mg/kg and in spleen 5,19 - 7,63 mg/kg, respectively. The Cd content in kidneys ranged from 0,72 to 4,07 mg/kg, in the liver 0,72 - 1,83 mg/kg and in the spleen 0,061 - 0,138 mg/kg. Mean levels of Pb in kidneys were within a range of 0,32 - 1,79 mg/kg, in the liver 0,11 - 0,92 mg/kg and in the spleen 0,45 - 1,77 mg/kg. On the basis of data reported for other species of fur animals (Silver foxes and minks) it can be concluded that contents of Co, Cu, Mn, Cd, and Pb in particular organs are similar. Only Zn and Fe concentrations in kidneys and liver of Polar foxes are distinctly higher, exceeding several times the levels in Silver foxes and minks. The level of Fe on average ranged between 5,66 and 1773,36 mg/kg in kidneys, in the liver between 1610,5 and 3647,88 mg/kg and in the spleen from 1610,5 - 3647,9 mg/kg. Mean content of Zn in particular organs was as follow: 74,2 - 143,9 for kidneys, 85,5 - 141,1 mg/kg in the liver and 89,1 - 208,4 mg/kg in the spleen.

Effect of Slow Releasing Melatonin Implant In the Course of Spermatogenesis in Testes of Blue Foxes

O. Szeleszczuk

The purpose of the present work was evaluation of the influence of exogenous slow-releasing melatonin on spermatogenic processes in testes of polar foxes.

The experiment was conducted on 48 young polar foxes divided into 3 homogenic groups. Animals from the group I received melatonin implants (12 mg) on July, 14, from the groups II on July, 28. Males of the group III served as a control.

Animals from the group I reached a maximal body weight (7,07 kg) at the beginning of October, while those from the IInd and IIIrd group 1-2 months later. Dynamic increase of testes weight and volume, in animals from group I and II. Started at the beginning of October. In animals from the control group a month later, and lasted up to the end of December.

Maximal volume of testes estimated by the end of January amounted to 80,84, 81,56 and 71,55 cm³ in animals from group I, II and III, respectively.

Paralelly with the volume of testes, a diameter of seminiferous tubules was growing up, reaching in animals of group I the maximal value (173,9 µm) in November, in group II 3 weeks later, while in group III following 5-6 weeks.

At the end of October, primary and secondary spermatocytes as well as few spermatids were observed in within the lumen of seminiferous tubuls.

Maturing spermatozoa appeared in testes of animals from group I and II by the end of November, while in those from group III (control) in January.

Disorders of Fertility and Prolificacy in Polar Blue Foxes

O. Szeleszczuk, P. Niedbata

Investigations were conducted on 7 fox farms situated in the south of Poland. Analysis of reproductive results of breeding stock included breeding and farm records over the years 1983-1994 and oral information from breeder or farm manager. Data contained number of vixens. Proportion of mated and whelped vixens, litter size, number of dead cubs from birth up to weaning and to the slaughter (sale). Besides, feeding system, including methods of acquiring feed, formulating diet, and use of vitamin-mineral mixtures was taken into account. Chemical composition of sampled feeds was also examined. Health status at the farm was estimated on the basis of records in the notebook of veterinary services, by clinical examinations. Besides, 10% of vixens culled from foundation stock were subjected to anatomicopathological examination with particular attention paid to reproductive system.

Over years 1983-1994 a clear decrease of the proportion of mated vixen (from 93,4 to 72,9%) whelped vixens (from 93,4 to 77,4%) was recorded on the farms included into analysis. Besides, regarding the numbers of born and weaned cubs a distinct decreasing tendency was observed (from 8,4 to 4,44). On some farms between years 1983-1987 a drastic to 1,1 and even 0,5 weaned cub/vixen was recorded.

Reduced prolificacy and fertility of blue foxes could be caused a negative correlation between reproductive performance and pelt quality traits. Systematic selection directed on the Norwegian fox pelt quality could result in accumulation of undesirable genes coding reproductive traits. Possible reason of decreased fertility and prolificacy of blue foxes on Polish farms were unfavorable environmental conditions- poor feeding and unsuitable care about cubs and the like. Breeders from examined farms used feeds of low quality (in respect of both nutritive and sanitary value) sometimes for reasons beyond their control.

Digestibility of Protein and Fat from Poultry Offals in Diets for Minks

B. Barabasz, D. Mertin, M. Lizak

The aim of the present work was to investigate a degree of utilisation of protein and fat from hard poultry offals (heads) included into feeding ration in different, increasing amounts and simultaneous estimation of the optimal content of these offals in the diet. Investigations were performed in years 1997-1998 on the farm of the Research Institute of Animal Breeding in Nitra, Slovak Republic. The experiment, conducted on minks of standard variety, included 4 stages of appropriate investigations preceded by preliminary periods. In succeeding stages of the experiment a content of poultry offals in diets was gradually increased to 20.8%; 33.0%; 43.6%; 55.3% respectively. The highest coefficient of digestibility was found for the mixture containing 43.6% of examined poultry offals. The coefficient amounted to 81.25%, which indicates that hard poultry offals (heads) are used effectively by minks and that it is possible to include into the diet up to 43% of poultry offals. The best digestibility of fat (coefficient of digestibility up to 94%) was found in case of mixtures containing large amounts of poultry offals (stage III and IV).

Blanced Feed Mixtures for Chinchilla Used Actually in Poland

B. Barabasz, R. Heliasz

Investigations involved an evaluation of pelleted mixtures for chinchillas available in the country. The examinations included composition of mixtures and nutritive value of particular ingredients. Besides, an attempt was conducted of estimation nutritive value of mixtures, using as a criterion reproductive results on the chinchilla farms utilising these mixtures in the practical feeding. It was found that all mixtures contained a large number (11-14) of components providing required variability of flavour. Protein content in examined mixtures ranged from 12-20%. Fibre content averaged 12% (in extreme cases 9-11%), which should be accepted under the condition of supplementing the diet with hay. On the basis of the obtained results authors offered new formulas of balanced mixtures, with composition optimal for chinchillas.

New doctor in fur animal nutrition

Iipo Pölönen, has presented his dissertation at the Faculty of Agriculture and Forestry of the University of Helsinki On October 20 in 2000.

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50

Silage for Fur Animals

Preservation Efficiency of Formic Acid and Benzoic Acid
in the Ensiling of Slaughterhouse By-Products
and their Subsequent Metabolism in Farmed Fur Animals

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Academic dissertation

To be presented, with the permission of
the Faculty of Agriculture and Forestry of the University of Helsinki,
for public criticism in Auditorium B2, Viikki,
on October 20th 2000, at 12 o'clock noon

Helsinki 2000

Abstract

The efficiency and feasibility of organic acids, especially formic and benzoic acids in the feeding of fur animals was investigated in five experiments, where the main emphasis was focused on the metabolism and rate of elimination of these preservatives, in order to assess practical dietary recommendations. Experiments were carried out with mink (*Mustela vison*), blue foxes (*Alopex lagopus*) and raccoon dogs (*Nyctereutes procyonoides*).

Formic acid (85% w w⁻¹) alone (6 g kg⁻¹, pH 4.0) stabilized slaughterhouse by-products, but only in the short term. The effect against yeasts was marginal and a regrowth of aerobic bacteria attributable to yeast growth and subsequent increase in pH resulted in organoleptic spoilage of the silages within 35 d irrespective of storage temperatures (4 and 20 °C). Additional propionic acid (2 g kg⁻¹) enhanced preservation efficiency, but benzoic acid (2 g kg⁻¹) was more effective against yeasts. In practical applications a combination of 10 g kg⁻¹ formic acid and 3 g kg⁻¹ sodium benzoate stabilized boneless by-products for several months. Ensiling improved apparent digestibility of fat of the boneless by-products in mink, but for high-ash by-products it resulted in the hydrolysis of fat, indicative of the formation of insoluble calcium salts.

Oxidation tests in mink showed that the mink oxidizes formate at a rather low rate. Based on the average oxidation rate of 30-35 mg kg⁻¹ BW h⁻¹, the maximum daily formic acid (85% w w⁻¹) intake was approximated to be 1 g kg⁻¹ BW. In blue foxes, based on the half-life measurements in blood, a maximum intake was estimated at 2.2 g kg⁻¹ BW. Regardless of the different methods of investigation, the results suggest that blue foxes metabolize formic acid more efficiently than mink. However, both in mink and blue foxes metabolism of formate appeared to be less efficient than in previously studied nonprimates which warrants a close monitoring of dietary concentrations in practice, particularly during periods of high feed intake. For optimal metabolism of formate, both mink and blue foxes should receive supplemental folic acid, more than is conventionally recommended for the prevention of folic acid deficiency.

The results concerning the practical production trial are consistent with observed formate oxidation rates and earlier research. Dietary formic acid concentration of 5 g kg⁻¹ appeared to be a threshold level for preweaned and weaned mink kits. At the threshold concentration during the intensive growth period performance is temporarily deteriorated by formate irrespective to defects in production parameters at pelting. Based on the number of born and weaned kits per female and the histologically evaluated developmental stage of spermatogenesis, the level of formic acid ensiled silage did not have negative effect on reproductive performance of mink. Furthermore, reproductive performance was not affected by dietary folic acid level (1.5 and 10 mg kg⁻¹ DM). Weaning weights of male kits were negatively affected by the highest silage level that contributed approximately 4.5 g kg⁻¹ formic acid.

With respect to the elimination of benzoate, none of the studied mink, blue foxes or raccoon dogs showed signs of sensitivity, but there were inter-species differences in benzoate elimination. Blue foxes eliminated large amounts of benzoate as hippuric acid (benzoylglycine) across all dietary levels whereas its proportion decreased in mink and raccoon dogs. In raccoon dogs, the proportion of hippuric acid was also initially low. In blue foxes 10% of dietary benzoate appeared unbound in urine, a value double that observed in mink and raccoon dogs. Furthermore, in this species, faecal percentage of free benzoic acid increased with dietary level and accounted for 15% with the highest dietary level of 4.15 mmol kg⁻¹. Dietary glycine contents encountered in practice did not limit urinary hippuric acid excretion.