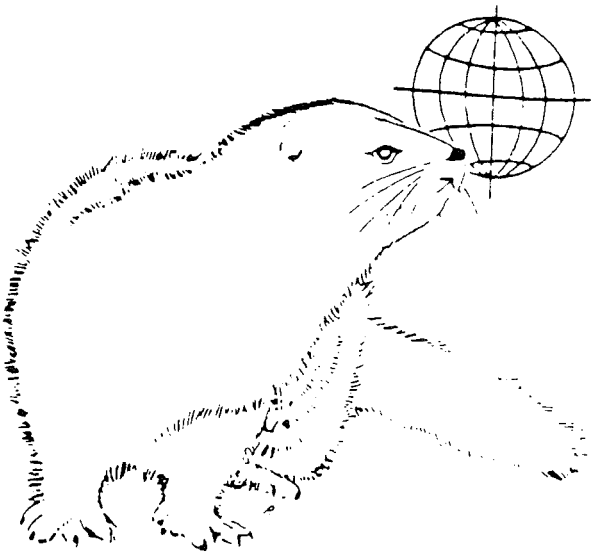

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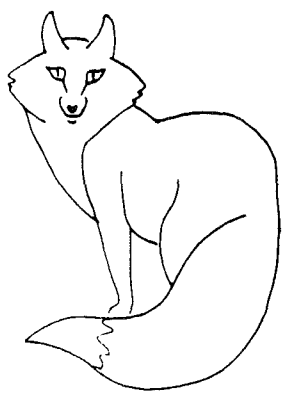

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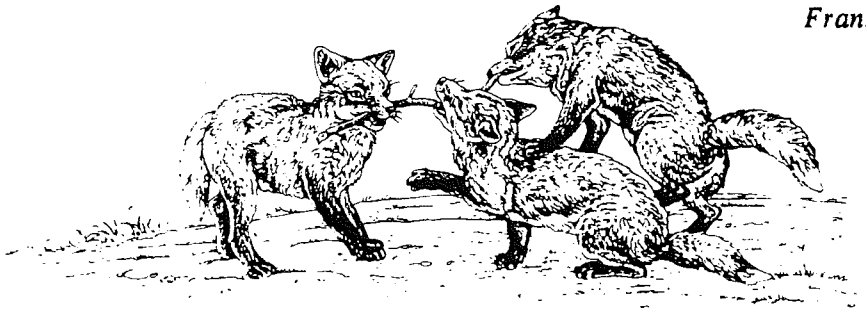

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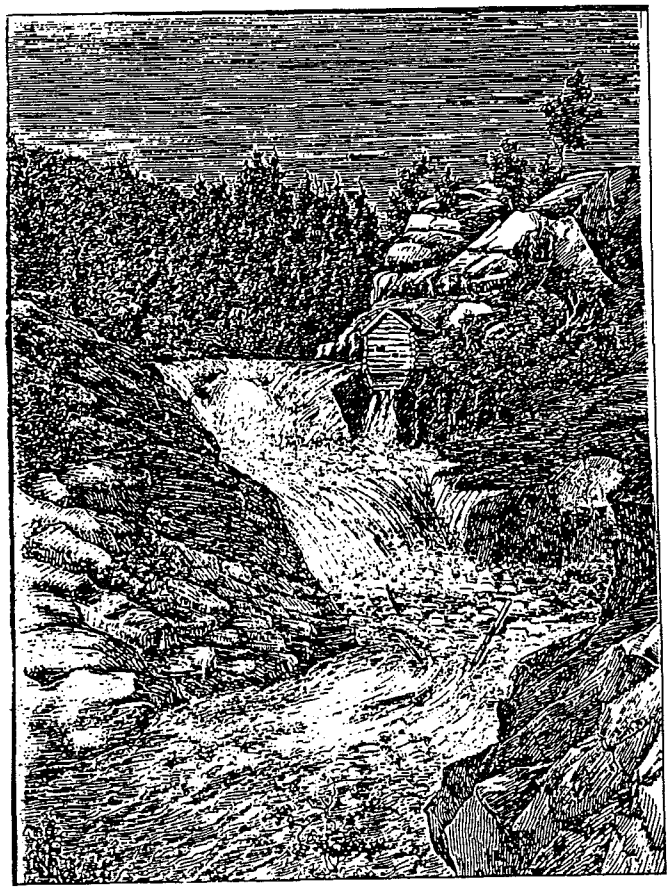


Notes
SCIENTIFUR
Vol. 18, No. 3, 1994

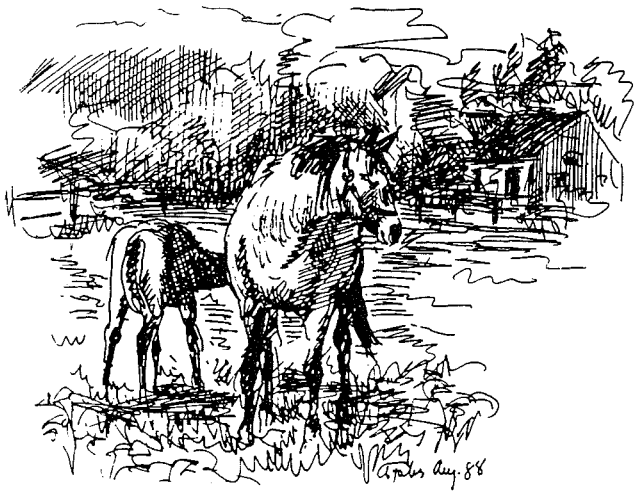
If we were to count the number of IFASA members by the number of memberships paid for 1994, the reduction in IFASA has been even more pronounced that the reduction in the number of skins produced.

Why are our colleagues not paying their memberships. Is it because the personal membership of the organization has to be paid out of their own pockets or is it simply because it is too difficult to send the money.

The fact that many members pay their membership fee through their banks or by cheque costs IFASA NOK 65-80 per payment - also a reduction of nearly 50% of the membership fees. As you will see, there is not much left for IFASA activities!

We will try to reduce these costs, but we are also toying with the idea of making it possible for personal members to pay memberships for life the moment they become personal members of IFASA.

The economic advantage for everybody concerned would be large, and the number of members would be as stable as the number of sympathizers.



We would like to have some suggestions from members and/or friends of SCIENTIFUR and IFASA, please?

Apart from the need for more IFASA members and SCIENTIFUR subscribers, we are pleased to inform that also in this issue of SCIENTIFUR we present a large number of abstracts and original reports on fur animal science.

For the majority of people in the fur industry, SCIENTIFUR is now almost the only possible - and by far the easiest - way of keeping informed about all facets of fur animal production.

Think about it when you work our your future budgets. This concerns not only the individual scientist or farmer but to a large extent also institutions and associations. We are still looking forward to including you in the IFASA/SCIENTIFUR family.

Finally we thank our main contributors to the economy of SCIENTIFUR for their 1994 support. Our main contributors are The Council of European Fur Breeders Association (CEFBA) and our - so far - only advertiser Schering-Plough Animal Health.

Have a good summer
Your editor

Gunnar Jørgensen

Original Report

Some blood indices of mink nanism

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Summary

Alkaline phosphatase of leukocytes and leukograms of normal and nanous kits of dark brown standard mink were studied. Attenuated lymphocytic component and lack of phosphatase positive leukocytes in nanous kits' blood are likely to be the reasons of decreased immunoreactivity.

Introduction

When mink are bred in cages, a disease known by the name of nanism or rachitic nanism (*Berestov, 1978*) is registered in the young mink. Its most important manifestations are: growth and development of abnormalitites, such as spine deformity, shortened limbs, especially the hind ones, and relative softness of the bones. Histological analysis shows considerable changes in the osseous tissue, caused by deficient mineralization, hypoplasia and fibrosis (*Akulova et al., 1977; Diveeva et al., 1977*).

Some authors note a genetical predisposition to rachitic nanism (*Diveeva, 1977*). The disease is most widely spread in farms with deficient feeding of pregnant and lactating females. Sick animals are behind in weight and are noted for weakened resistance to unfavourable effects.

Biochemical deviations connected with the disease are manifest in the reduction of calcium concentration in the blood serum and, on the contrary, in the increase of magnesium. Proper diet, as some investigations show, can be important for prophylaxis of damage and complications.

The study of clinical peculiarities of the disease and laboratory diagnostic research are important for early detecton of the causes of growht inhibition.

Materials and methods

In normal and sick kits with features of nanism leukocytic alkaline phosphatase (AP) was studied according to Burstone (1962) in modification and leukogram by the usual procedure. Quantitatively, the activity of leukocytic AP was determined on the basis of classifying 100 successively estimated polymorphonuclear leukocytes by a scale from 0 to 3+. Among phosphatase positive leukocytes three cell types are distinguished depending on colour intensity: the first, second and third, respectively with low, medium and high activity. Leukocytes, in which enzyme activity is not identified, belong to the zero type. Reaction intensity was expressed by percentage of enzyme positive leukocytes.

Results and discussion

In mink under normal conditions, AP is detected in a small number of polymorphonuclear leukocytes (fig. 1). The number of phosphatase positive cells in blood varies within a considerable range. Sometimes, when light microscopy is performed, it is possible to detect only single leukocytes taking on AP colouring. The factors determining variability in AP activity are so far unknown. Comparison with the data by other authors testifies to the fact that mink have a special place with respect to the content of leukocytic AP, being different from some animals with its high content (rabbits, rats, guinea pigs) as well as from the species in which AP in leukocytes has not been discovered by cytochemical methods (dogs, cats, white mice).

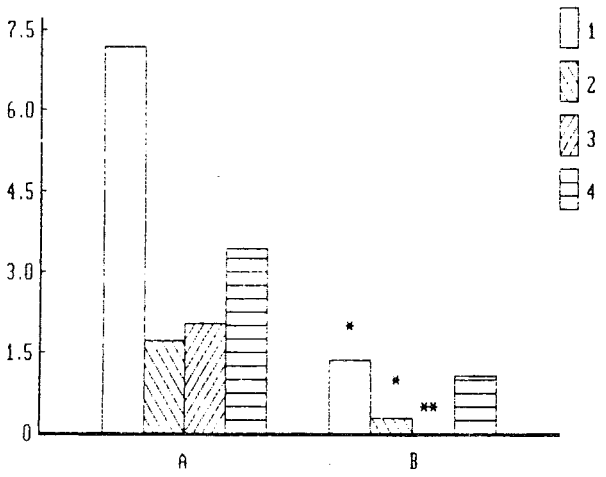

Fig. 1. The leukocyte alkaline phosphatase activity of normal (A) and nanous kits (B)
The number of phosphatase-positive leukocytes: 1 - total, 2 - low activity, 3 - moderate activity, 4 - high activity. On-Y-axis - the number of phosphatase-positive leukocytes (%). Significant differences (t-Student test, * - $P<0.05$, ** - $P<0.01$).

The study of AP, having a significant role in mineralization processes, is very important for differential diagnosis of enzymatic skeleton abnormalities. In this regard the clinical importance of serum AP is studied especially well. It is known that intensive osteogenesis is attended by the increase in its activity and, vice versa, when osteoblastic processes are weakened, the reduction in AP content is observed. The most significant change due to rachitis is the increase of AP in the serum, having, in some views, a compensatory character (*Todorov, 1961*).

The indices of leukocytic AP activity, characterized by sensibility to various damaging effects also give information valuable for diagnosis. An increase in AP activity is detected in inflammatroy processes, stress conditions, and tissue regeneration. A drop in activity accompanies viral diseases and collagenoses. The data on the change of leukocytic alkaline phosphatase in disturbances in the phosphorous-calcium exchange are not numerous. The best known are the data on reduction or full absence of AP in a congenital genotypical defect - hypophosphatesemia and rachitis (*Andreyev, 1980; Shubitsh, Nagoyev, 1980; Hall, 1981; Heyhoe & Quaglino, 1980*).

In nanous kits, compared with healthy ones, phosphatase activity in leukocytes is markedly lower at the expense of the reduced content of positively reacting cells as well as intensity of enzymatic reaction. In some cases disappearance of leukocytes with one or another degree of enzymatic reaction is registered in blood smears. Low content of leukocytes with AP activity in sick kits' blood can cause the loss of their functions and deterioration of an organism's resistance.

The revealed morphofunctional peculiarities of leukocytes in mink kits with rachitis nanism reflect heterogeneity of metabolic disorders associated with the disease. L.K. Kozhevnikova et al. (1993) detected the following shifts in exchange indices of sick kits: B_{12} deficient anemia, thiamin deficiency and reduced activity of some blood serum enzymes - ASAT, ALAT, LDH, AP.

The analysis of the leukogram condition testifies to its significant change in dwarfs compared to healthy kits (fig. 2). In healthy kit leukograms a small predominance of lymphocytes over neutrophils is observed. The level of all cellular elements in leukograms conform to normal values. In nanous kits a high average of 2.1-fold decrease in the relative number of lymphocytes and, on the contrary, 1.6-fold growth of neutrophils are noted. As a result, an increase in the neutrophil - lymphocyte ratio at the expense of the growth in the number of neutrophils is ob-

served in the dwarfs' leukograms. Due to the redistribution in leukograms the balance between cellular elements is broken and the leukogram characteristic of a normal organism is changed.

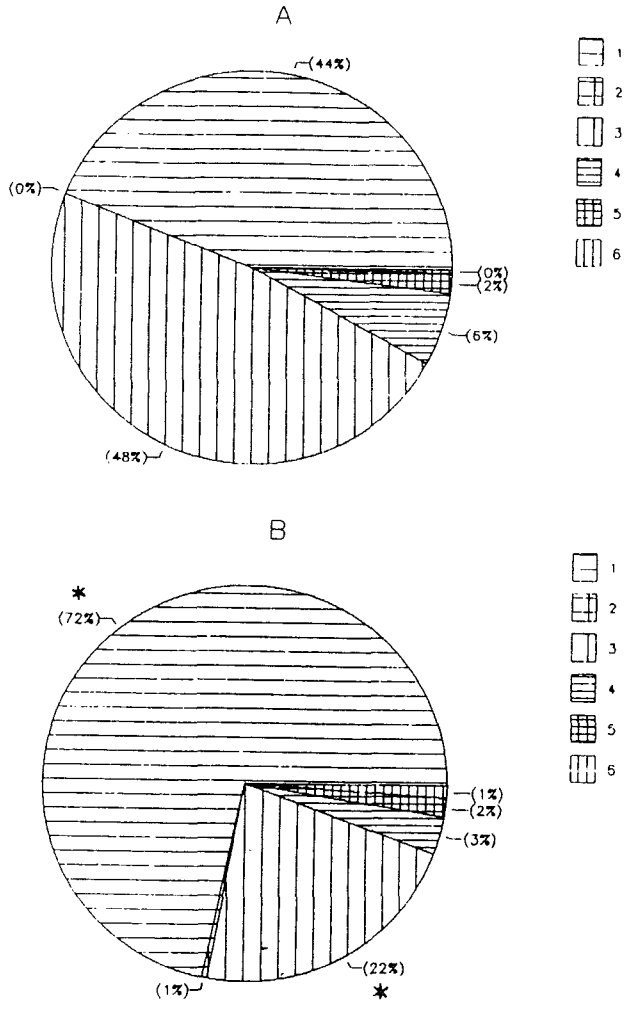

Fig. 2. Blood leukogram of normal (A) and nanous kits (B) of dark brown mink
1 - neutrophilic segmented; 2 - neutrophilic band; 3 - lymphocytes; 4 - monocytes; 5 - eosinophils; 6 - basophils. * - significant differences $P<0.05$ (t-Student test).

Cases of inheritance are known from publications, for example, a syndrome of dwarfish stature, and a disproportionately small stature, dysplasie of cartilages and hair (sparse pigment, less hair) attended by immunological deficiency, caused by selective T-cellular immunodeficiency (*Hall, 1981; Lebedev & Ponyakina, 1990*).

Thus, in nanous mink kits, the defects in osteogenesis are accompanied by changes in haematopoiesis and leukocyte biochemistry. Among clinicohaematologic tests in these animals attention should be paid to cytochemical study of leukocytic AP and leukogram.

A positive reaction of AP in normal mink is characteristic only of some polymorphonuclear leukocytes, demonstrating colouring of different intensity. Nanism development in kits leads to a pronounced drop in the level of AP indices, that manifest the blood's impoverishment of phosphatase positive leukocytes, especially with weak and moderate reaction.

In sick mink, the normal correlation between different cellular elements is broken. A significant predominance of neutrophil granulocytes is observed in the haemogram. The manifestation of enzymatic deficiency of leukocytes and a weakening of the lymphocytic element in nanous mink kits can be a reason for decreased resistance and immunoreactivity.

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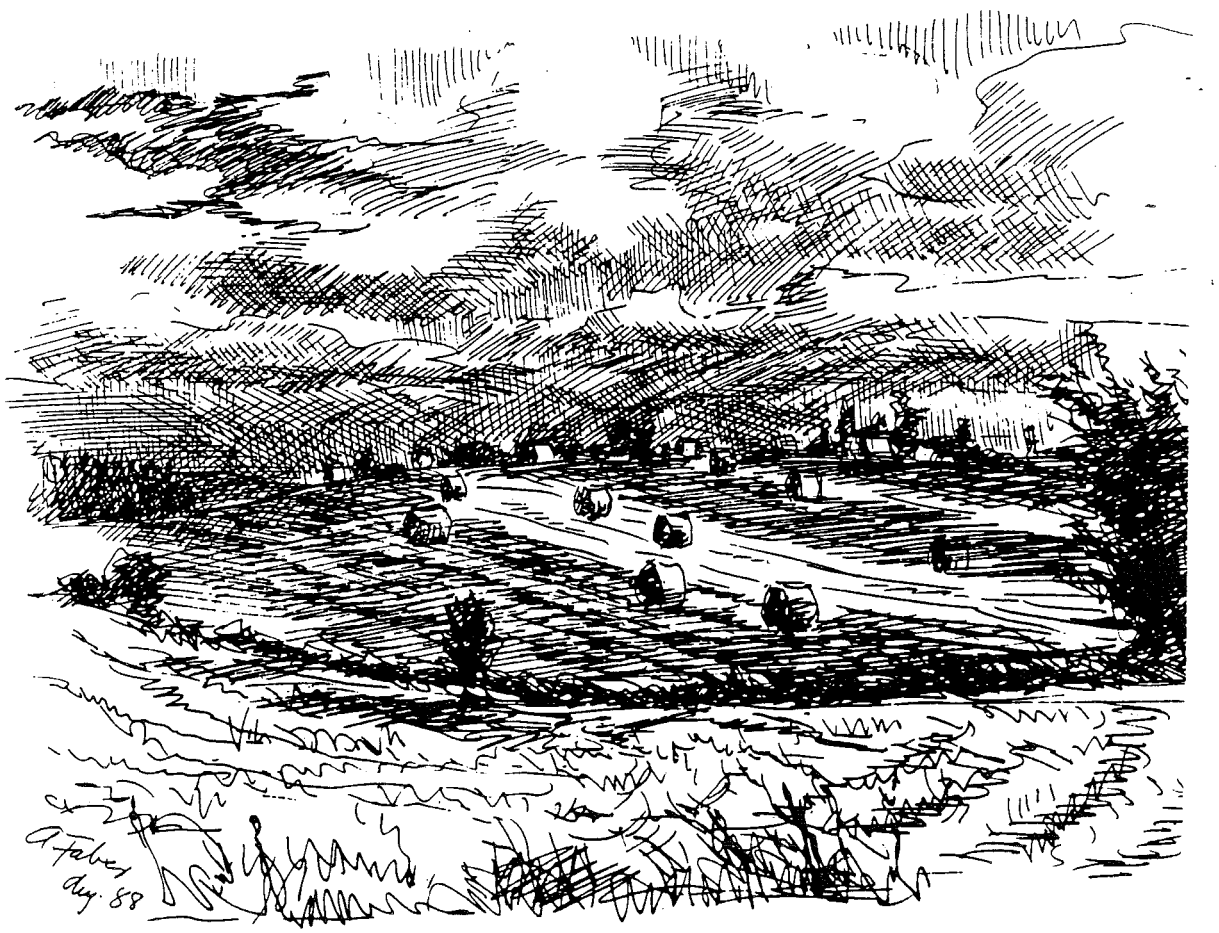

Original Report

Concentration of some trace elements in the fur of standard nutria during ontogenesis

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[2]All-Russian Research Institute of Agricultural Using Meliory Soils, P.O. Emmaus, 171 33 Tver, Russia

Summary

The concentration of some trace elements (Se, Co, V, Cr, As, Ti, Zr) in the fur of Standard nutria during ontogenesis was studied. The disperse-roentgenflourescent spectrometry was used. Fur samples were taken from two topological parts of the body (middle of back and middle of abdomen) of animals at the age of 60, 135 and 240 days. The obtained results were processed mathematically and statistically ($x \pm SD$). Statistically significant differences in the concentration of the studied elements were observed between males and females.

Introduction

Most of the mineral elements are concentrated in larger amounts in the fur where they are firmly connected with protein structures (ref. 5, 7) and in blood where their content is relatively stable (ref. 6).

Some authors have dealt with the mineral composition of fur of carnivorous fur animals (ref. 1, 2, 3, 8, 9, 10, 12, 13). The results of the studies by these authors relate to observations of dependence between the concentration of the studied elements and seasonal colour of the fur, sex, ontogenetic stage, locality on the body and type of hairs. Buleca and Sviatko (ref. 4) studied the content of some macroelements in fur and in blood serum of Greenland nutria.

Material and methods

The experiment was performed at the Fur Animal Farm of the Research Institute of Animal Production in Nitra. The animals were kept in cages with pools in a hall. They were fed pelleted feed mixture KK and they were given green feed (alfalfa) or fodder beet as a supplementary feed. The animals were clinically healthy.

There were approximately 25 males and 25 females of different ages of Standard nutria. The experiment lasted eight months. Fur samples were cut (approximately 2 g) from two topological parts of the body (middle of back and middle of abdomen). Samples were cut according to fur growth stage, namely at the age of 60 days (juvenile fur), 135 days (moulting) and 240 days (fur maturity).

Se, Co, V, Cr, As, Ti, Zr (in mg/kg dry matter) were determined from samples with disperse-roentgenflourescent spectrometry (ref. 14).

The concentration of the studied mineral elements in the feed components was studied as well. The results are given in table 1.

Table 1 Arithmetical means of studied mineral elements in feed components

Element	Alfalfa	KK	Fodder beet
Fe (mg/kg)	128,000	250,000	330,000
Zn (mg/kg)	15,400	57,700	28,000
Sr (mg/kg)	42,400	25,400	24,100
Cu (mg/kg)	4,620	3,660	4,080
Br (mg/kg)	7,920	3,340	6,780
Mn (mg/kg)	34,800	39,300	31,900
Pb (mg/kg)	1,040	0,700	1,380
Rb (mg/kg)	3,240	3,580	24,000
Se (mg/kg)	0,090	0,033	0,071
Co (mg/kg)	0,060	0,070	0,160
Cr (mg/kg)	0,495	0,589	1,300
As (mg/kg)	0,072	0,056	0,093
Zr (mg/kg)	3,120	2,630	3,710

The achieved results of the concentration of the studied elements were processed mathematically and statistically (x ± SD) and the significance of differences in arithmetical means between sexes was tested with a t-test.

Results and discussion

The concentrations of the studied mineral elements in the fur of Standard nutria during ontogenesis are given in table 2.

It is obvious from table 2 that significantly more Se, Co, V, and Zr are deposited in the fur of females. Higher Se concentrations ($P \geq 0.01$) were noticed in the fur of females at the age of 60 days on the back (male 0.147 mg and female 0.201 mg) and at the age of 240 days on the back (0.119 mg and 0.207 mg) and at the abdomen (0.102 mg and 0.217 mg).

At the level of significance $P \geq 0.01$, the Co concent ration was higher at the age of 60 days on the back (0.068 mg and 0.184 mg) and on the abdomen (0.071 mg and 0.165 mg) and at the level of significance $P \geq 0.05$ at the age of 135 days on the back (0.119 mg and 0.182 mg) and at the age of 240 days on the abdomen (0.101 mg and 0.166 mg). The content of V was higher ($P \geq 0.05$) in females at the age of 240 days on the back (0.106 mg and 0.137 mg) and on the abdomen (0.105 mg and 0.145 mg). Highly significant differences ($P \geq 0.01$) in As content were noticed at the age of 60 days on the back (0.012 mg and 0.023 mg) and on the abdomen (0.0157 mg and 0.035 mg).

Table 2 Concentrations of some trace elements (mg/kg dry matter) in fur of Standard nutria during ontogenesis (x ± SD)

Age (days)	Se		Co		V		Cr	
Parts of body	male	female	male	female	male	female	male	female
60 B	n=19 x 0,147++ s 0,053	n=17 0,201 0,059	n=19 0,068++ 0,033	n=17 0,184 0,083	n=19 0,174 0,063	n=18 0,135 0,052	n=19 0,822++ 0,282	n=17 0,368 0,156
60 A	n=19 x 0,153 s 0,068	n=18 0,169 0,051	n=19 0,071++ 0,036	n=18 0,165 0,088	n=19 0,142 0,042	n=20 0,144 0,072	n=19 0,817++ 0,206	n=18 0,395 0,193
135 B	n=19 x 0,160 s 0,054	n=15 0,160 0,041	n=14 0,119+ 0,054	n=20 0,182 0,085	n=19 0,107 0,045	n=15 0,118 0,048	n=19 0,347 0,151	n=15 0,412 0,129
135 A	n=19 x 0,158 s 0,049	n=16 0,158 0,067	n=14 0,158 0,070	n=21 0,174 0,098	n=19 0,117 0,053	n=16 0,113 0,046	n=19 0,421 0,215	n=16 0,357 0,091
240 B	n=10 x 0,119++ s 0,062	n=26 0,207 0,079	n=10 0,126 0,138	n=25 0,183 0,061	n=16 0,106+ 0,036	n=18 0,137 0,040	n=10 0,364 0,175	n=24 0,391 0,177
240 A	n=10 x 0,102++ S 0,027	n=25 0,217 0,062	n=10 0,101+ 0,100	n=26 0,166 0,074	n=10 0,105+ 0,037	n=21 0,146 0,048	n=10 0,369 0,215	n=24 0,431 0,120

Key: B - back; A - abdomen; + $P \geq 0.05$; ++ $P \geq 0.01$

Table 2 continued

Age (days)	As		Ti		Zr	
Parts of body	male	female	male	female	male	female
60 B	n=19 0,012++ 0,004	n18 0,023 0,017	n=18 1,038 0,348	n=17 1,155 0,547	n=19 0,337 0,177	n=17 0,346 0,136
60 A	n=19 0,015++ 0,009	n=20 0,035 0,027	n=19 1,286 0,395	n=18 1,062 0,419	n=18 0,302 0,100	n=18 0,399 0,184
135 B	n=19 0,029 0,021	n=15 0,028 0,023	n=19 1,064 0,675	n=15 0,801 0,343	n=17 0,315 0,158	n=15 0,417 0,230
135 A	n=19 0,023 0,017	n=16 0,032 0,017	n=19 1,076 0,420	n=16 0,826 0,305	n=17 0,294 0,143	n=16 0,327 0,154
240 B	n=10 0,014 0,009	n=23 0,029 0,027	n=10 1,153 0,492	n=26 1,155 0,515	n=10 0,263+ 0,154	n=26 0,354 0,092
240 A	n=10 0,035 0,038	n=22 0,028 0,025	n=10 1,263 0,496	n=15 0,990 0,350	n=10 0,254+ 0,163	n=25 0,374 0,130

Key: B - back; A - abdomen; + $P \geq 0.05$; ++ $P \geq 0.01$

A higher Zr concentration was observed in the fur of females ($P \geq 0.05$) at the age of 240 days on the back (0.263 mg and 0.354 mg) and on the abdomen (0.254 mg and 0.374 mg). A significantly higher Cr concentration ($P \geq 0.01$) in the fur of males was observed only at the age of 60 days on the back (0.822 mg and 0.386 mg) and on the abdomen (0.817 mg and 0.395 mg).

Significant differences in Ti content in the fur of Standard nutria were not observed between males and females.

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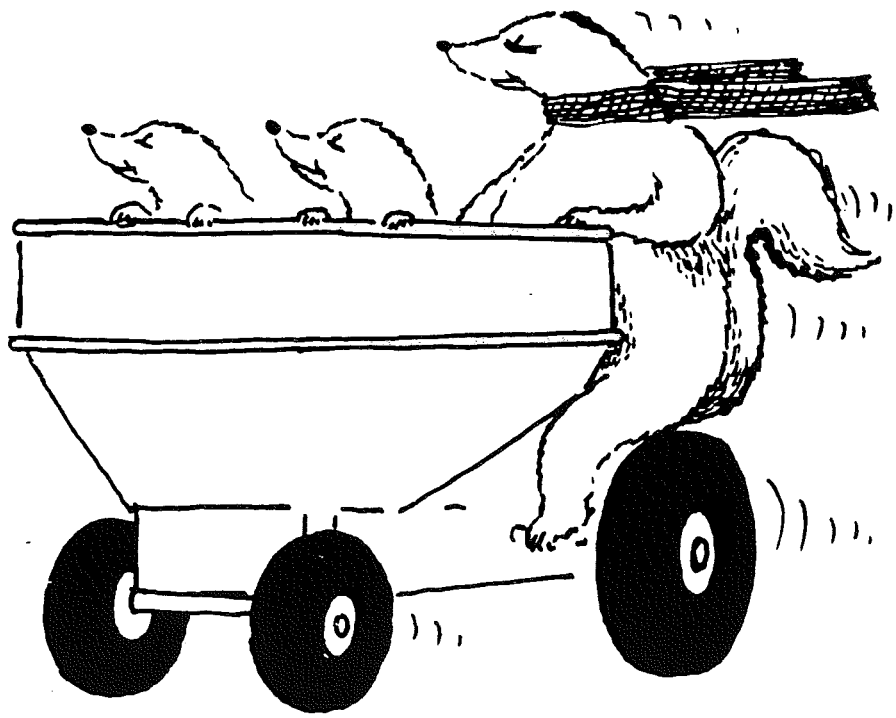

Original Report

Concentration of some macroelements in the fur of standard nutria during ontogenesis

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Summary

The concentration of some macroelements (Ca, P, K, S, Cl) in the fur of standard nutria during ontogenesis was studied. There were approximately 25 males and 25 females used in the experiment from the Farm of Fur Animals of Research Institute of Animal Production in Nitra. The animals were healthy, in optimum condition, fed the full value feeding ration. Fur samples were cut from two topological parts of body (middle of back and middle of abdomen) at the age of 60, 135 and 240 days.

Mineral elements in the fur were determined in the samples by disperse-roentgen flourescent spectrometry (*Tumanov and Stepanok, 1986*). The obtained results were processed mathematically and statistically and significance of arithematic means was tested with a t-test. Statistically significant differences were found between males and females in concentration of Ca, S and Cl. Higher concentrations of the mentioned elements were found in the fur of males at the age of 240 days.

Introduction

This work is a further contribution to the study of mineral element concentration in the organism of fur animals and is directly related to the previous experimental observations of the authors of these problems.

Authors such as Ajvazjan (1962), Samkov (1972), Tjurnina (1981), Saba et al. (1982), Berestov et al. (1984), Hornshaw et al. (1985), Bialkowski and Saba (1985), Mertin et al. (1990, 1991, 1992), Lohi and Jensen (1991) have dealt with the mineral composition of fur in carnivorous fur animals.

Buleca and Sviatko (1991 a, b) studied the content of macro- and microelements in nutria of the mutation silver and Greenland by atomic absorption spectral photometry. These authors determined 58.26±13.44 mg/100 g dry matter CA, 27.16±7.02 P, 45.62±8.43 Mg, 128.41±6.83 Na and 243.56±26.27 mg/100 g dry matter K in the fur of Greenland nutria.

Materials and methods

The experimental observations were performed in The Farm of Fur Animals of The Research Institute of Animal Production in Nitra. The animals were kept in one-floor cages with pools in a shed. They were fed pelleted feed mixture KK and were given green feed (alfalfa) or fodder beet as a supplementary feed. They drank water from the pools. The animals were clinically healthy.

The experiment lasted eight months. There were approximately 25 males and 26 females of different ages. Fur samples were cut from two topological parts of the body (middle of back and middle of abdomen). One sample contained approximately 2 g of fur. Fur samples were collected in dependence on growth of the individual fur generations namely at the age of 60 days (juvenile fur), 135 days (moulting) and 240 days (fur maturity). Ca, P, K, S and Cl (% of dry matter) were determined in the samples by disperse-roentgen flourescent spectrometry (*Tumanov and Stepanok, 1986*). The concentration of the studied elements in feeds was also determined (table 1). The gained results were processed mathematically and statistically (M ± SD) and significance of arithmetic means between sexes was tested with a t-test.

Table 1 Arithemetical means of studied mineral elements in feed components

Element	Alfalfa	KK	Fodder beet
Ca (%)	1,380	0,813	0,210
P (%)	0,630	0,403	0,471
K (%)	3,480	1,160	2,280
S (%)	0,170	0,023	0,078
Cl (%)	0,526	0,236	3,640

Results and discussion

The analyses showed (table 2) that the content of macroelements in the fur of standard nutria varies in dependence on age and sex.

The tendency towards the increase of calcium and sulphur content in the fur of females and phosphorus and potassium in the fur of males was observed at the age of 60 days. Chlorine was deposited more in the fur on the abdomen in males, and its content was higher on the back in females. However, the given differences in concentrations were not statistically significant.

The phosphorus content was higher in the fur of males during the moulting period at the age of 135 days. Higher concentrations of calcium and sulphur were noticed on the abdomen of females compared with males, and in males was a higher content of potassium and chlorine compared with females. Higher concentrations of chlorine and potassium in the fur of females and a higher content of calcium and sulphur in the fur of males was noticed on the back. The results are not statistically significant.

As shown in table 2, there are more of the studied macroelements deposited in the fur of males during fur maturity at the age of eight months. Highly significant differences ($P \leq 0.01$) were found in the content of sulphur on the back (9.601±0.939 % of dry matter in males, and 8.828±0.584 in females) and significant differences on the abdomen (9.744±0.617, $P \leq 0.05$). Significant differences ($P \leq 0.05$) were also found in the concentration of chlorine on the abdomen (males 0.061±0.034, females 0.041±0.02)1. There was a tendency of phosphorus and potassium content to increase in the fur of males. However, the results are not statistically significant.

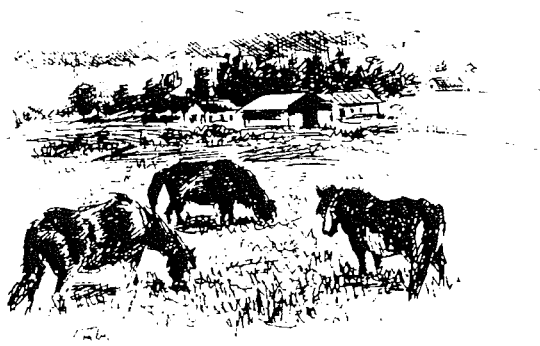

Table 2 Concentration of some macroelements (% of dry matter) in the fur of Standard nutria during ontogenesis (M ± SD)

Age (days)	Ca		P		K		S		Cl	
Parts of body	male	female	male	female	male	female	male	female	male	female
60 B	n = 24 M M 0.208 SD 0.068	n = 17 0.244 0.066	n = 19 0.520 0.230	n = 17 0.468 0.130	n = 19 0.175 0.063	n = 17 0.162 0.041	n = 21 7.362 0.772	n = 17 7.474 0.609	n = 13 0.075 0.044	n = 16 0.058 0.019
60 A	n = 24 M 0.147 SD 0.045	n = 18 0.163 0.025	n = 19 0.633 0.447	n = 15 0.430 0.153	n = 19 0.119 0.036	n = 18 0.106 0.015	n = 20 7.067 0.695	n = 18 7.363 0.655	n = 14 0.060 0.024	n = 19 0.052 0.037
135 B	n = 233 M 0.206 SD 0.026	n = 11 2.202 0.032	n = 19 0.461 0.165	n = 15 0.398 0.145	n = 19 0.100 0.039	n = 15 0.102 0.026	n = 19 8.846 0.767	n = 15 8.587 0.499	n = 19 0.045 0.028	n = 15 0.055 0.018
135 A	n = 24 M 0.208 SD 0.068	n = 17 0.244 0.066	n = 19 0.457 0.152	n = 17 0.395 0.129	n = 19 0.175 0.063	n = 17 0.162 0.041	n = 21 7.362 0.772	n = 17 7.474 0.609	n = 13 0.075 0.044	n = 16 0.058 0.019
240 B	n = 10 M 0.179 + SD 0.040	n = 24 0.150 0.034	n = 10 0.616 0.200	n = 23 0.503 0.212	n = 11 0.106 0.036	n = 23 0.102 0.023	n = 13 9.601 + + 0.030	n = 24 8.828 0.584	n = 10 0.071 0.032	n = 24 0.056 0.027
240 A	n = 10 M 0.182 SD 0.030	n = 24 0.159 0.039	n = 10 0.574 0.165	n = 23 0.504 0.181	n = 12 0.063 0.018	n = 22 0.058 0.013	n = 12 9.744 + 1.044	n = 23 8.988 0.617	n = 10 0.061 + 0.034	n = 24 0.041 0.021

Key: B - back; A - abdomen; + $P \geq 0.05$; + + $P \geq 0.01$

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Short Communication

Some considerations, for welfare comparisons, between cages, enclosures and wild conditions in the arctic blue fox

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Introduction

The welfare of farmed fur animals has recently attracted increasing attention. It has been claimed, for instance, that conventional farm cages are too small and do not provide stimuli for the appropriate activation of natural needs and instincts of the species in question. Therefore, more enriched housing conditions, including free access to mark contact and various whole-year shelters have been demanded. However, it is often difficult to form the right conclusions as to what constitutes the best housing environment and vice versa (*Hubrects, 1993; Korhonen & Alasuutari, 1993*). Thus, more data from comparative conditions are needed.

The present paper will provide summarized data on some welfare parameters for arctic blue foxes (*Alopex lagopus*) living in cage, enclosure and wild conditions.

Materials and methods

Data on cage conditions are based on the study of Korhonen & Niemelä (1993) in which the activity levels of 20 male and 20 female blue foxes were monitored by video camera equipment. Body weight data are based on 160 farmed blue foxes. Enclosure data are from studies of 197 blue foxes (*Korhonen & Alasuutari, 1994a, b*) carried out during 1990-1994 in large ground floor enclosures (17 m long x 8 m wide x 2 m high, or 11 m long x 8 m wide x 2 m high). The activity of these animals was monitored by visual observations and video camera. Data from wild conditions are from the studies of Frafjord (1992) carried out mainly in Svalbard. Locomotor activity data on 11 wild foxes was gathered by radio tracking.

Results and conclusions

Table 1 gives comparative data on some of the main variables of the different conditions. The body weights of wild arctic foxes are significantly lower than their captive counterparts, as wild foxes must adapt to severe arctic conditions characterized by high fluctuations in the availability of food and other essential resources (*Garrott & Eberhardt, 1987*). In this respect, the position of farm foxes is very different since their food supply is free or occasionally slightly restricted. In captivity, the selection for large body size has therefore been possible because of the continuous availability of food. According to Frafjord (1992), the maintenance requirements of the arctic fox are 120 kcal x kg^{-1} x day^{-1}. Thus, a wild fox weighing 3 kg requires only 360 kcal per day, but a captive one of 6 kg (mean weight value of the year) already requires 720 kcal.

Table 1 Comparison of maximum body weight, locomotor activity and whelping success in (arctic) blue foxes in wire-mesh cages, ground enclosures and in the wild. Data are presented as mean ± SD. Number of kits per whelped female is presented at weaning.

	Farm cage	Enclosure	In the wild
Maximum body weight, kg	8.8 ± 1.1 (N=160)	8.6 ± 1.1 (N=27)	3.1 ± 0.6 (N=16)
Loc. activity, min/24 h	288 ± 69 (N=40)	412 ± 117 (N=52)	482 ± 240 (N=11)
Kits/whelped female	10.5 (N=119)	3.1 (N=8)	5.8 (N=5)
% of females delivered	80.7	18.2	varies yearly

Locomotor activity is somewhat lower in foxes housed in farm cages in comparison with enclosures and wild conditions, but the rate varies between individuals, seasons and areas more so in terms of the latter two. High activity in the wild is probably mainly due to the fact that foxes are compelled to move quite frequently in their search for food. According to Frafjord (1992), some roaming foxes travelled 30-40 km in less than three days. Home ranges typically vary between 5 and 120 km^2.

Foxes housed in farm cages had the best reproductive success, whereas those in enclosures had the poorest and only 8 out of 29 females studied whelped. Reproductive success in wild foxes varies considerably, depending e.g. on abundance of the food supply, number of enemies and appropriate breeding areas with dens (*Frafjord, 1992*). In the case of groups, especially groups housed in enclosures, but also in the wild, the major factors restricting whelping success are the high social tension and the aggressions involved in reproductive behaviour (*Korhonen & Alasuutari, 1994a, b*).

Table 2 An example of how to estimate welfare of (arctic) blue foxes. Conditions in a farm cage, an enclosure and in the wild have been compared. Each variable has been classified on a scale of 1-3, where 1 is the poorest and 3 is the best.

Variable	Farm cage	Enclosure	In the wild
Fur quality	good (3)	acceptable (2)	acceptable (2)
Health	good (3)	good (3)	acceptable (2)
Reprod. success	good (3)	poor (1)	variable (2)
Character	semi-tame (2)	rather tame (3)	wild (1)
Lifespan	rather short (1)	rather short (1)	variable (2)
Food quality	good (3)	good (3)	variable (2)
Activity	limited (1)	more free (2)	free (3)
Stimulation	limited (1)	acceptable (2)	free (3)
Total	17	17	17

It is well-known fact that the estimation of an animal's welfare is not necessarily easy. Nevertheless, several sound physiological and behavioural parameters have been presented for its evaluation, also for farmed foxes (*Pedersen, 1993*). Table 2 additionally summarizes some other generally mentioned welfare parameters (*Korhonen, 1991*) One method for comparing the conditions was by a system where points were given to each parameter on a scale of 1-3 and the total points were then calcualted. As can be seen, the sum of the points for each of the three conditions was the same, i.e. 17. This result can also be presented in the form of an equilateral triangle (fig. 1). Thus, it now seems obvious that none of the conditions is totally flawless, but each has both good and bad sides. Every condition requires compromises on the part of the fox, indicating that welfare always is a kind of adaptation to specific circumstances. Finally, it is tempting to ask if the demand for perfect welfare is a realistic or utopic view of evolution.

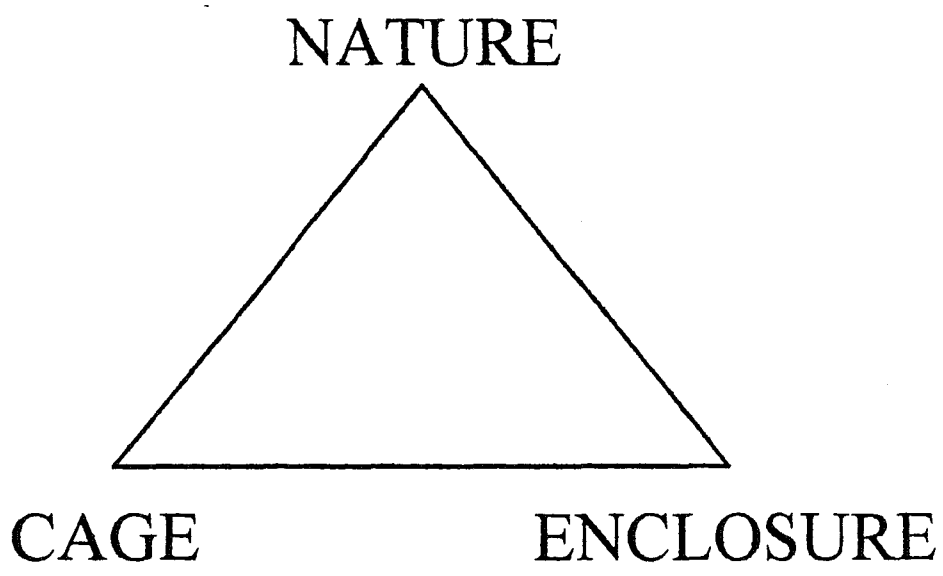

Fig. 1. Evaluation of foxes' welfare based on table 2 can be presented as an equilateral triangle. None of the three living conditions studied is perfect, but all have both good and bad sides. Welfare is a result of the evolutionary adaptation to specific circumstances

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Original Report

Tests on pelt quality and hair coat in raccoon dogs (Nyctereutes procyonoides Grey) from different slaughters

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Abstract

The test material comprised 96 pelts of raccoon dogs slaughtered in three different periods (28 Oct. - 3 Nov.; 10-15 Nov.; 22-27 Nov.). Raw and dressed skins underwent organoleptic and laboratory evaluation. The tests were on traits considered as characteristic: skin weight and area, weight of 1 dm^2 skin, thickness, length, and hair coat density. Results of laboratory and organoleptic tests showed that full fur maturity of the raccoon dog's coat, in Polish climatic conditions, occurs between 10th and 15th November. After this period the coat of the raccoon dog loses much of its hair.

Introduction

The first farm of raccoon dogs was established in 1929 in the western area of the former Soviet Union. Raccoon dogs were quick to acclimatize under cage husbandry which ensured good breeding and rearing results in the young stock.

The first attempts to breed raccoon dogs in Poland were made between 1958-1960. The results of breeding were favourable but, owing to the low prices paid for the pelts and negligible interest of the world market in this kind of pelt, the cage husbandry of these animals was discontinued (*Niedzwiadek, 1981*).

In the late 1970's the world markets became interested in longhaired furs, which made the prices of raccoon dog pelts go up. The raccoon dog, as a new species of animal in cage husbandry, proved a rewarding material. Proper and consistent work on selection and breeding may bring about desired results in a comparatively short time. Introduction of the raccoon dog into large-scale breeding increased the number of pelts in world trade.

The time of slaughter is one of the elements that influence the production of valuable pelts. Premature or late slaughter will cause irreparable deterioration in hair coat quality. Therefore, it was advisable to conduct studies to determine the fur value of raccoon dog pelts obtained from different slaughter dates, and in consequence to determine an optimal time for the slaughter of these animals in Polish conditions.

Materials and methods

The experimental material comprised 96 pelts of year-old raccoon dogs. The pelt-bearing animals were raised in a pavilion system of cages. The animals were fed equal rations in accordance with the feeding standards specified for this species of fur bearers (*Jarosz, 1987; Slawon, 1987*).

Table 1 Parameters of raccoon dog raw skins

Group	Sex	Area (dm^2)		Weight (g)		Weight of 1 dm^2(g)		Length of skin (cm)		Length of tail (cm)	
		X	V	X	V	X	V	X	V	X	V
I	♀	26.7^{ab}	8.6	498.3	10.2	18.7	10.2	101.2^{ef}	7.2	22.3	8.3
	♂	27.1^{cd}	9.2	501.4	9.8	18.6	10.1	103.1^{gj}	7.8	22.5	9.4
II	♀	28.2^{a}	7.3	505.2	8.3	18.1	9.3	108.7^{e}	6.7	22.7	9.1
	♂	28.9^{c}	7.8	510.1	8.7	17.8	8.4	110.2^{g}	6.3	22.9	9.3
III	♀	28.7^{b}	8.1	507.3	9.2	17.8	8.8	109.3^{f}	7.5	22.8	8.7
	♂	28.9^{d}	8.3	509.2	9.7	17.7	8.9	112.2^{h}	7.8	22.9	9.2

Means followed by the same letters are significantly different /P≤ 0.05/.

The animals were slaughtered in three periods:

Group I: 32 raccoon dogs slaughtered between 28 October and 3 November

Group II: 32 raccoon dogs slaughtered between 10 and 15 November

Group III: 32 raccoon dogs slaughtered between 22 and 27 November.

Each group was equal with regard to sex (16 females and 16 males). Raw data were evaluated for the following traits:

- planimetric area of skins, using a planimeter
- skin weight (weighing of skins to an accuracy of 10 g)
- weight of 1 dm^2 skin (coefficient calculated from the ratio of skin area to skin weight)
- skin length from the tip of the nose to the base of the tail,
- tail length

The raw pelts were evaluated and classified into 4 quality grades with special attention paid to the condition of the rough side (dark spots) and hair losses.

Studies on the quality of hair coat comprised the following physical parameters considered as diagnostic in the fur trade (*Kaszowski, 1957*):

- thickness of undercoat hair and guard hair
- length of undercoat hair and guard hair
- density of hair coat

The above measurements were conducted for 6 topographic parts, that is, neck, shoulder girdle, back, pelvic girdle, side, and middle belly. An attempt has been also made to determine the composition of the hair coat colour by measuring the length of colour zones of undercoat hair and guard hair.

Results

Analysis of variance of the traits that distinguish raw pelts showed that the differences between the means for corresponding sexes between the groups were statistically significant. Thus, the results in table 1 are compiled according to sex.

The weight of raw pelts in all groups was similar and ranged from 498.3 to 507.3 g in females, and from 501.4 to 510.1 g in males (table 1). In all groups, the pelts from males were heavier in relation to the weight of female pelts, but these differences were minor and statistically non-significant.

Statistically significant differences between groups were found for pelt area. Group I pelts of both sexes had the smallest area (26.7 - 27.1 dm^2). Greater and similar areas were found in

group II and III pelts (28.2 - 28.9 dm^2). The weight of 1 dm^2 raw pelt was highest for both sexes in group I, and lower and similar in groups II and III. It ranged from 17.8 g to 18.7 g in females, and from 17.7 g to 18.6 g in males.

The difference in the length of pelts was statistically significant. Pelts of group I females were 101.2 cm, of group II 108.7 cm, and of group III 109.3 cm long. Similar regularity was found in the pelts of males: they were longer than the corresponding pelts in females by 2-3 cm.

Tail lengths were not much different between sexes and groups, and ranged from 22.3 to 22.9 cm.

The organoleptic evaluation of raccoon dog raw pelts, with regard to the maturity rate of the rough side and loss of hair, is as follows:

Group	Grades (%)				Immature pelts (%)	Pelts with hair loss (%)
	1	2	3	4		
I	22.2	33.3	33.3	11.1	100.0	-
II	31.6	42.1	21.0	5.3	21.5	-
III	22.0	30.0	25.0	19.8	-	48.4

Table 2 Thickness of hair (microns)

Group		Sample													
		1		2		3		4		5		6		Mean of 6 samples	
		under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard
I	X	12.6	69,2	12.4	76.1	12.3	74.8	12.7	66.2	12.0	68.3	12.3	68.6	12.5	70.3
	V	24.7	27.4	23.3	28.3	25.4	29.4	22.7	27.4	23.1	28.3	24.2	29.3	24.8	27.3
II	X	13.4	71.2	13.1	78.1	13.0	76.4	13.4	68.4	13.2	70.1	13.1	70.2	13.3	72.3
	V	18.3	23.1	19.4	22.7	18.7	21.3	21.3	22.4	20.4	23.7	18.8	24.1	21.3	22.1
III	X	13.5	71.3	13.0	77.9	13.1	75.9	13.2	68.8	13.1	69.8	13.2	71.0	13.2	72.4
	V	19.7	24.3	21.3	28.3	19.4	24.1	21.7	23.1	23.4	24.1	19.8	22.7	21.8	23.2

The mean thickness of undercoat hairs in group I pelts was smaller in every sample analysed (12 - 12.7 microns) than in the remaining groups (table 2). The mean calculated from 6 samples for this group was 12.5 microns. The thickness of undercoat hairs of group II and III pelts was higher and closely similar in the corresponding samples: the mean values calculated from 6 samples were 13.3 and 13.2 microns, respectively.

Similar regularity was observed for the thickness of guard hairs. The lowest values across all samples were obtained for the pelts of group I, where the mean was 70.3 microns, whilst they were 72.3 and 72.4 microns in groups II and III.

The differences in the thickness of undercoat hair and guard hair between groups were not confirmed as statistically significant either in samples or in means for 6 samples.

Similar variation between groups was found in the length of hair (table 3). The shortest undercoat hair was found in group I pelts in all analysed samples, the mean from 6 samples being 56.4 mm. The length of undercover hair in pelts of groups II and III was closely similar in the corresponding samples, the average of 6 samples being 59.0 and 58.9 cm. It should be noted that the longest undercoat hair and guard hair in all groups were shown in samples 3 and 4, and the shortest in sample 6.

Table 3 Length of hair (mm)

Group		Sample 1		2		3		4		5		6		Mean of 6 samples	
		under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard
I	X	56.5	76.4	54.2	81.3	62.8	92.1	60.3	86.3	59.5	82.3	44.7	64.0	56.4	80.0
	V	9.2	10.3	8.7	9.2	7.6	11.2	10.3	9.8	7.6	9.9	10.1	11.2	8.4	9.2
II	X	58.5	80.1	57.2	84.2	65.4	96.1	62.7	88.4	61.3	84.7	47.8	68.0	59.0	83.7
	V	7.3	7.6	8.3	9.1	8.4	7.6	9.8	10.3	8.7	9.3	7.8	9.3	7.8	8.4
III	X	57.9	81.2	57.1	83.9	65.6	95.9	63.1	88.8	61.9	84.3	47.9	68.3	58.9	83.9
	V	8.1	8.4	11.3	12.3	8.9	9.3	10.2	11.4	9.7	9.9	9.7	10.3	8.1	9.1

Table 4 Hair density of raccoon dog per 1 cm^2 skin

Group		Sample 1		2		3		4		5		6		Mean of 6 samples	
		under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard	under-coat	guard
I	X	9870	210	10520	170	10840	175	9750	158	7870	130	3800	107	8780	158
	V	20.2	21.3	22.4	27.1	21.4	24.5	20.8	25.7	21.3	24.7	22.7	26.8	21.3	24.7
II	X	10540	237	11020	197	11320	208	10200	175	8870	145	4250	123	9360	180
	V	18.6	21.4	19.2	21.7	20.3	24.7	21.3	24.3	22.7	24.8	19.8	24.7	20.4	23.8
III	X	10238	235	10700	195	10280	208	9800	173	8650	148	4150	121	8990	179
	V	21.3	24.7	20.8	20.3	23.7	21.4	25.3	22.4	24.7	21.7	20.3	24.7	21.4	22.8

Undercoat hair density of group I pelts was different across samples and was highest in samples 3 and 2 at 10840 and 10520 hairs/1 cm^2 pelt, respectively, and lowest in group 6 at 3800 hairs/1 cm^2 pelt (table 4).

The highest density was observed in group II pelts. In samples 1-4, the density ranged from 10200 to 11320 hairs/1 cm^2 pelt. A slightly lower density of undercoat hair was found in group III, where the mean density for 6 samples in groups was 8780, 9360 and 8990 hairs/1 cm^2 pelt, respectively.

Similar regularity was observed in the number of guard hairs per 1 cm^2 pelt. A decreasing number of guard hairs in samples 1 to 6 was observed across all groups. The mean number of guard hairs calculated for 6 samples in test groups was 158, 180, and 179/1 cm^2 pelt.

The differences between groups both in particular samples and for all pelts were not confirmed as statistically significant.

The evaluation of hair coat colour composition was based on the measurement of the dimensions of the colour patches of the undercoat and guard hairs (table 5). Uniform colour of guard hair was found in samples 2, 5, and 6 in all groups. In the remaining groups two colour zones were singled out: dark-grey and light-grey. In sample 6 there was a light-grey colour all the way along the hair. Three colour zones, marked as A, B, and C were found for guard hair in all samples under study. The length of black-coloured zones from the tip of the hair (A) was different among topographical parts and groups. Higher and similar values were found for groups II and III. Lowest values were obtained for all groups in sample 3, highest ones in sample 5.

Table 5 Colour zone lengths of guard and undercoat hairs expresses as percentage of length of the entire hair

Colour zone length of guard hair	Group	Sample					
		1	2	3	4	5	6
A	I	42.3	40.8	32.7	35.4	56.0	58.4
	II	44.3	42.3	33.7	36.5	56.5	59.1
	III	45.8	43.2	34.1	35.9	56.0	58.7
B	I	27.1	22.7	25.4	25.9	17.2	24.0
	II	26.4	21.8	26.1	25.3	16.6	23.7
	III	25.9	20.9	26.0	25.8	16.2	23.9
C	I	30.6	36.5	41.9	38.7	26.8	17.6
	II	29.3	35.9	40.2	38.2	26.9	17.2
	III	28.3	35.9	39.9	38.3	27.8	17.4
Colour zone length of undercoat hair: - at base (dark-grey or dark- brown patch)	I	52.0	100.0	69.7	72.8	100.0	-
	II	52.2	100.0	70.5	73.4	100.0	-
	III	51.9	100.0	70.2	73.5	100.0	-
- at tip (light-grey or light-brown/red patch)	I	48.0	-	30.3	27.2	-	100.0
	II	47.8	-	29.5	26.6	-	100.0
	III	48.1	-	29.8	26.5	-	100.0

The length of the white streak in mid-hair (B) also showed variation depending on sample and group. Highly similar values were found for groups II and III in the corresponding samples, and lower ones in group I.

Considerably greater variation in the length of the black-coloured streak measured at the hair tip (C) was found in all groups between particular samples, the differences across groups being smaller. The longest black streak was found in samples 3 and 4, and 2.

As follows from the data obtained, the variation between groups was small. In all groups the length of the black zone (A) is dominant in samples 1, 2, 5, and 6, and zone C in sample 3. In undercoat hairs, the dark-grey streak occurs all the way along the hair in samples 2 and 5, and light-grey in sample 6.

Discussion

Pelt-tested raccoon dogs had different body weights: animals slaughtered between 28 Oct. and 3 Nov. weighed 9200 g on average; between 10-15 Nov., 9510 g; between 22-27 Nov., 9620 g. Mean body weight for this period was in line with the figures given by Jarosz (1987), and Sapovalov (1984). Valtonen (1979) recognizes, for Scandinavian conditions, a body weight higher by 800 to 1000 g.

The weights of raw skin obtained were different and dependent on slaughter date - the later the slaughter the higher the weight of the pelt. This is due above all to the pre-slaughter weight of the animals, and these two are highly correlated (*Kaszowski, 1957; Niedzwiadek, 1981; Zon, 1991*). These authors also specify the high correlation between the weight of slaughtered animals

and the area and length of raw skins. This is fully justified in the present study. The weight of 1 dm^2 raw skin (the lower the better) varied, being decidedly higher for pelts obtained between 28 Oct. - 3 Nov. It was most favourable in pelts from the slaughter of 10-15 Nov. Comparison of the length and weight of raw pelts with figures given by other authors shows our figures obtained to be decidedly higher (*Perczak, 1963; Wolinski, 1987*). This testifies to the considerable progress in breeding work and in the rationalization of feeding and rearing. It must be stressed, however, that the length of raw pelts at 110 cm long was smaller by 30% than the length of pelts from raccoon dogs of Scandinavian origin (*Zon, 1991*).

An important indicator of fur value is the thickness of undercoat hairs and guard hairs. The thickness of undercoat hairs in the pelts of raccoon dogs under study was above 11 microns in all topographical parts and slaughter dates. It varied, however, depending on the time of slaughter. In early-slaughtered pelts it was lower at just over 12 microns. In the remaining dates it was over 13 microns for the pelts on average. This confirms that the hair coat from the slaughter of 28 Oct. - 3 Nov. had not completed its growth period. Attention should be paid to the very equal thickness of undercoat hair throughout the pelt area. Similarly, the thickness of guard hair shows variation depending on slaughter time. Lower values from the earliest slaughter testify to the continuing growth of hair. Guard hair thickness also varied in terms of topography, the thickest hairs occurring in the pelvic girdle and back zones. It was similar in the remaining topographical parts. Similar values for the thickness of both types of hair are given by Korhonen and Harri (1986), Mazurkiewicz (1987), Palimaka-Rapacz and Niedzwiadek (1989), and Wolinski (1987).

The length of undercoat hair and guard hair also shows a dependence on the slaughter date. The shortest hair was characteristic of pelts obtained from the slaughter of 28 Oct. - 3 Nov., which testifies also to the unfinished growth period. These values differed, compared to pelts from subsequent slaughters, by 2.3 mm for undercoat hair and 3.8 mm for guard hair. Figures for pelts from the slaughter of 10-15 Nov. are on the same level as figures given by other authors (*Korhonen and Harri, 1986; Palimaka-Rapacz and Niedzwiadek, 1989; Zon, 1991*).

Hair coat density, expressed as the number of hairs per 1 cm^2 pelt area, varied both between slaughter dates and topographic parts. The most desirable density was found in pelts obtained between 10-15 Nov. The thickest topographical parts were back and shoulder girdle, the lowest density was displayed on the belly. The density of pelts obtained between 10-15 Nov. was higher by 500-800 hairs/1 cm^2 in relation to figures given by Palimaka-Rapacz and Niedzwiadek (1989), and Zon (1991).

Raccoon dog pelts show a varied colour of hair coat. In Poland 3 colour types are distinguishable: silvery grey, golden brown, and intermediate (*Niedzwiadek, 1981; Zon, 1991*). The colour of hair coat may have different tones depending on colour intensity. The colour type of hair coat depends above all on the colour of undercoat hair. In the present study a zonal colouring of undercoat hair has been ascertained in the following topographic parts: neck, pelvic girdle, and all the way down to the base of the tail. In the remaining topographic parts, the colouring of undercoat hairs occurred from their entire length. The golden brown type was made up by undercoat hair of brown dark and light brown colourings. The intermediate colour type was characterized by a dark-grey colouring at the root of the hair and a light brown colouring at the tip. The silvery grey type preferable in breeding work and selection was made up by undercoat hair that was grey-coloured at the root and brighter at the tip. Similar characteristics of undercoat hair colour is given by Ciurzynski (1982), and Zon (1991).

The overall tone of hair coat colour and the silver-plating effect is given by guard hair classified into 3 colour zones: dark-grey at the root, white (plain) in the middle, and dark at the tip. The silver-plating effect of hair coat was distinct in those topographic parts in which the relative length of plain zone (white) and dark at the root of guard hair was greater than NAP. The most visible effect of silver-plating occurred on the side and the belly. Intensity of coat weil depended on the length of the black zone at the tip of the guard hair. It must be noted that the relation between the length of the hair colour zones, which influenced the hair colour composition of raccoon dogs, were similar to Blue foxes as described by Cholewa and Gedymin (1980).

The organoleptic evaluation of pelts showed that all pelts from the slaughter of 28 Oct. - 3 Nov. showed blue spots on the pelt that are proof of the fur's immaturity. The most advantageous classification was for pelts from the slaughter of 10-15 Nov., where only 21.5% showed blue spots on the rough skin, but where no cases of loss of hair were reported. In the slaughter of 20-27 Nov., over 48% pelts showed distinct losses of hair. These losses were due to hair broken mostly in the nape, pelvic girdle, and side parts. Hair breakage should be associated with its reduced elasticity and springiness, which most probably is due to the fast-decreasing secretion of endocrine glands in the hair after the hair coat reached full maturity.

In summing up the results of the laboratory and organoleptic studies of the traits which influence fur quality, it must be stated that, under Polish climatic conditions, raccoon dog pelts reach full winter maturity around mid-November. An earlier date of slaughter does not cause fur quality to deteriorate visibly but, as studies showed, such a coat is not fully grown and not mature. The slaughter of raccoon dogs at a later period, that is after 20 November, causes significant losses and decreases the quality of hair coat due mostly to the great loss of hair.

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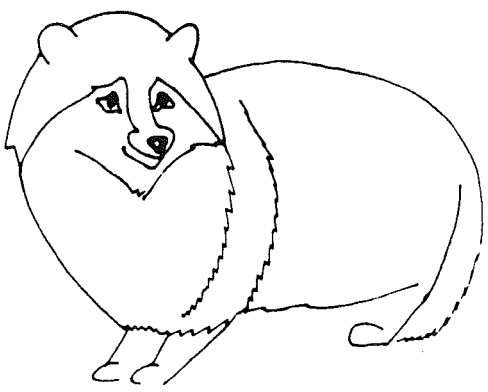


The role of the adrenal glands in regulating onset of winter fur growth in mink (*Mustela vison*)

Jack Rose, Mauritz Sterner

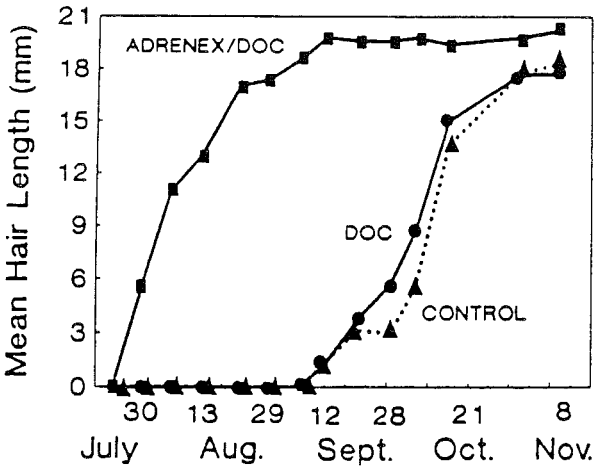


Fig. 1 Fur growth of adult female standard dark mink subjected to bilateral adrenalectomy and treated with deoxycorticosterone (ADRENEX/-DOC, N=5), treated with deoxycorticosterone (DOC, N=4) only, and Controls (N=6) from July 23 to November 8, 1990. The common estimate of the standard error of the mean was ± 1.10 mm.

The role of the adrenal glands in regulating onset of winter fur growth in mink was investigated in long-term adrenalectomized animals. Bilateral adrenalectomy of adult female standard dark mink between June 23 and July 11, 1990, initiated onset of winter fur growth approximately 6 weeks earlier than controls. One month following completion of the winter fur growth in adrenalectomized mink, molting and growth of a new coat was observed. The type of pelage that grew as a result of the second growth wave was less dense than the normal summer or winter fur. However, this renewed hair growth suggests that adrenal hormones not only inhibit the onset of winter fur growth but also influence the duration of inactivity following each period of hair growth. Administration of deoxycorticosterone as a mineralocorticoid supplement had no effect on initiation of fur growth. It would appear that adrenal hormones are part of the mechanism through which photoperiod regulates fur growth in the mink. The identity of the adrenal hormones and their site of action is unknown.

The Journal of Experimental Zoology 262: 469-473, 1992. 1 fig., 45 refs. Authors' abstact.

Ultrasonography of the adrenal gland

Curtis G. Schelling

A current review of ultrasonographic adrenal imaging is presented with emphasis on the clinical and problematic aspects of adrenal disease in the dog. Examples are presented to illustrate the usefulness of ultrasonography in distinguishing between canine pituitary- and adrenal-dependent hyperadrenocorticism. Adrenal imaging in the cat and ferret are discussed briefly. When coordination of sonographic findings with clinical and biochemical results is implemented properly, ultrasonography becomes a powerful and specific diagnostic tool for adrenal disease.

Problems in Veterinary Medicine (USA), Vol. 3, No. 4, p. 604-617, 1991. 1 table, 9 figs., 12 refs. Author's abstract.

Early maturation of the coat in foxes

I.I. Kravtsov, G.A. Kuznetsov

Data were obtained on 3 groups, each of 10 silver-black foxes, implanted at the beginning of June with 20 or 40 mg melatonin or not implanted (controls). Maturation of the coat was completed 23 and 25 days earlier in the 2 treated groups resp. than in the controls, but there was no difference in coat quality. In a follow-up experiment, groups of 20-30 foxes were housed in sheds shaded so that the light allowance in July-Sep. would be 40 lux (groups 1-5), or were kept under natural light (groups 6-10). Various groups were given different implants of melatonin (10 or 20 mg) on different dates (1 or 16 July, 1 Aug.). At cropping, the largest animals were those housed under restricted light and given the 20 mg implants on 16 July (body weight 6973 g, body length 69.4 cm, and coat

mature 6 days earlier than in controls) and those housed under natural light and given the 20 mg implants on 1 July (body weight 6803 g, body length 70.0 cm and coat mature 24 days earlier than in unimplanted controls). The animals in the first of these 2 groups received the highest points (110.3) for overall pelt quality and a low percentage of defective pelts.

Krolikovodstvo i Zverovodstvo, No. 2, p. 8, 1990. 1 table. CAB-abstract.

Melakril shortens the rearing period of fur bearers

O.L. Rapoport, V.G. Bernatskii, A.A. Khudyakova

Data were obtained on 14,680 mink implanted in 25 June-10 July with melatonin in a biodegrable polymer (Melakril), and on 15,800 untreated controls. Maturation of the coat was completed 35-55 days earlier in the treated animals than in the controls, but there was no difference in coat quality. The date of completed maturation of the pelt differed between colour types, Ampalo silver being the earliest (9 Sep.) and Standards the latest (6 Oct.) of the treated group; the controls were cropped from 18 Nov. For the treated group, the density of undercoat and guard hairs averaged 176 and 15 mm^2 resp. vs. 162 and 13 for the controls.

Krolikovodstvo i Zverovodstvo, No. 4, p. 9, 12, 1990. In RUSS. 1 table. CAB-abstract.

The effect of repeated blood sampling on different hormonal and immunological parameters in silver fox vixens (*Vulpes vulpes*)

Randi Oppermann Moe, Morten Bakken

Evaluation of blood parameters is often an important part of animal experimentation. Unless permanent catheters are used, blood sampling entails handling the animal one or more times. This is also the case in fur animal research, where blood values have been used in a wide range of experiments. It has been shown that the presence of humans, handling and immobilization are stressors for the majority of farmed silver foxes. Repeated handling and blood sampling may influence the animals' physiological status and therefore also the parameters of interest in the experiment. The aim of the present study was to elucidate whether repeated blood sampling series can influence a range of hormonal and immunological parameters in the silver fox.

A total of 14 one-year-old silver fox vixens were divided into two groups. The animals in Group 1 were blood-sampled every two weeks for a year: five samples were taken with 30-minute intervals on each occasion. Those in Group 2 functioned as controls and were not sampled in that period. At the end of this period, a similar series of samples was taken from both groups. The following parameters were then measured: eosinophilic and neutrophilic granulocytes, lymphocytes, total numbers of red and white blood cells and plasma concentrations of cortisol, prolactin and testosterone. During the experiment the animals were lifted out of their cages using neck tongs and blood was sampled from the cephalic vein on the forelimb. Each blood sample took approximately two minutes. The staff handling the animals were the same during the whole experiment.

The numbers of white blood cells, neutrophilic granulocytes and plasma concentrations of prolactin varied between groups but not within a sample series. The numbers of eosinophilic granulocytes and total red cells varied within a sample series, but significant differences were not registered between the groups. Plasma concentrations of cortisol and testosterone, together with total lymphocyte numbers, varied both between groups and within a sample series. Testosterone concentrations showed the greatest variations. Repeated blood sampling resulted in significantly lower concentrations of testosterone compared with the controls.

These results are based on relatively few animals, but suggest that repeated blood sampling over a long period can influence the values of several blood parameters. Furthermore, effects can also be demonstrated during repeated sampling over a short period.

NJF Proceedings No. 92, 1994, Oslo. Authors' summary.

Immobilization of mink (*Mustela vison*) with medetomidine-ketamine and remobilization with atipamezole

J.M. Arnemo, N.E. Søli

Four groups of mink were immobilized with medetomidine-HCl (MED) 0.1 mg/kg + ketamine (KET) 5 or 7.5 mg/kg at different ambient temperatures. The induction time, degree of immobilization and analgesia, rectal temperature, heart and respiration rates were recorded at intervals throughout the immobilization period. The animals were then given atipamezole-HCl (ATI) 0.5 mg/kg for reversal at different times after injection of MED/KET and the effects of the antagonist were evaluated.

Subcutaneous administration of MED/KET induced complete immobilization in all 20 animals, and the highest dose was considered suitable for major surgery. Prolonged immobilization at low ambient temperatures (-10 to +5°C) caused severe hypothermia in all animals. The mean rectal temperature had dropped to 37.8°C and 32.1°C at 15 and 85 min, respectively, after injection of MED/KET, significantly lower than the corresponding values for the animals' immobilized temperature.

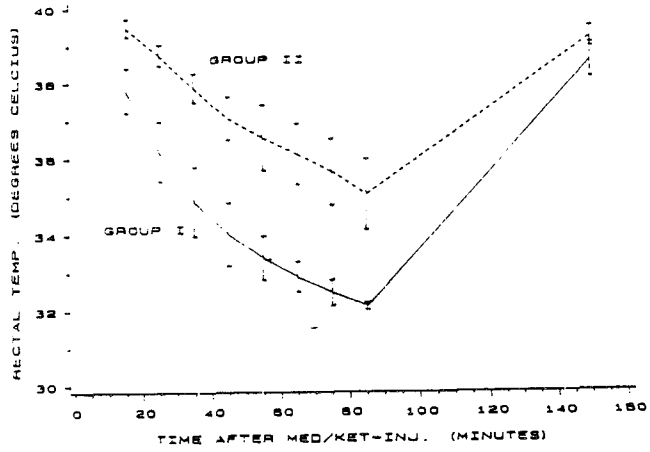


Fig. 1 Mean rectal temperatures of mink immobilized with medetomidine-ketamine (MED/-KET) at different ambient temperatures: group I - outdoors (-10 to +5°C); group II - room temperature (22 to 24°C). Both groups received atipamezole 90 min after injection of MED/KET.

Intramuscular administration of ATI 20 or 40 min after injection of MED/KET rapidly remobilized the animals without apparent side-effects. Administration of ATI to animals recovering spontaneously 90 min after injection of MED/KET induced thermogenesis (shivering) in animals immobilized at a low ambient temperature, while no such effect was seen in animals immobilized at room temperature. One hour after injection of ATI, the rectal temperatures of all treated animals had returned to normal and there were no signs of abnormal behaviour.

Veterinary Research Communications, 16, 4, p. 281-292, 1992. 2 tables, 1 fig., 41 refs. Authors' abstract.

Isolated, buffer-perfused ferret heart: A new model for the study of cardiac physiology and metabolism

Stefan Neubauer, Joanne S. Ingwall

The isolated, buffer-perfused ferret heart is a new model for the study of cardiac physiology and metabolism. Compared to the more commonly used isolated heart preparation, the rat heart, the ferret has a lower rate-pressure product due to lower heart rate, a remarkably low coronary flow and almost complete oxygen extraction. The ferret heart remains in stable haemodynamic and metabolic conditions for a longer period of time than the rat heart. ATP contents of the two species are similar, but creatine phosphate content is higher in the ferret while NAD content is much lower.

Laboratory Animals, 25, p. 348-353, 1991. 5 tables, 1 fig., 13 refs. Authors' summary.

Analyzing fur damage with a microscope

Roy J. Pence

Fur damage is often difficult to diagnose with the naked eye - especially after the fur has been cleaned or brushed, and the loose, visible evidence has been removed. This circular describes and illustrates with photos certain unmistakable characteristics of various kinds of damage, including that caused by insects, as seen under the

microscope. Fur-damaging insects are also described and shown, and a section is included on the care and protection of furs.

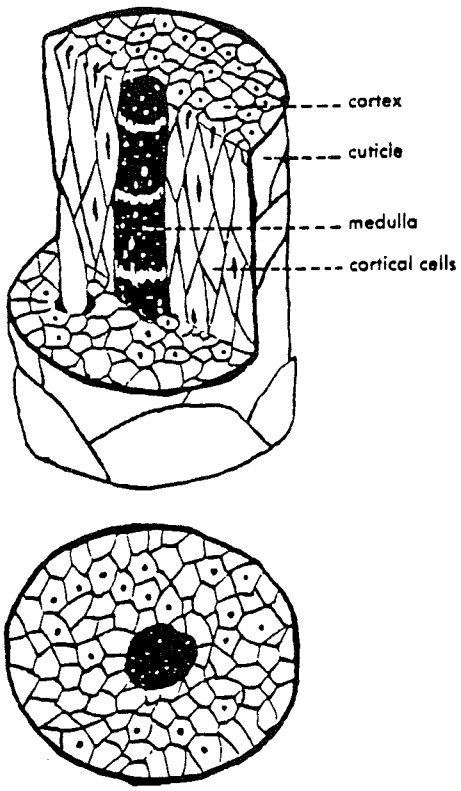


Fig. Cutaway and cross-section of an animal fiber (guard hair) showing internal structure. The cortex is made up of millions of cortical cells. The medulla is partially hollow. (Modified from Wool as an Apparel Fiber, by G.E. Hopkins, N.Y.-Toronto: Rinehart & Co., Inc., 1953)

Circular 541 from California Agricultural Experiment Station, 1966. 17 pp. 21 figs. Author's summary.

The cartilages of larynx in farm mink

C. Lisovschi-Chelesanu, M. Miclea

The cartilages of larynx were studied in 10 fresh farm mink bodies and compared with those of other carnivores. The thyroidian cartilage was generally larger with *cornu caudalis* much more developed than in other carnivores. The epiglottis had a widened basis and a very sharp tip. *Processus corniculatus* of arytenoid was represented only by a reduced extension.

Buletinul Institutylui Agronomic Cluj-Napoca Seria Zootehnie si Medicina Veterinara, 46, p. 109-111, 1992. In RUM, Su. ENGL. 2 figs., 5 refs. Authors' summary.

Comparative studies on *in vitro* mitogen-induced proliferation of peripheral blood lymphocytes in dog and breeding fox

K. Kostro, K. Wiktorowicz

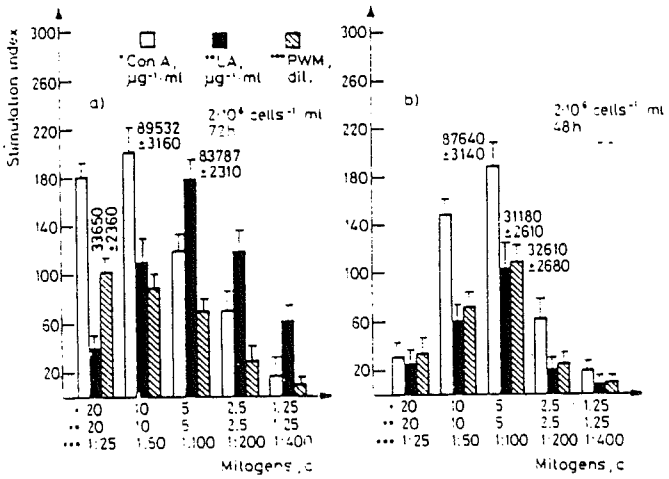


Fig. 1 Stimulation indices (SI) in dog peripheral blood lymphocytes cultured for 3 days (a) and in fox peripheral blood lymphocytes cultured for 2 days (b) with various doses of concanavalin A (Con A), leucoagglutinin (LA) or pokeweed mitogen (PWM). Each bar represents mean values ± SD from 10 experiments. Numbers adjacent to the bars are the mean values

In vitro blastogenesis of dog and fox lymphocytes was compared by a microculture technique. The highest ^{3}H-thymidine incorporation in cultures of dog lymphocytes was observed at day 3, while in those of fox at day 2, incubated either at 37°C or at 39°C. Lymphocytes cultured at 39°C incorporated more tritiated thymidine than did cells cultured at 37°C. The stimulation index (SI) of dog peripheral blood lymphocytes

to both mitogens concanavalin A (Con A) and leucoagglutinin (LA) was in a similar range, while pokeweed mitogen (PWM) showed a weaker but significant stimulatory action. The blastogenesis of fox lymphocytes was the greatest in Con A stimulated cultures. The mitogenic potency of LA and PWM was about half of that of Con A, with no essential difference between them. Maximum lymphocyte proliferation of dog and fox was observed when culture media were supplemented with 10% fetal calf serum (FCS).

Acta Veterinaria Hungarica 40 (1-2), p. 39-45, 1992. 3 figs., 21 refs. Authors' summary.

Analysis of the volume of cerebral circle and basal artery in blue fox

Danuta Goscicka, Jerzy Gielecki, Witold Brudnicki, Ryszard Jablonski

Observations were performed on 30 brains of blue foxes, whose arteries were filled with synthetic latex. The measurements of volume, length and diameter of the basal artery and arteries that made the cerebral circle were done using digital image analysis system. It has been indicated that an average volume of the cerebral circle in that species was 12.96 mm^3 and was statistically highly important correlated with the weight of the brain (0.83). The total volume of the cerebral nasal arteries was estimated as 4.96 mm^3 and the volume of the communicating caudal arteries was 8.08 mm^3. No statistically important correlation has been indicated between the weight of the brain and the volume of the basal artery (8.84 mm^3). The volume of the basal artery was negatively correlated with the length of the vessel (-0.42).

Polskie Archiwum Weterynaryjne 31, 1-2, p. 83-90, 1991. 4 figs., 2 tables, 16 refs. Authors' summary.

Participation of the splanchnic nerves in the structure of the celiac plexus in the coypu

Marian Langenfeld

From 28 dead coypu, the greater splanchnic nerve, lesser splanchnic nerve and lumbar splanchnic nerves as well as their participation in the structure of the celiac plexus were investigated.

1. Individual differences in the formation of the celiac plexus were found.
2. The greatest contribution to the formation of the celiac plexus is of the greater splanchnic nerve, in 100% on both sides, next of the lesser splanchnic nerve, in 53.57% on the right and 57.14% on the left side, and of the lumbar splanchnic nerves, in 25% on the right and 28.57% on the left side of the body.
3. No differences due to sex were found between the studied coypu.

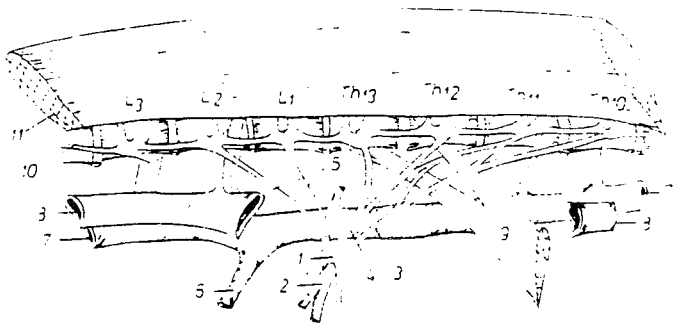
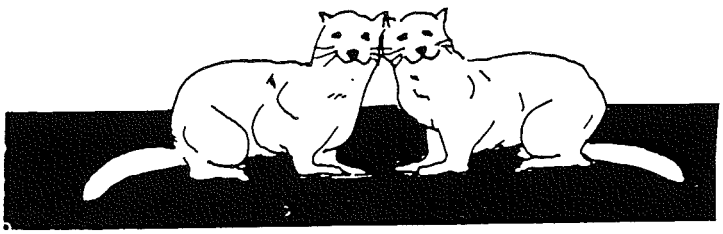


Fig. 1 The celiac plexus of the coypu (light aspect): 1 - celiac plexus, 2 - celiac artery, 3 - greater splanchnic nerve, 4 - lesser splanchnic nerve, 5 - lumbar splanchnic nerves, 6 - cranial mesenteric artery, 7 - aorta, 8 - caudal vena cava, 9 - diaphragm, 10 - sympathetic trunk, 11 - psoas major muscle; Th_{10}-th_{13} and L_1-L_3 - sympathetic trunks ganglia

Polskie Archiwum Weterynaryjne 21, 1-2, p. 141-145, 1991. 1 table, 1 fig., 6 refs. Authors' synopsis and conclusion.



Comparative studies of the serum lipoproteins and lipids in some domestic, laboratory and wild animals

J. Vitic, J. Stevanovic

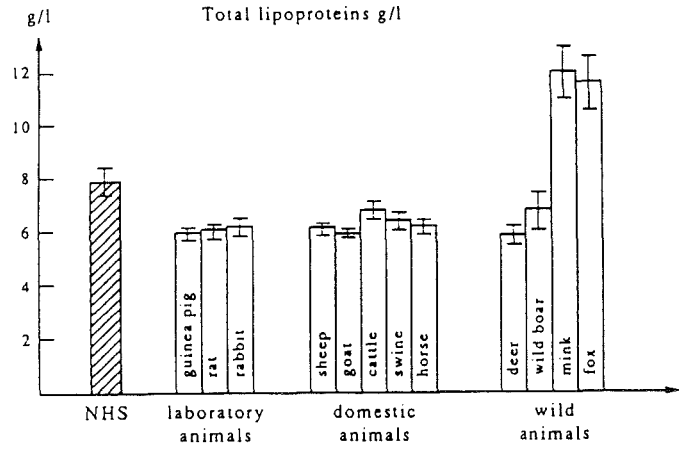


Fig. 1 The concentration of total serum lipoproteins of laboratory, domestic and wild animals. For comparison, the concentration of total lipoproteins in normal human serum is also presented

1. The concentration of lipoproteins and lipids in the sera of several species of healthy adult laboratory animals (guinea-pig, rabbit and rat), domestic animals (cattle, sheep, goat, horse and swine) and wild animals (deer, wild boar, mink and fox) have been investigated under physiological conditions. Special attention was paid to the lipoproteins which are precipitated with heparin-$MnCl_2$ and to the ratio of lipids in separated alpha and beta lipoproteins.

2. Most of the studied animals had significantly lower concentrations of total lipoproteins, beta lipoproteins and cholesterol than those in man ($P<0.001$). Only some wild animals (mink and fox) had concentrations of total lipoproteins, beta lipoproteins, phospholipids and cholesterol which were significantly higher than man's ($P<0.001$).

3. The ratio of lipids in the separated lipoprotein fractions also differed between the examined animals. Thus, in the sheep, rabbit, guinea-pig and wild boar most of the cholesterol (70-76%) was in beta lipoproteins. However, in the horse (60%), mink (60%), fox (65%), goat (70%) and cattle (73%) the high density lipoprotein fraction was the main carrier of cholesterol.

4. With the exception of the guinea-pig (42%) most of the serum phospholipids were found in the high density lipoprotein fraction.

Comp. Biochem. Physiol. Vol. 106B, No. 1, p. 223-229, 1993. 3 tables, 5 figs., 29 refs. Authors' summary.

Chemical composition and biological value of nutria meat

Mirjana Latkovska, S. Savic, Vidica Stanacev

The use of nutria meat in human nutrition is one of the factors which can reduce expenses of nutria breeding.

Thirty nutrias were used to estimate chemical composition and biological value of meat. After being sacrificed the meat samples were taken for analysis. The average dressing percentage was found to be 52.5.

Based on chemical analysis, the high percentage of meat protein was found ranging from 21.53 to 23.14%. Results of amino acid analysis proved the nutria meat to be high in essential amino acids.

According to the results given in this paper, a general conclusion can be made that besides good pelt quality, nutria can be used as a source of high quality meat for human consumption.

Savremena Poljoprivreda, 39, 1, p. 35-40, 1991. 5 tables, 15 refs. Authors' summary.

Effect of addition of fox fat and cattle tallow to feed mixtures for hens on the laying rate

A. Zglobica, S. Wezyk

The effect of 2% addition of fox fat or cattle tallow to feed mixtures composed of domestic feed raw materials, without the share of maize and soybean meal, on the laying rate of hens was investigated. The experiment comprised 1500

hens and 175 cocks of the Astra-S type, divided into 5 groups, in 5 replications each.

From the 21st-64th week of hen life the laying rate, feed consumption and bird health were determined. In the 34th and 58th week of hen life the quality of eggs was estimated, while in the spring 3 test hatchings were performed.

In the course of 44-week observations better health (1.8-0.9%) of deaths) of birds fed fat-containing feed mixtures as compared with the control group (5.67% of deaths) were found.

Hens from the experimental groups reached a higher mean number of layed eggs in conversion to the initial state of hens (225.8-229.4) as compared to hens of the control group (222.4).

Highly significantly higher mean egg weights (59.4 g) were reached by hens of the control group at the lowest feed consumption (3.54 kg per 1 kg of eggs).

Eggs of the experimental hens showed less intensive yolk colour, on average; by 3.5° in the 34th week and 1.7° in the 58th week.

No effect of the applied fats on impregnation and laying rate has been proved, whereas in the control group a higher per cent (3.34) of weak and crippled chicks was found.

Roczniki Nauk Rolniczych Seria B, Zootechniczna, 105, 3-4, p. 69-81, 1990. 6 tables, 17 refs. In POLH, Su ENGL, RUSS. Authors' summary.

Influence of addition of fox fat to feed mixtures for growing chicks on the rearing results

A. Zglobica, S. Wezyk

The effectiveness of feed mixtures containing home-made feeds, in which the energy level was equalized by addition of 2% of fox fat to feed of laying-type chicks during their rearing period (0-20 weeks of life) was investigated. The results obtained were compared with the results of rearing chicks fed similar mixtures, but without fat addition and fed maize-soybean mixture with approximate energetic value.

The results obtained in the 20th week of life proved an insignificant tendency to body weight increase from 1601.3 g up to 1688.2 g and lower feed consumption from 9.342 to 9.080 kg at feeding rations with added fat. Also significantly better conversion of feed mixtures with added fox fat, amounting to 5.52-5.71 kg as compared with 6.00 kg of fatless mixture has been found.

Roczniki Nauk Rolniczych Seria B, Zootechniczna, 106, 3-4, p. 101-111, 1991. 7 tables, 16 refs. In POLH, Su. ENGL, RUSS. Authors' summary.

Wintering strategy of the raccoon dog as judged from its thermoregulatory properties

Hannu Korhonen, Mikko Harri

Although the raccoon dog (*Nyctereutes procyonoides*) has a thick and warm coat, comparable to that of the blue fox (*Alopex lagopus*), its lower critical temperature (T_{lc}) is rather high at close to +10°C. Below this temperature the metabolic rate (y) increases with decreasing air temperature (x), and can be described with the equation $y = 14.8-0.28x$. This increased heat production in the cold cannot be explained by chemical thermogenesis which, although measured for two-month-old whelps, is totally absent in adults. The adults have to resort to shivering, the activity of which increases with decreasing temperatures. At -18°C the mean retified voltage of EMG averages 20.3 uV, which is 4.5 times higher than the EMG activity measured at thermoneutrality. In normal Finnish winter weather continuous shivering is thus required for the maintenance of homeothermy. Representative infrared thermographs showed that heat loss of the raccoon dog is greatest from the chest, the head, the abdomen and the feet. Especially the ventral surface seems to be a significant heat loss route. The blue fox is somewhat better insulated than the raccoon dog. Basking behaviour associated with the black chest colour seems to play a role in the thermoregulation of the raccoon dog during spring. At its best the solar energy gain could be at most 1.5 times the resting metabolic rate (RMR) of this species. Furthermore, the raccoon dog is a poor hunter. Especially its ability to move on snow is very limited because of its small foot

pads which, in addition, are very sensitive to frost bites. Thus, unlike the blue fox, the raccoon dog is poorly adapted to Finnish climate. Other properties than thermoregulatory ones have to be re-searched to explain its succesfull colonization of the country.

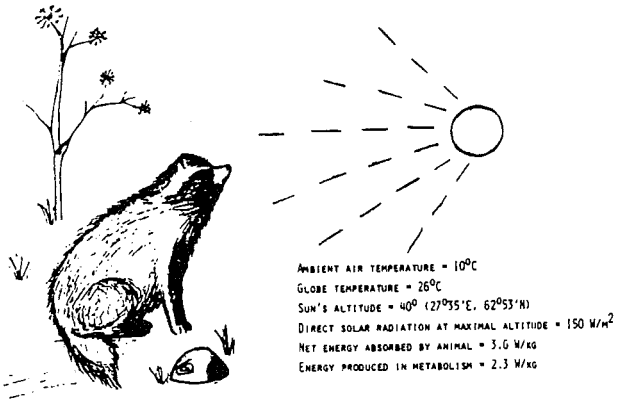


Fig. 9. Diagramatic illustration of a basking raccoon dog. Redrawn from a photograph. Note the raised nose and direction of the black chest area towards the sun. Form Korhonen 1984.

Aquilo Ser. Zool. 24, p. 29-36, 1989. 9 figs., 35 refs. Authors' summary.

Some aspects about accomodation and exploitation conditions in a nutria farm

Marcela Sirbu, Mirela Cadar

The work aims to analyze constructive details, like

- thermic isolation of cages
- the decrease of pool's cross section
- the decrease of collector drain
- the suppression of nests inside the shelter for breeding youth.

All this has some influence upon the nutria farm's conditions.

Buletinul Institutului Agronomic Cluj-Napoca Seria Zootehnie si Medicina Veterinary, 45, p. 57-59, 1991. 2 refs. In RUM, Su. ENGL. Authors' summary.

Martens

Anonymous

This paper is a summary of data on the size, coat characters, sexual maturity and feeding of martens of several species used in fur farming. The data were extracted from 2 Russian publications: Biologiya i razvedenie sobolei i kunits (Moscow, 1947) and Okhota na pushnykh zverei (Moscow, 1980).

Krolikovodstvo i Zverovodstvo, No. 4, p. 12, 1992. 2 tables.

Serum chemistry values of the endangered san Joaquin kit fox (*Vulpes macrotis mutica*)

Patrick M. McCue, Thomas P. O'Farrell

Serum chemistry values were obtained from 64 adult San Joaquin kit foxes (*vulpes macrotis mutica*) in western Kern County, California (USA). The goal of the study was to establish normal chemistry values for this endangered species. No significant differences were found for mean values of alanine aminotransferase (217.1 IU/l), alkaline phosphatase (44.2 IU/l), cholesterol (145.6 mg/dl), total protein (5.8 g/dl), creatinine (0.63 mg/dl), calcium (8.2 mg/dl), albumin (3.0 g/dl), glucose (129.2 mg/dl), amylase (196.8 IU/l), sodium (153.7 mEq/l) and phosphorus (5.42 mg/dl) between sexes or seasons. Significant differences were noted for aspartate aminotransferase, blood urea nitrogen and potassium between seasons. Possible disturbances in normal hepatic and renal functions were noted.

Journal of Wild Life Disease, Vol. 28, No. 3, p. 414-418, 1992. 2 tables, 20 refs. Authors' abstract.

Interspecific competition and the geographical distribution of red and arctic foxes Vulpes vulpes and Alopex lagopus

Pall Hersteinsson, David W. Macdonald

The geographical distribution of red and arctic foxes differ. The hypothesis that this difference

results directly from their relative adaptations to extreme cold is evaluated and dismissed. An alternative hypothesis is developed from considerations of body size and biogeographic effects on productivity. This suggests that the northern limit of the red fox's geographic range is determined directly by resource availability (and this ultimately by climate), whereas the southern limit of the arctic fox's range is determined, through interspecific competition, by the distribution and abundance of the red fox. Predictions from this hypothesis are fulfilled, particularly by data on fur harvests. The argument is extended to other pairs of similar canid species, with the conclusion that equivalent interactions between body size, secondary productivity and direct competition have general relevance to their geographical distributions.

OIKOS 64, p. 505-515, 1992. 2 tables, 8 figs., 109 refs. Authors' summary.

New data on distribution of American mink (*Mustela vison* Schreber) in Central Spain

C. Bravo, F. Bueno

The distribution of the American mink (*Mustela vison* Schreber) around the Spanish mountains of the Sistema Central has been studied confronting the data obtained in 1990 with those of a previous study carried out in 1984-85, through a direct field survey. The species has continued its expansion in a general way by the esteemed area and is quickly spreading. It's been discussed that only the absence of water in the studied area prohibits the expansion of the species even if other factors (presence of otter, dams, humanization, trofic impoverishment) may be obstructing the same temporarily.

Ecologia, NO. 6, p. 161-164, 1992. 1 fig., 17 refs. In SPAIN. Authors' summary.

Original Report

The utilization of the platinum and white neck genes for obtaining new colour varieties in foxes

J. Maciejowski, G. Jezewska

Department of Biological basis of Animal Production

University of Agriculture in Lublin

Summary

As a result of mating platinum (or white neck) foxes with red and pastel ones the characteristic features of platinum (or white neck) variety were combined to a red or brown background. The platinum gene made the background considerably lighter, whereas the white neck gene, while leaving the characteristic "mask", did not cause the shade of the background to become paler.

Therefore, the offspring whose genotype included the white neck gene turned out to be much more interesting than the offspring of platinum foxes.

Introduction

The most well known colour mutant in the fox (*Vulpes vulpes*) is platinum fox, which appeared as a result of a spontaneous mutation in a Norwegian farm in the 1930's (ref. 3). The first pelts of this type were very highly valued due to their previously unknown colour pattern and small supply. Shortly afterwards, other mutations appeared whose genes belonged to the same locus. They were white face, Georgian white, arctic marble and, finally, white neck (called also "ring neck" - *Nes et al., 1988*) which appeared in Poland in the 1970's.

In all these mutants the mutated genes are partly or totally lethal in homozygous condition. All platinum, white neck (ref. 2) and white face (ref. 3) individuals are heterozygous whereas very rare homozygous individuals of Georgian white and arctic marble (ref. 8) are not very viable.

The authors have attempted to transfer the platinum and white neck genes onto a background that would not be black.

Materials and methods

The materials used in the research come from the fur animal farm in Jeziory Wielkie, Western Poland and cover a period of 5 years. They include the data concerning the colour split in the offspring coming from variously coloured parents. The following colour types were mated: red, platinum, white neck, pastel, platinum pastel and their combinations. The mating types are described in detail in table 1.
The pups were qualified as belonging to particular colour types in the 7th week after weaning.

Table 1. Mating results in various colour types of foxes

Mating type	number of litters	number of offspring	COLOUR SPLIT IN OFFSPRING																	
			silver		red		platinum		white neck		pastel		gold platinum		red pastel		platinum pastel		cross fox	
			n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
red x platinum	90	364	97	26,65	102	28,02	107	29,40	-	-	-	-	57	15,66	-	-	-	-	1	0,27
red x platinum gold	48	211	33	15,64	77	36,49	29	13,74	-	-	-	-	70	33,18	-	-	-	-	2	0,95
red with pastel factor x platinum pastel	30	137	11	8,03	47	34,31	12	8,76	-	-	52	37,95	3	2,19	1	0,73	11	8,03	-	-
red with pastel factor x platinum with pastel factor	3	13	2	15,39	3	23,08	6	46,15	-	-	-	-	-	-	-	-	2	15,38	-	-
pastel x platinum	13	40	18	45,00	-	-	22	55,00	-	-	-	-	-	-	-	-	-	-	-	-
pastel x platinum with pastel factor	96	380	82	21,58	-	-	44	11,58	-	-	153	40,26	-	-	-	-	101	26,58	-	-
silver x platinum pastel	12	40	22	55,00	-	-	18	45,00	-	-	-	-	-	-	-	-	-	-	-	-
pastel x platinum pastel	81	295	-	-	-	-	-	-	-	-	159	53,90	-	-	-	-	136	46,10	-	-
silver with pastel factor x platinum with pastel factor	14	62	20	32,26	-	-	18	29,03	-	-	14	22,58	-	-	-	-	10	16,13	-	-
silver with pastel factor x platinum pastel	39	173	42	24,28	2	1,16	42	24,28	-	-	58	33,52	-	-	-	-	29	16,76	-	-
red x white neck	10	50	30	60,00	-	-	-	-	10	20,00	-	-	10	20,00	-	-	-	-	-	-
pastel x white neck with pastel factor	8	27	6	22,22	3	11,11	-	-	5	18,52	8	29,63	-	-	-	-	5	18,52	-	-
Total	444	1792	363		234		298		15		444		140		1		294		3	

Results and discussion

The authors were interested in the possibility of transferring the pattern and colour of platinum and white neck fox onto a red or pastel background. Combination types resulting from mating platinum fox with other types have been described many times by many authors (refs. 1, 4, 7, 8). Platinum fox was mated with red fox many times. It was not, however, mated with pastel fox, being a fairly new type. Similarly, white neck fox was not used in such matings, either. Therefore, it became interesting whether platinum and white-neck, being so close to each-other, would give offspring similar or different phenotypically when mated with red and pastel fox.

Combining the colour pattern of the mutants on the red background did not prove difficult since this colour is dominant and already in F_1 the pups belonging to the initial types (i.e. platinum or white neck) as well as silver ones and red combination types with a platinum or white neck pattern were born. The intensity of the shade of the red colour in the combination types differed considerably. In the combination type individuals coming from platinum fox (platinum gold fox) the red colour was significantly paler, its shade of red being often close to beige, whereas in the offspring of white neck fox (white neck gold fox) the red colour was identical with that in red fox and the presence of the white neck gene manifested itself in the presence of the large collar and the so-called "mask" (i.e. a wide blaze covering the snout).

The intensity of red in the offspring of white neck fox depends to a great extent on the shade of red in the red parents.

Combining the colour and pattern of platinum or white neck fox on a brown background of pastel fox is more complicated.

Pastel fox is a recessive homozygote (ref. 5) and mated with white neck or platinum mutants does not produce pastel offspring in F_1. Depending on the partner used in the mating the pups in F_1 are silver, platinum or white neck.

Regardless of their phenotype, however, all such individuals are carriers for the recessive pastel gene. Platinum or white neck individuals from F_1 mated with pastel individuals, i.e. recessive homozygotes produced not only silver, platinum (or white neck) and pastel pups but also pastel pups with platinum pattern, called platinum

pastel by the authors (ref. 6). Such individuals, whose genotype includes the platinum gene, are very pale brown with a platinum pattern. They are recessive homozygotes for the pastel gene and heterozygous for the dominant platinum gene. Carriers for the white-neck gene, being also homozygous for pastel, were much more intensely brown, which was similar to the colour of pastel fox. Such individuals had exceptionally good purity of colour and were much more interesting than those with the platinum gene. In Poland the marketing name of both those types is "platinum pastel".

Table 1 shows the colour split in offspring coming from specific mating types. The mating types present there do not differentiate e.g. "red male x platinum female" type from "platinum male x red female", as no differences in both types were spotted.

The colour split proportions obtained confirm earlier hypotheses of homozygous recessive determination of the pastel colour (ref. 5), dominant determination of the red (refs. 2, 4) as well as of the exclusive heterozygosity of platinum (ref. 3) and white neck (ref. 2) individuals. The results obtained also prove the independence of inheriting the genes of the red and pastel colour and the locus W genes. The colour split ratios are close to the expected values resulting from genetical assumptions.

Different phenotypic effects result from using platinum and white neck individuals for matings. The platinum gene combined to a red or pastel background gives, apart from the presence of the characteristic "mask", also very evident paling of the hair colour. The presence of the white neck gene in the genotype also gives a "mask" but without the loss of intensity of the general hair colour. Therefore, individuals coming from white neck parents are much more interesting than combination types with platinum fox.

Conclusions

1. Independent inheritance of the pastel and red colour genes and the genes in the locus W has been proved.

2. Red or pastel individuals carriers for the platinum gene have a much lighter hair colour.

3. In red or pastel individuals carriers for the white neck gene the hair colour is more intense which makes such animals look more attractive.

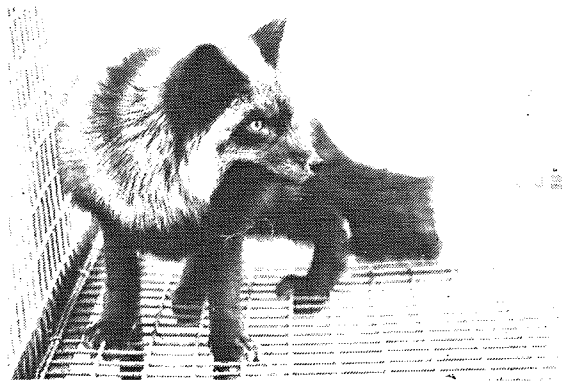


Fig. 1. Pastel fox

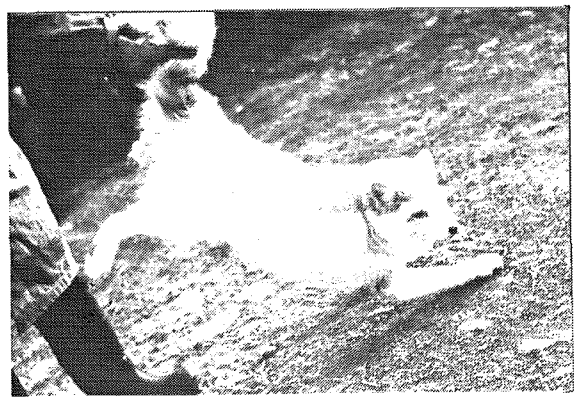
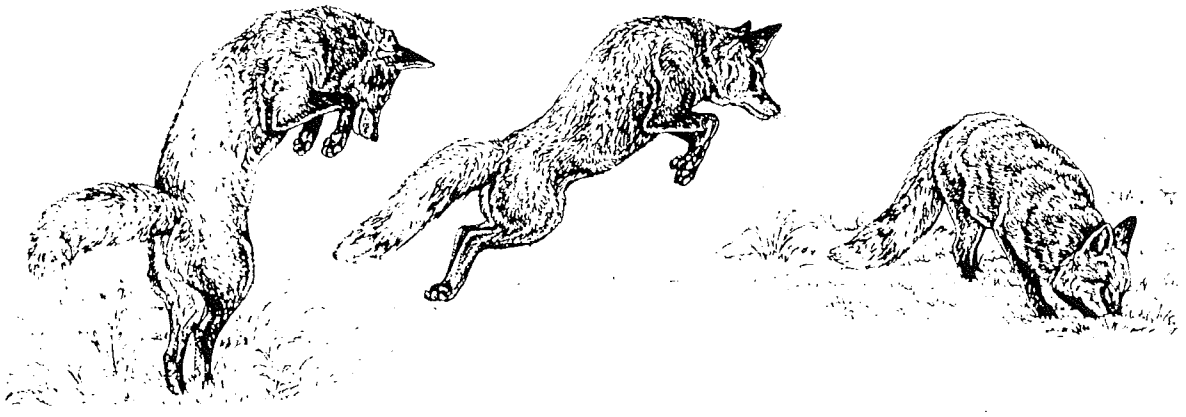


Fig. 2. Platinum pastel fox



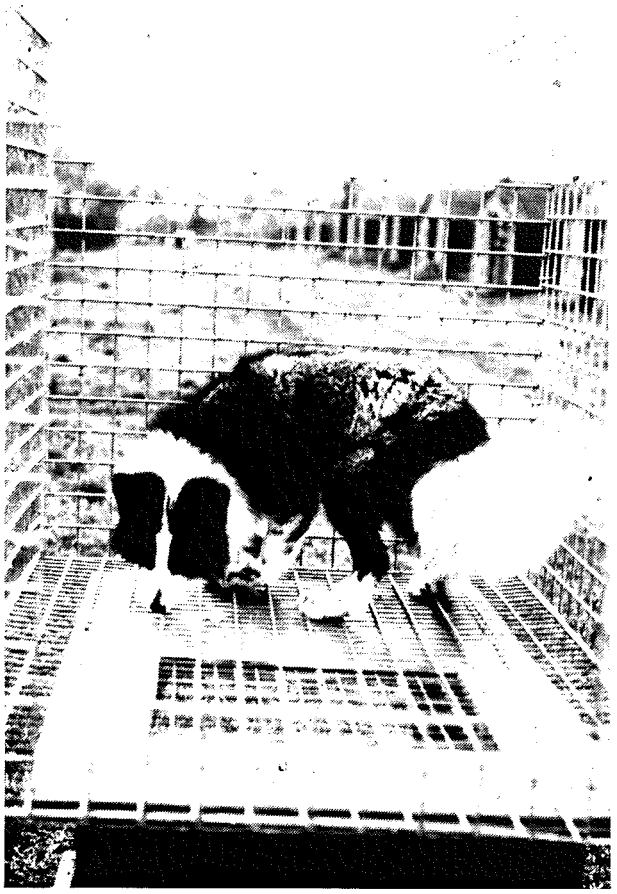


Fig. 3. White neck fox

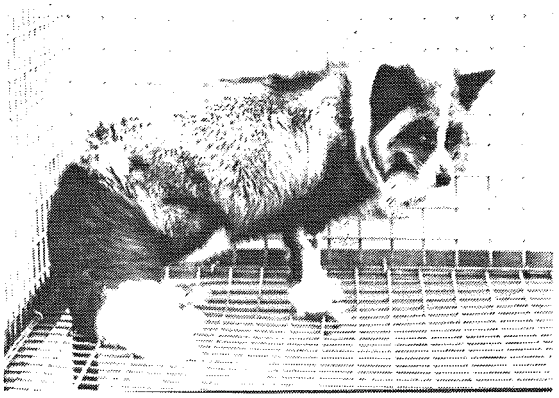


Fig. 4. Platinum pastel fox (one of the parents was white neck)

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Characteristics of zonal pigmentation of hairs in pastel fox

G. Jezewska, J. Maciejowski

In 1983 and 1987 colour zones of the hair coat of pastel foxes of the same herd were measured. The height of the pigmented hair streak in accordance with the maximum hair length from the hair base to the non-pigmented "silver" zone as well as the length of this depigmented (silver) streak and the height of pigmented hair tips above this zone were distinguished. The measurements were performed in the autumn on 792 young foxes originating from 286 mothers. Apart from average values and variability characteristics, the heritability indices of particular colour zones were calculated. The heritability of the measured traits varied from $h^2 = 0.25$ for the length of coloured hair tips to $h^2 = 0.42$ for maximum hair length. The investigations of the height of pigmented and non-pigmented hair zones in foxes can allow, according to the authors, to perform more precisely the selection for the "silver" trait of hair coat of foxes.

Roczniki Nauk Rolniczych Seria B, Zootechnicza, 106, 1-2, p. 149-154, 1991. 2 tables, 9 refs. In POLH, Su. ENGL, RUSS. Authors' summary.

Genetic polymorphism of IgG in the mink. VIII. A quantitative study of the expression of cγ-allotypes (H3, H4, H6, H8) in sera

L.V. Mechetina, I.I. Fomicheva, A.V. Taranin

The results of a quantitative study of the expression of mink Cγ-allotypes (H3, H4, H6, and H8) in sera are presented. H6 and H8 were found to be stably expressed, and the individual concentrations of the allotypes varied within one order of magnitude. Gene dosage effects were observed for H6 and H8: average sera allotype concentrations in homozygotes were twice those in heterozygotes. In contrast, the serum concentrations of H3 and H4 varied by three orders of magnitude, ranging from minor (2-200 μg/ml) to high (1-10 mg/ml). No gene dosage effects were observed for the expression of H3 and H4. Histograms for the population of H3 concentrations showed three peaks, sharply differing from those of H4, H6, and H8. There was no association between the minor expression of H3 and H4. The data obtained indicate that the expression of mink Cγ-allotypes is regulated by different allotype-specific mechanisms.

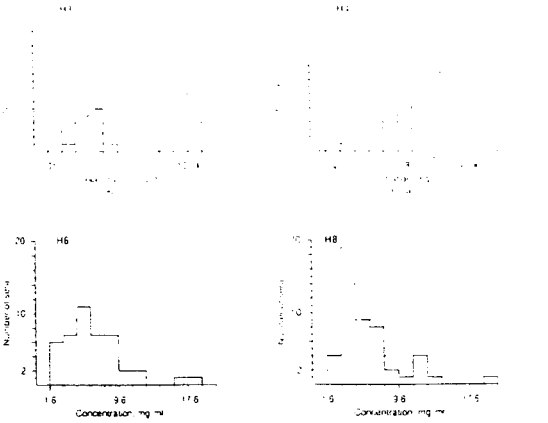


Fig. 1 Histograms for the distribution of the concentrations of allotypes H3, (**a**), H4 (**b**), H6 (**c**), H8 (**d**) in the sera of adult mink in population 1 (-----) and population 2 (.....), based on ELISA data

Exp Clin Immunogenet 9, p. 24-32, 1992. 2 tables, 3 figs., 33 refs. Authors' summary.

Genetic polymorphism of IgG in the mink. IX. High proportion of allotype-producing lymphocytes in individuals with minor levels of allotypes H3 and H4 in serum

L.V. Mechetina, D.Ch. Olimova, A.V. Taranin

The levels of mink Cγ-allotypes (H3, H4, H6 and H8) were determined in sera, and the proportion of the corresponding allotype-synthesizing B cells was estimated in peripheral blood, spleen and mesenteric lymph nodes. Individual differences in H6 levels and, possibly, those in H8 were entirely dependent on the proliferation degree of the corresponding clone of B cells and also determined by the dosage of the structural gene. There was no correspondance between the great numbers of $H3^+$, $H4^+$ cells and low levels of H3 and H4 allotypes in the sera of the majority of mink with their minor expression. A

possible cause of this discrepancy may be a blockade of the secretion of IgG by $H3^+$, $H4^+$ cells. There exists most likely a gene (or genes) controlling the blockade of IgG secretion. The regulation of Cγ-allotype expression is presumably effected in a manner specific to each of the allotypes.

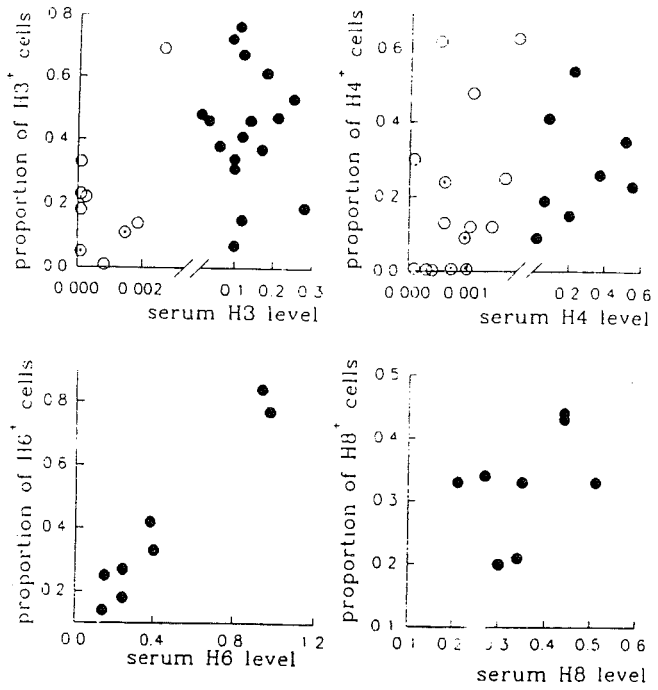


Fig. 1 Serum allotype levels and proportion of allotype-synthesizing peripheral blood lymphocytes in individual mink. ● = Mink with normal expression of allotype. o = mink with minor expression of H3 and H4 (allotype concentration up to 300 μg/ml). o = individual mink with allotype-synthesizing cells identified in spleen cell preparations. The level of allotype in serum was expressed as the ratio of the ELISA-measured serum concentration of an allotype to the level of total IgG. The proportion of allotype-synthesizing cells was expressed as the ratio of the percentage of cells staining for an allotype to the percentage of cells staining for IgG.

Exp Clin Immunogenet, 9, p. 141-148, 1992. 1 table, 2 figs., 26 refs. Authors' abstract.

Characterization of a new hybrid mink-mouse clone panel: chromosomal and regional assignments of the *GLO, ACY, NP, CKBB, ADH2,* and *me1* loci in mink (*Mustela vison*)

Svetlana D. Pack, Vladimir M. Bedanov, Olga V. Sokolova, Natalia S. Zhdanova, Natalia M. Matveeva, Oleg L. Serov

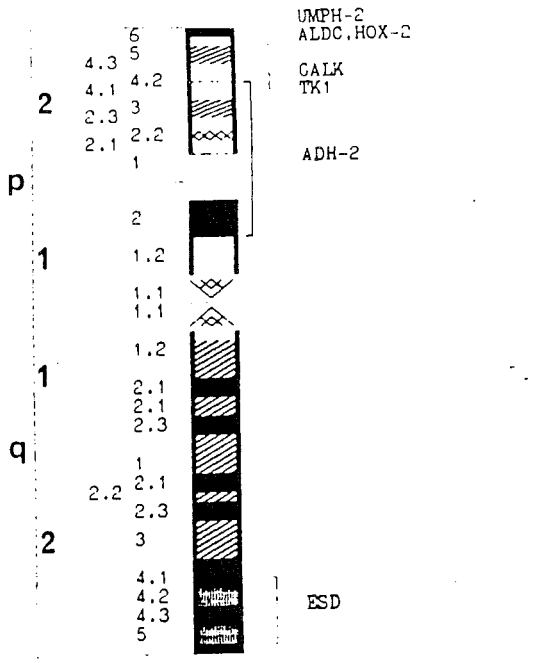


Fig. 6 Subchromosomal localization of the gene for *ADH2* on the short arm of mink Chr 8

To expand the mink map, we established a new panel consisting of 23 mink-mouse clones. On the basis of statistical criteria (*Wijnen et al. 1977; Burgerhout, 1978*), we developed a computer program for choice of clones of the panel. Assignments of the following mink genes were achieved with the use of the hybrid panel: glyoxalase (*GLO*), Chromosome (Chr) 1; acetyl acylase (*ACY*), Chr 5; creatine phosphokinase B (*CKBB*), Chr 10; alcohol dehydrogenase-2 (subunit B) (*ADH2*), Chr 8. Using a series of clones

carrying re-arrangements involving mink Chr 1 and 8, we assigned the gene for *ME1* to the short arm of Chr 1 and that for *ADH2* to Chr 8, in the region 8p12-p24. Mapping results confirm the ones we previously obtained with a mink-Chinese hamster panel. However, by means of an improved electrophoretic technique, we revised the localization of the gene for purine nucleoside phosphorylase (*NP*), which has been thought to be on mink Chr 2. It is reassigned to mink Chr 10.

Mammalian Genome, 3, p. 112-118, 1992. 4 tables, 7 figs., 22 refs. Authors' abstract.

Aneuploidy induction in mice: construction and use of a tester stock with 100% nondisjunction

C.V. Beechey, A.G. Searle

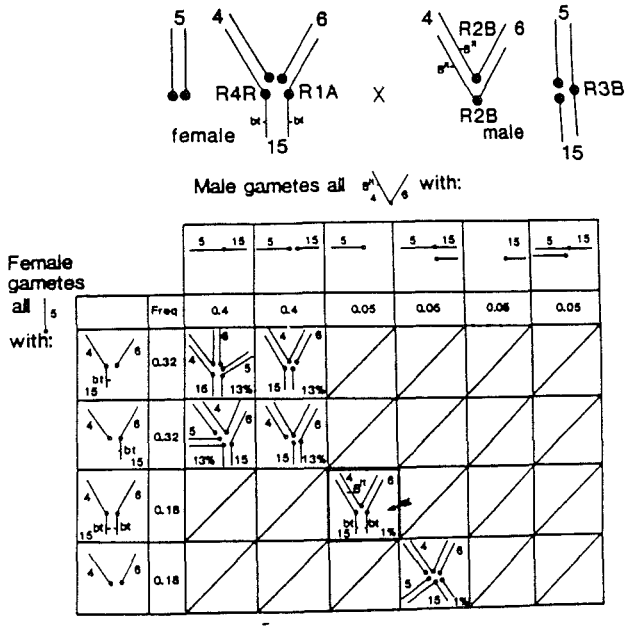


Fig. 1 Checkerboard to show consequences of mating R1A *bt*/R4R *bt* females to R2B B^u/R2B B_u R3B/+ males in order to produce belted mice with tribrachial homology for Chrs 4, 6, and 16 (R1A/R2A/R4R) marked with an arrow. See text for derivation of female and male gametic frequencies. Blank squares denote lethal unbalanced zygotes (expected frequency 47%). Relevant karyotypes and expected zygotic frequencies of the various viable balanced products (half triple and half double metacentrics) are shown

A new murine tester stock for primary nondisjunction incorporates three genetically marked Robertsonian translocations with tribrachial homology (TBH): Rb(6.15)1Ald, Rb(4.6)2Bnr, and Rb(4.15)4Rma. The resultant tricentromeric meiotic configuration leads to 100% aneuploid gametes, but the TBH stock can be maintained by intercrossing, through the complementation of nullisomic and disomic gametes. The only neonatal survivors from test crosses to wild type come from complementation of aneuploid gametes and genetic tests allow wild type gains or losses of Chromosomes 4, 6, and 15 to be distinguished. Alternatively, cytogenetic examination allows products of wild type chromosome gain, with one metacentric, to be separated from chromosome loss wiht two metacentrics. A pilot study, with 0-2 Gy X-irradation of oocytes at diakinesis, revealed twelve examples of chromosome loss in wild type gametes but none of chromosome gain and thus provided no evidence for the induction of nondisjunction.

Cytogenet Cell Genet 56, p. 2-8, 1991. 6 tables, 4 figs., 43 refs. Authors' abstract.

Interaction between cortisol and cortisol-binding protein in silver foxes (*Vulpes fulvus*)

I.N. Oskina, A.A. Tinnikov

1. Selection of silver foxes for domestic behaviour resulted in the parallel lowering of both cortisol and cortisol-binding protein (CBP) levels in the blood plasma.

2. During seasonal cycles (summer-winter) and after stress an increase in cortisol levels is followed by a decrease in CBP activity.

3. It is concluded that there are two types of interaction between cortisol and CBP in silver foxes: Parallel changes in the process of domestication and opposite changes under the influence of environmental factors.

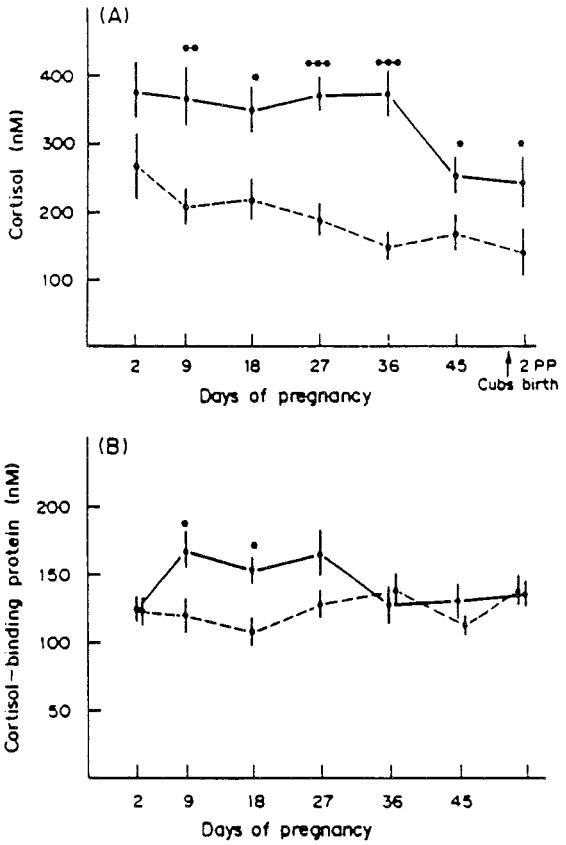


Fig. 3 Cortisol (A) and cortisol-binding protein (B) levels in the plasma of pregnant wild (---) and tame (...) silver foxes and 2 days after cub birth (2PP). Blood was taken from *V. saphene* in rest conditions. Mean±SEM, *N*=12. *P<0.05; **P<0.01; ***P<0.001 between wild and tame animals

Comp. Biochem. Physiol. Vol. 101A, No. 4, p. 665-668, 1992. 3 figs., 11 refs. Authors' abstract.

Genetic polymorphism of esterase in plasma of American mink (*Mustela vison* L.)

V. Simonsen, B.M. Damgaard, B. Larsen, O. Lohi

Plasma samples of 412 mink, including 20 families and representing 15 lines, have been investigated by isoelectric focusing for the enzyme esterase (ES). The observed variation of the enzyme may be explained as a result of one locus with at least seven codominant alleles. The segregation of six alleles assumed for the locus in 20 families supports this genetic model. Genetic divergence among the lines is observed and may be due to founder effect and/or selection.

Animal Genetics 23, p. 553-555, 1992. 1 table, 1 fig., 7 refs. Authors' summary.

Polecat x mink hybrids

Yu.G. Ternovskaya, D.V. Ternovskii

Work carried out since 1978 at the Biological Institute, Novosibirsk, Russia on polecat male x mink female hybrids is summarised. The hybrids were similar in appearance to mink. Their coat had shiny, black guard hairs and dense, brown underfur, and the colour was designated as dark sable. Adult hybrids were larger than their parents. Hybrids exhibited swimming and burrowing. Female hybrids were fertile, but males were sterile. Litter size averaged approx. 6, and 2 litters per year could be produced. Progeny from mating hybrid females with polecats were phenotypically very variable.

Krolikovodstvo i Zverovodstvo, No. 5, p. 27, 1991. In RUSS. CAB-abstract.

Heterosis in crossing of foxes

S.N. Kashtanov

Within-population matings of 140, 142 and 30 breeding pairs of veiled foxes at 3 farms were made, and between-farm mating of 124, 43 and 48 pairs. The genetic distances between the farm populations, estimated from data on gene frequencies at 5 marker loci, were 0.006, 0.20 and 0.32 for the 3 types of between-farm mating resp. For the 6 mating groups, litter size (live births) averaged 8.26, 8.01, 8.81, 8.56, 8.35 and 11.42 resp., the percentage of large male cubs 26.6, 25.3, 18.1, 27.4, 65.0 and 82.0, and the percentage of large female cubs 67.7, 53.1, 47.1, 65.2, 76.0 and 100.

Krolikovodstvo i Zverovodstvo, No. 5, p. 5, 1991. 1 table. In RUSS. CAB-abstact.

Reproduction of American mink selected for behaviour

O.V. Trapezov, D.V. Klochkov

For mink divergently selected for behaviour (tameness or aggression), data are presented on characteristics of the oestrous cycle, as determined for vaginal smears, in Dec. For selected and non-selected mink in Nov., given natural or artificial light, data are tabulated on ovary weight, uterus weight and percentage of females in oestrus. Tame mink tended to mature sexually at an earlier age than aggressive mink, although the incidence oestrus in mink in Nov. on artificial light was 11 and 66 % for tame and aggressive mink resp., and no mink in natural light exhibited oestrus.

Sel'skokhozvaistvennaya Biologiya, No. 6, p. 72-75, 1991. 2 tables, 7 refs. In RUSS, SU. ENGL. CAB-abstract.

Effects of timed melatonin infusions and lesions of the suprachiasmatic nuclei on prolactin and progesterone secretions in pregnant or pseudopregnant mink (*Mustela vison*)

C. Bonnefond, L. Martinet, R. Monnerie

To test the hypothesis that the duration of melatonin secretion may be a critical parameter in the transduction of photoperiodic signals on prolactin and progesterone secretions, timed intravenous melatonin infusions were carried out in intact and ganglionectomized pregnant and pseudopregnant mink. To localize the target sites of melatonin, electrolytic lesions of hypothalamic nuclei were performed in females receiving melatonin infusions. As a control, the first experiment was designed to confirm that pineal denervation by bilateral ablation of the superior cervical ganglion rendered the pregnant mink totally unresponsive to the inhibitory effects of short days on progesterone secretion. In the following experiments, timed intravenous melatonin infusions were carried out in intact and ganglionectomized females from Day 12 to 32 of pregnancy or pseudopregnancy.

Daily infusions of melatonin for 16 h in intact females or for 11 or 13 h in ganglionectomized females suppressed the rise in plasma prolactin and progesterone levels. In intact as in ganglionectomized females, daily infusions of melatonin for 9 h delayed the rise in plasma prolactin concentrations without affecting the secretion of progesterone.

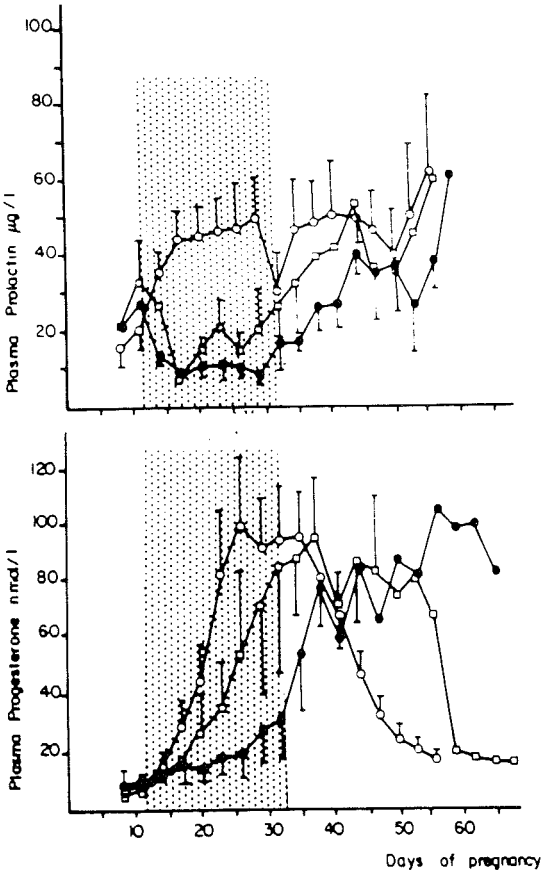


Fig. 2 Concentrations of plasma prolactin (upper panel) and progesterone (lower panel) (mean + SEM) in ganglionectomized females; control (open circles) or receiving daily infusions of melatonin for 9 h (open squares) or 16 h (closed circles). The shaded area represents the infusion time period from days 12 to 32 of pregnancy or pseudopregnancy

In ganglionectomized females, saline infusions for 13 h or melatonin infusions for 7 h did not modify the secretions of prolactin and progesterone. In ganglionectomized females bearing lesions of the suprachiasmatic nuclei or the retrochiasmatic area, melatonin infusions for 13 h were still able to inhibit prolactin and progesterone secretions.

These results are consistent with the hypothesis postulating that the peak duration of melatonin secretion is a critical parameter for transducing photoperiodic responses in pregnant or pseudo-

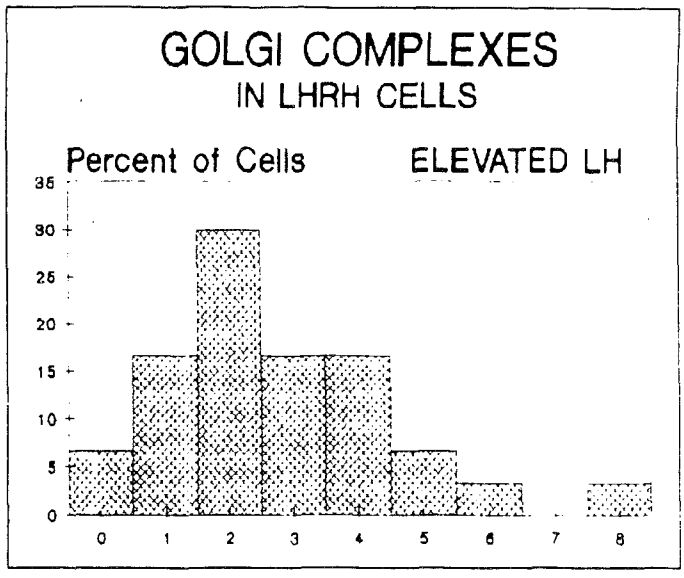
pregnant mink. Secondly, they suggest that the suprachiasmatic nuclei and the retrochiasmatic area are not essential for the action of melatonin in the photoperiodic control of prolactin and progesterone secretions during pregnancy or pseudopregnancy in mink.

Journal of Neuroendocrinology, Vol. 2, No. 5, p. 583-591, 1990. 3 tables, 6 figs., 45 refs. Authors' abstract.

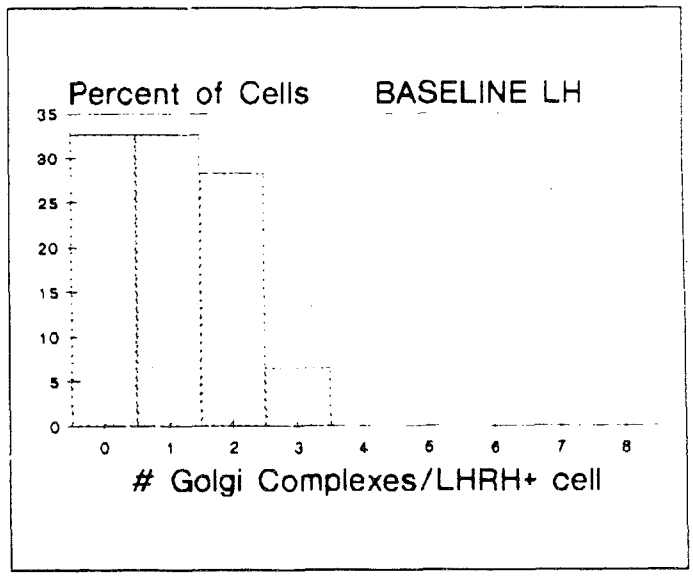
Vaginocervical stimulation of ferrets induces release of luteinizing hormone-releasing hormone

Carole E. Bibeau, Stuart A. Tobet, Edythe L.P. Anthony, Rona S. Carroll, Michael J. Baum, Joan C. King

Vaginocervical stimulation of ovariectomized estradiol-primed ferrets (which are reflex ovulators) with a glass rod in the presence of a neck-gripping male induced an increase in plasma luteinizing hormone (LH) from undetectable levels (≤0.50 ng/ml) before stimulation, to 2.4±0.43 ng/ml 75 min after stimulation (stimulated females). Forty-eight h after stimulation plasma LH returned to baseline levels (post-stimulated females). A significant decrease in the number of perikarya containing LH-releasing hormone (LHRH), detected by immunocytochemistry, was associated with the increase in plasma LH following stimulation. Approximately one half of the number of immunoreactive LHRH neurons (243±27) were detected in the forebrain of stimulated females, compared to those detected in the forebrain of post-stimulated animals (436±88) using antiserum AR 744. Equivalent results were obtained with a different antiserum (RM 1076) capable of detecting the extended decapeptide, or precursor, as well as partially or fully processed decapeptide.
We conclude that controlled vaginocervical stimulation of female ferrets evokes the release of LHRH as well as LH, depleting approximately 50% of the LHRH perikarya of detectable LHRH. Additionally, electron microscopy of LHRH perikarya of stimulated females revealed more Golgi complexes/cell compared to baseline females. We propose that vaginocervical stimulation also augments the processing of extended precursor forms of LHRH to generate the decapeptide.



A.



B.

Fig. 4 Histogram illustrating numbers of Golgi complexes per section from stimulated (A) and post-stimulated (B) females. Sections analyzed contained the nucleus of LHRH-immunopositive cells

Journal of Neuroendocrinology, Vol. 3, No. 1, p. 29-36, 1991. 4 figs., 27 refs. Authors' abstract.

Sexual maturation and subsequent reproductive function of mink in relation to changes in photoperiod

D.V. Klochkov, R.G. Gulevich, L.A. Semenova, A.N. Kharlamova

The results of the studies of the specific activity of the reproductive organs of mink females outside the season of reproduction are presented. It was demonstrated that symptoms of estrus in the vaginal smears of mink are accompanied by more active folliculogenesis and by growth of the parenchyma and stromal index of endometry. Imitation of earlier onset of autumn increased the proportion of females with symptoms of estrus in the vaginal smears and further activization of folliculogenesis. Greater fertility was noted in the animals with earlier symptoms of estrus. The possibility of use of time of estrous onset for prognosing mink fertility is discussed.

Sel'skokhozvaistvennaya Biologiya, No. 2, p. 81-86, 1991. 3 tables, 1 fig., 13 refs. Authors' summary.

Uterine metabolic activity and steroid receptor concentrations in response to suppressed secretion of PRL in anestrous mink

Ov Slayden, Fredrick Stromshak

Two experiments were conducted to evaluate the effects of bromocriptine, melatonin (MLT), and 17ß-estradiol (E_2) on uterine physiology in mink (*Mustela vison*). In Expt. 1, summer-anestrous mink were injected sc daily with 2 mg bromocriptine or vehicle (n=20 each) for 14 days. On Day 14, both groups were divided into two subgroups and injected sc with either 100 µg E_2 or vehicle. Mink were bled immediately prior to euthanasia (24 hr after E_2) and the sera analyzed for prolactin (PRL), E_2, and progesterone (P_4). At necropsy, aliquots of uterine tissue (n=5) were used to measure *in vitro* oxidation of [^{14}C]glucose, incorporation of [^{3}H]thymidine into DNA and [^{14}C]leucine into protein, and nuclear concentrations of estrogen receptor (ER) and P_4 receptor (PR). In Expt. 2, anestrous mink were assigned to one of two treatment groups or a control group (n=5 each). In mid-summer, groups 1 and 2 were implanted with 10 mg Silastic MLT implants. Seventeen weeks later, mink in group 1 received 100 µg E_2 (sc) while group 2 and nonimplanted controls (group 3) were injected with vehicle. Mink were sacrificed 24 hr after injection and levels of PRL, E_2, P_4, ER, and PR determined. Bromocriptine suppressed serum concentrations of PRL ($P<0.001$), increased serum levels of E_2 ($P<0.05$) and levels of PR ($P<0.01$), but had no effect on levels of P_4, uterine weight, glucose oxidation, DNA and protein synthesis, or concentrations of ER. Treatment with E_2 or bromocriptine plus E_2 increased uterine weight ($P<0.01$), DNA and protein synthesis ($P<0.01$), and concentrations of ER ($P<0.01$) and PR ($P<0.01$). Exogenous MLT reduced serum levels of PRL ($P<0.01$) and increased concentrations of E_2($P<0.01$). Both MLT and MLT plus E_2 increased uterine weight ($P<0.001$) and levels of ER and PR ($P<0.01$). Results of this study indicate that inhibition of PRL secretion in anestrous mink increases endogenous levels of E_2 which evoke uterine responses similar to those observed after treatment with exogenous E_2.

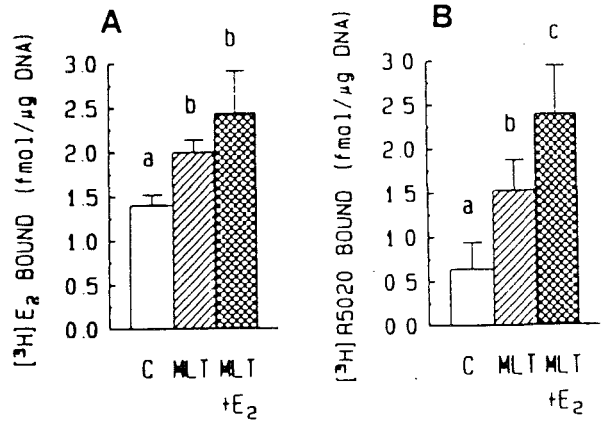


Fig. 7 Nuclear concentrations (mean±SE) of specifically bound [^{3}H]E_2 (A) and [^{3}H]R5020 (B) in uteri of mink implanted with 10 mg MLT alone or implanted and injected with 100 µg E_2 24 hr prior to sacrifice. Means with different superscript letters differ ($P< 0.05$). Melatonin alone and MLT plus E_2 increased nuclear concentration of ER and PR ($P<0.05$).

General and comparative endocrinology 88, p. 307-315, 1992. 7 figs., 31 refs. Authors' summary.

Non-invasive monitoring of corpus luteum activity by measuring progesterone metabolites in faeces of carnivores

E. Möstl, H. Lehmann, U. Wenzel

Progesterone is produced by the corpus luteum, metabolised in the liver and excreted via urine and faeces. For monitoring corpus luteum activity usually blood samples are collected and the progesterone concentration is measured using RIA or EIA.
Collecting consecutive blood samples in mink and cats is sometimes difficult. Therefore we established a non-invasive method for measuring progesterone metabolites in faeces.
Faecal samples were collected from 8 queens and 12 female mink during the reproductive season.
For extraction, 0.5 g faeces were suspendend in 2.5 ml distilled water and 3 ml methanol were added. After shaking for 30 min using a multivortex, samples were centrifuged (2.500 g; 15 min) and an aliquot of the supernatant was used for EIA. HPLC of faeces extracts showed that progesterone was present in the samples only in minor amounts. However, other gestagens cross-reacted with the antibody used in EIA.
In cats, gestagen metabolites rose from 7.1±3.2 µmol/kg (oestrus) to 76.6 µmol/kg (pregnancy).
In mink, the values of gestagens were also elavated during pregnancy compared to those of oestrus cycles.
The results show that faecal samples can be used for monitoring corpus luteum activity in carnivores.

XVIII WSAVA World Congress and the 39th National Congress of the DVK (FK) Berlin, 6.10.1993. Only abstract received. Authors' abstract.

Gestagens in the faeces of mink and cats for monitoring corpus luteum activity

E. Möstl, H. Lehmann, U. Wenzel

Steroid hormones are metabolized by the liver and excreted in the urine and faeces. As faecal samples can be collected without animal restraint, a method for monitoring corpus luteum activity by measurement of progestagens in faecal samples from feline and musteline species was established.

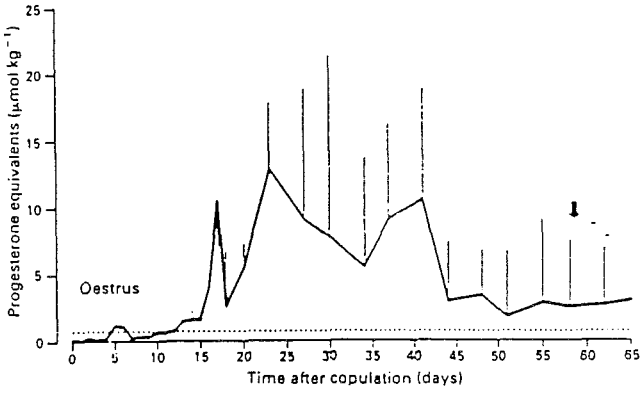


Fig. 1 Mean (±2 SD) progesterone equivalents in faecal samples from 12 female mink during oestrus and gestation. The dotted line indicates mean ± 2 SD of gestagen concentrations during oestrus; the arrow indicates parturition.

J. Reprod. Fert., Suppl. 47, p. 540-541, 1993. 1 fig., 2 refs. Authors' summary.

Chemical analysis and quality analysis within the Swedish food control 1993

Eva Aldén

The Swedish voluntary program for controlling chemical composition and chemical quality of food mixtures and feed ingredients for mink and foxes also in 1993 included the main part of the food production.
During 1993 the program included feed kitchens compared to 48 in 1992. Chemical analyses were made of 126 feed mixtures and 112 feed ingredients. The number of quality analyses was 45.

The average content of dry matter in the mixtures varies from 27.7 (whelping-30th of June) to 32,5% (1st of September-31th of December).

The average ash content was 3.1% from 1st of January-whelping and 2.8% during the rest of the year.

The average content of crude protein was 13.7 (January-whelping), 12.4 (whelping-30th of June), 13.4 (1st of July-31st of August) and 13.0 (1st of September-31st of December) respectively. Corresponding values for fat were 7.2, 6.4, 7.5 and 8.6% and for carbohydrates 5.7, 6.1, 7.5 and 8.4%. Calculated mean contents of metabolizable energy per kg feed mixture during corresponding periods were 5.2, 4.8, 5.5 and 5.9 MJ.

During the four production periods the average calculated metabolizable energy, % from protein, was 41, 40, 37 and 34. Corresponding values for fat and carbohydrates were 46, 45, 47 and 49 and 13, 15, 16 and 17%, respectively.

Regarding feed ingredients the main divergences from expected values, as earlier, were higher contents of water in filleting scrap from fish, and higher fat contents in slaughterhouse offal.

Stenciled report, 12 pp. 9 tables, 5 refs. In SWED. Author's summary.

The mink as a model to study vitamin A metabolism in carnivores

Ingeborg Buchholz, Ulf D. Wenzel, Florian J. Schweigert

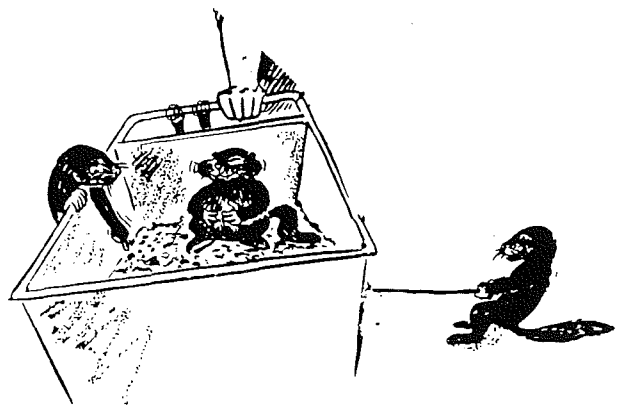
Carnivores are unique in the animal kingdom with regard to vitamin A metabolism. In these species vitamin A levels in the blood are considerably higher, which is exclusively due to a high percentage of retinyl esters bound to lipoproteins. Despite this non-specific vitamin A transport no signs of intoxication can be observed (*Schweigert et al., 1990*). In addition, most carnivores excrete significant amounts of vitamin A (retinol and retinyl esters) with the urine (*Schweigert et al., 1991*).

To investigate these major differences in vitamin A metabolism a model species is desirable.

Nine adult female mink (*Mustela vison*) were investigated with regard to the vitamin A plasma transport, the vitamin A distribution in tissue (liver, kidney, lung, heart, skeletal muscle, spleen, adipose tissue) as well as the excretiion of vitamin A with the urine. Tissue sample were homogenized, extracted and saponified (adipose tissue only).

Organic extracts were subject to a gradient rp-HPLC separation, followed by detection (325 nm) and peak characterization using a photodiode array.

In plasma vitamin A esters (mainly palmitate and stearate) were bound to lipoproteins, representing 92% of total vitamin A (mean 4.2 µg/ml plasma). High levels in liver (1441.4 µg/g tissue) and kidney (427.0 µg/g tissue) were due to esters (94-99%). Up to 11 different retinyl esters could be identified. In all cases retinyl palmitate represented the major ester, followed by stearate and oleate. No vitamin A could be detected in the urine.



These results correspond well with those obtained for dogs and foxes except for the low percentage of retinol in tissue and the lack of vitamin A excretion with the urine. The latter might be due to a possibly low supplementation in the feed. Thus, mink might be a useful model to study vitamin A metabolism in carnivores.

3rd Biennial Conference on Retinoids. New Trends in Research and Clinical Applications, Oct. 4-7th, 1993. Only abstract recieved.

Vitamin A and E in carnivores: transport in blood and distribution in tissues

F.J. Schweigert, E. Thomann

Canides transport vitamin A in the blood not only as retinol but predominantly as retinyl esters bound to lipoproteins. With regard to the tissue distribution, extremely high levels of vitamin A were observed in the kidney of canides. In the fox and the raccoon dog kidney levels were markedly higher (1066 and 1259 µg/g, respectively) compared to levels found in the liver (8 and 142 µg/g, respectively). This is discussed to be related to the excretion of vitamin A with the urine in these species. In other tissues vitamin A levels were only slightly higher compared to other species. With regard to vitamin E, the highest levels in canides were observed in the kidney, followed by the liver and the adipose tissue.

Mh. Vet.-Med. 48, 1, p. 25-29, 1993. 2 tables, 28 refs. In GERM, Su. ENGL. Authors' summary.

Determination of vitamin A in blood plasma, tissue and urine of mink by means of HPLC and photo diode array

I. Buchholz, U.D. Wenzel, F.J. Schweigert

In most animal species of the order of carnivores, vitamin A can be transported in the blood in the form of retinyl esters, bound to lipoproteins. Different from humans and rats, however, this is not associated with problems of intoxication. This peculiarity of vitamin A transport is due to fundamental differences in vitamin A metabolism which have not been clarified yet.

Looking for a test animal for examinations of this kind we thought mink a suitable subject, which, bred for fur production, can easily be used for examination of blood plasma and tissue after pelting. In initial examinations for determining vitamin A status, blood plasma, liver, kidneys, lungs, heart and skeleton muscles, spleen, organ and depot fat and urine of 9 female mink kept on a fur animal farm were analysed. After organic extraction of the tissues, of blood plasma and of the urine (the fatty tissues were additionally saponified), the forms of vitamin A were separated in a rp-HPLC gradient system. Detection (at 325 nm) and recording of peak spectra was done by means of photo diode array.

The following results were obtained:

In blood plasma vitamin A occured as retinol and retinyl esters. The retinyl esters which were bound to lipoproteins totalled over 80 per cent and formed the major part of vitamin A. Among them, retinyl palmitate averaged 77 per cent of the total retinyl esters and took a key position, followed by retinyl stearate and retinyl oleate. Whereas only these three retinyl esters were detected in blood plasma, up to 11 different retinyl esters were identified in the liver, up to 10 in the kidney and up to 8 in the lungs. In the liver, kidney and lungs, retinyl palmitate was the ester found in the largest quantities, whereas there was only a very low percentage of retinol (an average of 1 to 4 per cent). In the other tissues examined vitamin A content as well as the number of retinyl esters was considerably lower.

Retinyl palmitate was the most frequent ester in all tissues. In urine (n - 5) neither retinol nor retinyl esters were found. As far as quality quantity are concerned, these results are in good agreement with examinations in carnivores carried out so far. What is striking is the low retinol level in the tissues and missing vitamin A excretion in urine. Thus, mink is not decisively different from other carnivores and is suitable as a test animal for examination of vitamin A metabolism.

4. Symposium "Vitamin und Weitere Ursakstolle bei Mensch und Tier" 30.9-1.10.1993. Junc. Wissenschaftl. Fachverlag Dr. Fleck, Niderkleen, 31-34. Only Abstract recieved. Authors' abstract.

Feeding supplemental iodine to adult mink; effect on thyroid hormones in adult and offspring

Ross E. Jones, Richard J. Aulerich, Robert K. Ringer

We fed adult mink diets containing supplemental iodine, from 0 to 320 ppm, for one or seven months prior to breeding. Blood samples collected from the adults and their offspring (kits) at 4 wk post-partum were assayed for total thyroxine (T_4) triiodothyronine (T_3), reverse T_3 (rT_3) and T_4-binding indices. As expected T_4 concentrations of the adult and kit mink varied inversely with the level of supplemental iodine. In addition, T_3 and rT_3 concentrations decreased gradually in kits from the long-term experiment in response to the increased dietary iodine of the dams. T_3 concentrations of kits from dams fed iodine short-term decreased markedly while rT_3 concentrations were elevated greatly in response to increased dietary iodine of the dam. These decreases in hormone levels are due to serum iodine blocking the thyroid uptake of iodine and subsequent decrease of hormone synthesis. Excess iodine may also block the effect of thyroid stimulating hormone. The T_4-binding indices of the adults, in general, were depressed, while the T_4-binding indices of the kits were more variable. These effects are probably due to fluctuations in thyroglobulin.

Biomedical and Environmental Sciences 6, p. 81-88, 1993. 2 tables, 19 refs. Authors' summary.

The efficacy of mineral oil combined with feed restriction in enhancing the elimination of heptachlor epoxide from mink (*Mustela vison*)

J.A. Crum, R.J. Aulerich, D. Polin, W.E. Braselton, S.J. Bursian

Adult female mink previously fed diets containing 0 (control) and 6.25 mg heptachlor/kg diet for 181 days were fed either the same control diet *ad libitum (AL)* or the control diet containing 10% mineral oil and restricted by 45% of *ad libitum* intake (MO/R) for 21 days to determine the efficacy of the latter treatment in enhancing the elimination of heptachlor epoxide (HE) from mink. Kit mink (2-3 months of age) whelped by dams of the control and 6.25 mg/kg groups were also fed the MO/R or *AL* diets for 21 days. Daily consumption (g/kg bw/day) of the *AL* diet by kit mink was significantly greater than consumption of the same diet by the adult females. Body weights of the control adults and the control and 6.25 mg/kg kits were significantly reduced by feeding the MO/R diet. Two adults from the control group and one adult from the 6.25 mg/kg group fed the MO/R diet died during the 21-day period. No mortalities occurred in kit mink fed either diet. Administration of the MO/R diet caused a significant reduction in body fat of the control adults and kits, but not in the 6.25 mg/kg adults and kits. Decreases in body fat of the MO/R groups were not associated with greater elimination of HE when compared to the *AL* groups. Comparison of HE body burdens in adult female and kit mink from the former 6.25 mg/kg heptachlor group at day 21 indicated that consumptio of the MO/R diet did not increase the elimination of HE when compared to day 21 HE body burdens in adults and kits fed the *AL* diet. Heptachlor epoxide body burdens were reduced by 78 (MO/R) and 80% (*AL*) in the 6.25 mg/kg adults, while HE elimination from the 6.25 mg/kg kits was 96 and 93%, respectively. The half-lives of HE in adults were 9.1 (*AL*) and 10.9 (MO/R) days, and 4.9 (*AL*) and 4.6 (MO/R) days in the kits. These results indicate that HE is readily mobilized and eliminated from mink.

Arch. Environ. Contam. Toxicol. 26, p. 374-380, 1994. 4 tables, 2 figs., 28 refs. Authors' abstract.

Intestinal perfusion of ß-carotene in the ferret raises retinoic acid level in portal blood

Xiang-Dong Wang, Robert M. Russell, Robert P. Marini, Guangwen Tang, Gregory G. Dolnikowski, James G. Fox, Norman I. Krinsky

To determine whether ß-carotene (ß-C) can serve as a source of intestinally-derived retinoic acid (RA), either 15,15'-[^{14}C]ß-C or unlabeled ß-C was perfused through 30 cm jejunal segments of ferrets in vivo. Portal vein blood was sampled periodically via an indwelling catheter. RA was identified in portal blood by comparing

retention times in HPLC, by UV absorption, and by derivatization (methylation) and subsequent GC-MS analysis.

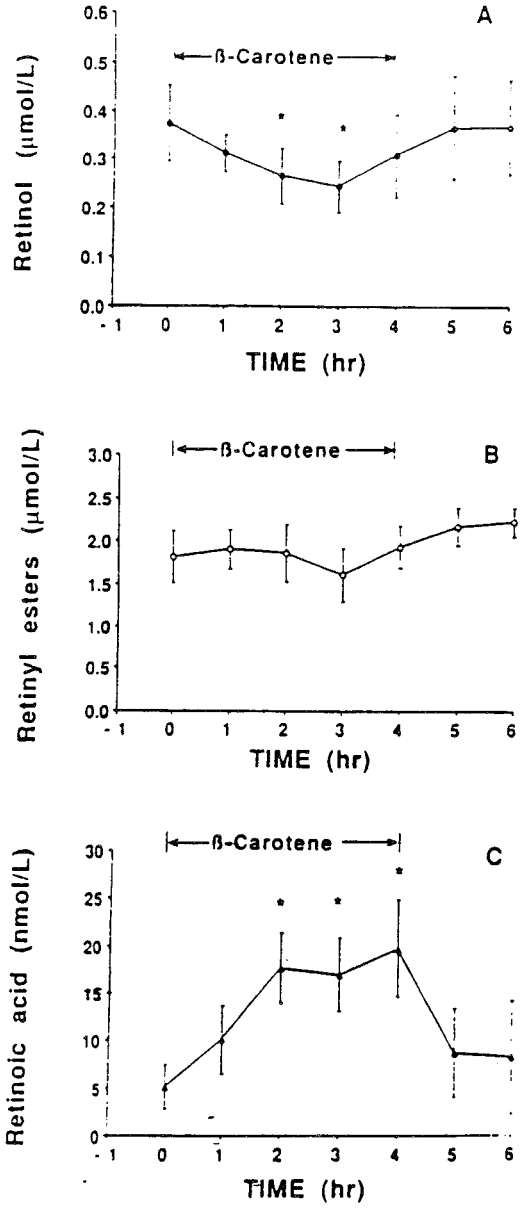


Fig. 3 The concentration of retinol (A), retinyl esters (B) and RA (C) in portal vein blood before, during and after the intestinal perfusion of ß-carotene. Ferrets were killed either at 1 h (n=3) or 4 h (n=7) after ß-C perfusion, or at 6 h (n=3), after an additional 2 h perfusion with 5% dextrose. Results are expressed in means±S.E.
* - significant difference from baseline value at $P<0.05$

The RA concentration in the portal blood increased 3-fold with perfusion of ß-C ($P<0.05$), and remained at 18 nmol/L during the perfusion of ß-C. The single peak of RA in HPLC was shown to consist of four separate peaks by GC-MS, which may be *cis-trans* isomers of RA. The concentration of RA in portal blood returned to the initial level (5 nmol/L) after a 2 h period of intestinal perfusion with 5% dextrose. Retinyl ester concentration in portal blood did not change before or after the perfusion, whereas retinol decreased significantly during the perfusion of ß-C. This study clearly indicates that a considerable quantity and number of polar metabolites, including RA, are formed from ß-C in the ferret intestine which are transported via the portal vein to the liver.

Biochimica et Biophysica Acta, 1167, p. 159-164, 1993. 3 figs., 35 refs. Authors' summary.

Arachidonic acid increases cholinergic secretory responsiveness of ferret tracheal glands

Robert K McBride, Krista K. Stone, Matthew G. Marin

The purpose of this study was to determine if arachidonic acid could alter ferret tracheal gland secretory responsiveness to a cholinergic agonist. We prepared glandular explants and incubated the explants in a medium containing [^{3}H]glucosamine. Secretory responsiveness was expressed as the percent change in basal secretion of acid-precipitable [^{3}H]glucosamine-labeled glycoconjugates induced by the addition of agonist with and without arachidonic acid [mean±SE (n)]. Addition of 10^{-3} M arachidonic acid caused a significant increase in secretion [28±6% (n=6)] compared with untreated control tissues [-10±4% (n=7), $P\leq0.05$]. Carbachol (10^{-7} M) increased secretion 39±9% (n=7). The combination of 10^{-3} M arachidonic acid and 10^{-7} M carbachol elicited a significantly greater change in secretion compared with either agent alone [173±50% (n=5)]. The addition of nordi-hydroguaiaretic acid (10^{-6} M) or indomethacin (10^{-6} M) partially attenuated the arachidonic acid-enhanced secretory responsiveness to carbachol. Treatment with both blockers completely inhibited the arachidonic acid-enhanced secretory responsiveness to carbachol.

The effect of arachidonic acid on cholinergic stimulation was also abolished by treating the explant cultures with tetrodotoxin (10^{-7} M). This hypersecretory state is most likely mediated by eicosanoid-induced release of neurotransmitters from nerve terminals.

American Journal of Physiology, 262, 6, p. 694-698, 1992. 4 tables, 36 refs. Authors' summary.

Failure of down covering in nutria

V.F. Kladovshchikov, T.Yu. Antipova

Results from feeding experiments indicated that "pinching" and eating of down by young nutria was associated with the absence of protein feeds, such as seed oilmeal and fish meal, and grass meal in the diet together with a generally low level of feeding, which was 25 to 30% below normal requirements.

Krolikovodstvo i Zverovodstvo, No. 5, p. 10-11, 1991. 2 tables. In RUSS. CAB-abstract.

Feed yeasts in diets for wild fur-bearing animals

D.N. Perel'dik, V.A. Afanas'eva

Protein-vitamin concentrates, Paprin and Eprin, derived from Candida yeast, and bacterial biomass, Gaprin and Meprin, are discussed in relation to their nutrient contents and their value as supplementary feeds for furbearing animals. Suggestions are given about the amount of dietary protein to be replaced by, and the suitable periods of the year to include the supplements in the diet. The effects of the supplements on pelt size and quality are also discussed.

Krolikovodstvo i Zverovodstvo, No. 3, p. 8-10, 1991. 3 tables. In RUSS. CAB-abstract.

Use of waste from the penicillin industry

O.L. Rapoport, L.V. Vachugova

The possibility was studied of replacing meat and fish protein in diets for brown mink with dried waste mycelium from penicillin production containing moisture 5.0, protein 30.0, fats 6.0, fibre 8.0, ash 28.3% and metabolizable energy 195 kcal/100 g. From July to November 4 groups of 40 male and female wild mink were given mixed diets without or with dried mycelium replacing 10, 15 or 20% of the animal protein. Differences in liveweight between groups were observable from September. Mean weight of male mink at the end of the experimental period was 2440±27, 2648.5±49, 2769±40 and 2785±47 g in the 4 groups, respectivevly. Results indicated that up to 20% of the animal protein could be replaced with mycelium without affecting development of mink or quality of skins.

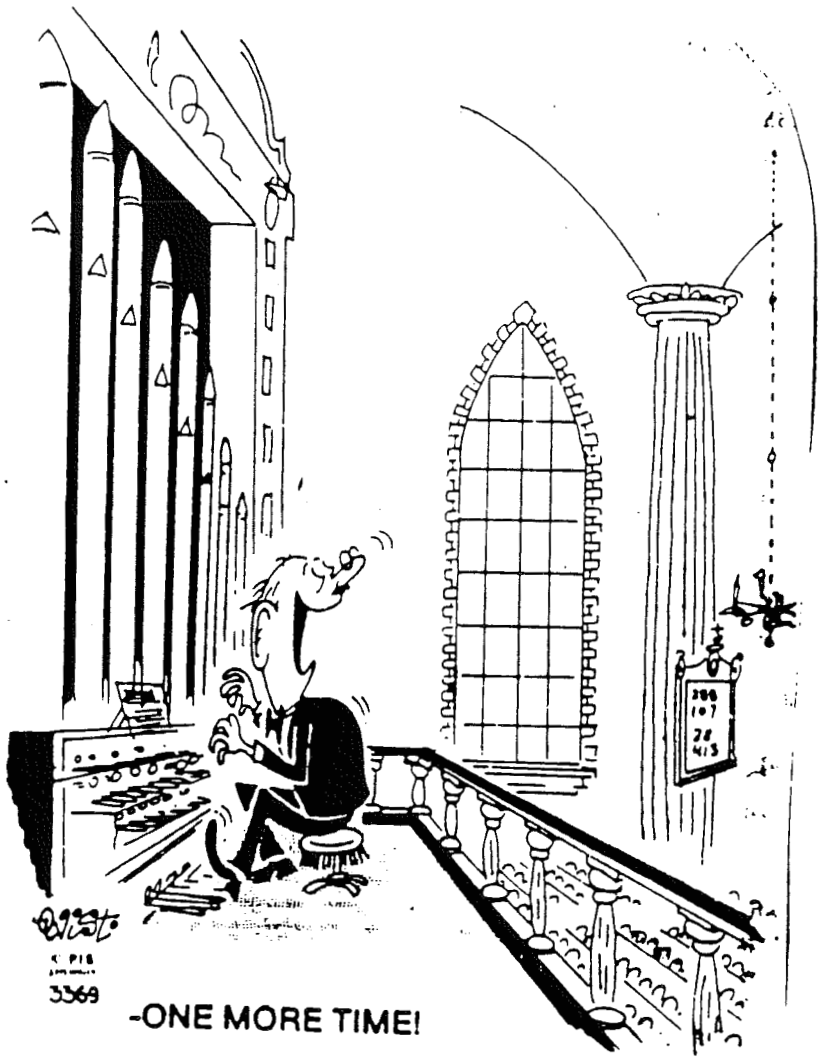
Krolikovodstvo i Zverovodstvo, No. 6, p. 7, 1990. 3 tables. In RUSS. CAB-abstract.

Nutrition of polecats

T.I. Kazakova

The nutritional requirements of polecats reared in captivity are reviewed. The normal diet used is similar to that for mink and can include all feeds used for furbearing animals in cages. Fish products can supply up to 40 or 50% of the animal protein although thiamin and iron supplements may be necessary with some type of fish. Up to 10% slaughterhouse blood can be included in diets. Grain can make up a larger part of the diet (40 to 45%) than in mink but should not exceed 25% during the reproductive period. Vitamin and mineral supplementation should be used to cover requirements. The energy and protein requirements of polecats during different seasons and stages of the productive cycle are discussed and a sample diet for growing polecats is presented.

Krolikovodstvo i Zverovodstvo, No. 2, p. 28-29, 1992. 1 table, In RUSS. CAB-abstract.



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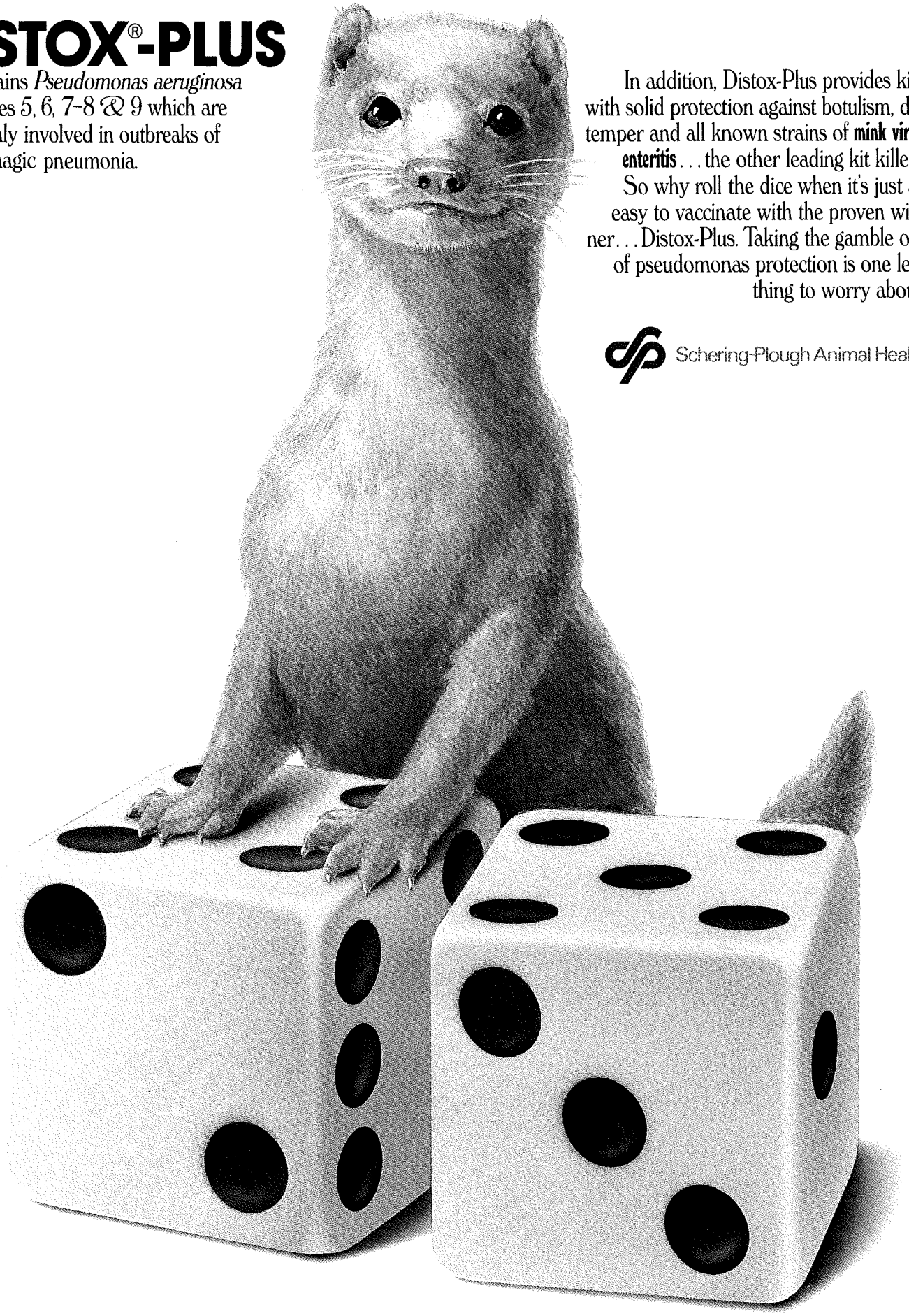

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cal signs, which included ataxia, torticollis, paralysis, incoordination, and tumbling. The ranches were separated by several kilometres, but the 3 owners shared animals, cages, utensils, feed, storage facilities, and occasionally chores. The largest ranch (A) had about 400 chinchillas. The other 2 (B and C) had about 250 animals each. Throughout the summer and autumn of 1989 animals on the 3 ranches continued to develop CNS signs. In October 1989, 5 more live chinchillas with similar clinical signs were submitted to the laboratory for necropsy. Cross-sections of ascarid larvae were seen adjacent to necrotic areas in the brain.

J Vet Diagn Invest 3, p. 77-79, 1991. 3 figs., 4 refs. CAB-abstract.

The ferret as an animal model in cerebrovascular research

C. Scott Atkinson, Gary A. Press, Patrick Lyden, Barrett Katz

Clinical and pathologic observations have suggested analogies between the developing nervous system of ferrets (*Mustela putorius furo*) and those of more traditional animal models employed in stroke research. Experimental work has demonstrated advantages of the ferret as a model of visual development. We performed in vivo cerebral angiography and postmortem neurovascular dissection of latex-injected specimens of adult ferrets. The great vessels include a cervical arterial trunk that gives rise to both carotid arteries. The anatomy of the cranial arteries is similar to that of rabbits. No carotid rete mirabile is present. There are no intracranial anastomoses between the external and internal carotid systems. We present in vivo cerebral angiograms with pathologic correlation that demonstrate that ferrets may provide the same anatomic advantages as a rabbit model for the experimental study of cerebrovascular disease, with the additional advantage of a long extracranial cervical segment of the carotid artery, affording easier access to the intracranial vasculature.

Stroke, 20, p. 1085-1088, 1989. 2 figs., 22 refs. Authors' abstract.

Spontaneous neoplasms of ferrets, particularly ovarian tumours

M. Welle, T. Gobel

In the present study an overview concerning the frequency of neoplasias in the ferret is being given with special consideration of the histological and immunohistochemical examination of fibroleiomyosarkomas in the ovaries. Origin as well as clinical significance of these tumours are discussed.

Kleintierpraxis 37, Heft 9, p. 629-630, 632, 1992. 1 table, 4 figs., 12 refs. In GERM, Su. ENGL, FREN. Authors' abstract.

Cytological diagnosis of chordoma of the tail in a ferret

Lois Roth, Irene Takata

A 4-year-old intact male ferret was examined because of a smooth lobulated mass at the end of his tail which had been present and growing for a year. This was surgically removed after a fine needle aspirate showed large physaliferous cells and chondrocytes and a diagnosis of chondroma had been made.

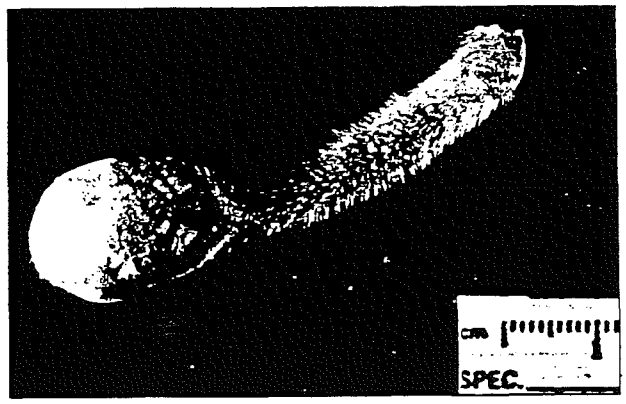


Fig. 2B A slice of the mass was removed. The paranchyma of the mass is composed of glistening grey and white, smooth, poorly defined lobules

Veterinary Clinical Pathology, Vol. 21, No. 4, p. 119-121, 1992. 3 figs., 11 refs. CAB-abstract.

Concurrent mammary gland hyperplasia and adrenocortical carcinoma in a domestic ferret

Natan Mor, Charles W. Qualls, John P. Hoover

Mammary gland hyperplasia associated with adrenocortical carcinoma in a domestic ferret had a histological appearance similar to that observed in cats. The authors point out that it is important to consider this hyperplastic condition in the differential diagnosis of mammary gland enlargement in the ferret.

Journal of the American Veterinary Medical Association, Vol. 201, No. 12, p. 1911-1912, 1992. 2 figs., 7 refs. CAB-abstract.

Functional islet cell tumor in six ferrets

Robert P. Marini, Eva B. Ryden, William D. Rosenblad, James C. Murphy, James G. Fox

Functional islet cell tumour was diagnosed in 6 ferrets. Prominent clinical signs included weight loss, hind limb weakness, ptyalism, and tremors. The diagnosis was made on the basis of 2 or more of the following methods and confirmed by histological examination of biopsy tissue: hypoglycaemia on routine serum biochemical analysis, clinical signs of hypoglycaemia, simultaneous development of hypoglycaemia (44±9.9 mg/dl; mean±SD), and hyperinsulinaemia (58±18.4 microU/ml; mean±SD) after food was withheld for 4 h. Surgical resection of affected tissue was associated with clinical improvement in all cases. Foci of metastasis were found in 1 ferret. Diazoxide was unsuccessful in controlling persistent postsurgical hypoglycaemia in 2 ferrets. Additional functional islet cell tumours were identified in 5 of 6 ferrets at PM examination. It was concluded that functional islet cell tumours are important neoplasma of older ferrets. Preventive health programmes for ferrets 3 years old should include monthly weight determination and biannual CBC and serum biochemical analysis.

Journal of the American Veterinary medical Association, Vol. 202, No. 3, p. 430-433, 1993. 1 table, 3 figs., 11 refs. CAB-abstract.

Combination doxorubicin and orthovoltage radiation therapy, single-agent doxorubicin, and high-dose vincristine for salvage therapy of ferret lymphosarcoma

Christina A. Hutson, Mark J. Kopit, Emily J. Walder

Lymphosarcoma is the most common neoplasm of the ferret. Previous treatment reports are limited to four commonly used chemotherapy agents: vincristine, cyclophosphamide, prednisone, and L-asparaginase. Treatment of relapsing lymphosarcoma with doxorubicin plus radiation therapy, doxorubicin alone, and high-dose vincristine each causing a clinical or complete remission is reported. Toxicity was minimal, and survival was 23 months.

Journal of the American Animal Hospital Association, Vol. 28, p. 365-368. 1 table, 5 figs., 10 refs. Authors' summary.

Gastrointestinal foreign body in ferrets: 25 cases (1986 to 1990)

Holly S. Mullen, Thomas D. Scavelli, Katherine E. Quesenberry, Elizabeth Hillyer

Gastrointestinal foreign body was diagnosed in 25 ferrets. Clinical signs included vomiting, bruxism and pawing at the mouth, diarrhea, and anorexia (1 to 28 days). Single and multiple foreign bodies were locaed in the esophagus, stomach, and intestine and were surgically removed in all. Four did not survive the immediate postoperative period. Of 22 discharged from the hospital, 16 were normal clinically. Of the other six, one died, one has lymphosarcoma, and in the other four signs of anemia andicterus had resolved within three weeks. Twenty-one were alive and well two weeks after surgery. Mean follow-up period was 27.4 months (range 1 to 33 months). Three died of causes unrelated to foreign body. The remaining 18 were alive and well at long-term follow-up. Gastrointestinal foreign body is not uncommon in ferrets and is a surgically correctable condition, with diagnosis, treatment, and surgical outcome similar to that seen in dogs and cats.

Journal of the American animal Hospital Association, Vol. 28, p. 13-19, 1192. 1 table, 8 figs., 10 refs. Authors' summary.

Nursing disease in mink: clinical and postmortem findings

R.R. Schneider, D.B. Hunter

One hundred fifty lactating mink on one ranch in southern Ontario were monitored over the lactation period in 1989 for evidence of clinical disease, and serial blood samples were collected for biochemical analysis. Antemortem blood samples were collected and necropsies performed on the 17 females that developed nursing disease and on 17 controls matched to the same stage of lactation and on ten nonlactating controls. Twenty-two additional nursing disease cases were selected from seven ranches in the following year and processed similarly. The clinical signs typically observed in affected females were sudden onset lethargy and anorexia followed by dehydration, ataxia, and a reluctance to move. The major clinical-pathologic findings were a marked increase in serum osmolality and total protein, urea nitrogen, creatinine, phosphorus, glucose, and potassium concentrations and a decrease in sodium and chloride concentration. In addition, the animals were acidotic, there was a reduction in the urine specific gravity, and the hemogram was consistent with a stress response. Emaciation and dehydration were the only pathologic changes consistenly present in cases of nursing disease and not in controls. In almost all cases, bacteria were not cultured from the liver, spleen, and mammary gland, but *Campylobacter jejuni* was cultured from the intestinal contents of 15/17 affected mink and 2/5 controls. Aleutian disease virus antibody was not present in any of the affected mink. Lipid vacuoles in hepatocytes and renal tubular epithelium, hypertrophy of cells in the adrenal cortex, and pulmonary congestion and atelectasis were present in both diseased females and controls, as were various sporadic inflammatory lesions. Nursing disease may result from energy depletion due to lactation. All lactating females are affected by this process; clinical disease reflects the terminal physiologic decompensation of the most susceptible individuals.

Vet Pathol 30, 6, p. 512-521. 5 tables, 33 refs. Authors' summary.

Skin disorders of small mammals

D.H. Scarff

Small mammals are frequently presented to the veterinary surgeon for skin disorders as children's pets, laboratory animals or commercial breeding groups. The role of the veterinary surgeon in these different categories is examined. Investigation and management of these disorders is discussed placing particular emphasis on a diagnostic approach and highlighting those areas which differ from canine and feline dermatology. Common dermatoses of these animals are described on an aetiological basis.

Journal of Small Animal Practice, 32, 8, p. 408-412, 1991. Author's abstract.

A case of skin mycosis in otter (*Arctocephalus sp.*)

Arlete Sogorb, Jacquelino Mendes Rodrigues Telo

In the present work the authors describe a clinical case of mycosis in otter (*Arctocephalus sp*) due to a mixed infection by *Aspergillus spp, Curvularia bigemica, Penicillium spp, Candida spp* and *Torula spp*. The treatment applied is also described.

Revista Portuguesa de Ciencias Veterinarias (Portugal), Vol. 87 (501), p. 54-56, 1992. 5 figs. In PORT, Su. ENGL, FREN, PORT. Authors' summary.

Complex odontoma of the upper jaw in a fox (*Vulpes vulpes* L.).

A. Karpenko, K. Bukovjan

The complex odontoma of the male red fox (*Vulpes vulpes* L.) was described. The differential diagnosis with other tumors of odontogenous tissues are discussed. The occurrence of dental tumors in wild animals was discussed.

Veterinarstvi, 42, 11, p. 421, 1992. 4 refs. In CZECH, Su. ENGL. Authors' summary.

Screening for antibodies against Aleutian disease virus (ADV) in mink. Elucidation of dubious results by additive counterimmunoelectrophoresis

Åse Uttenthal

In order to distinguish true positive results in counter-immunoelectrophoresis from false positive ones an additive counterimmunoelectrophoresis was developed. The method was tested on selected mink serum samples as part of a routine testing for antibodies towards Aleutian disease virus on 3 million blood samples. The procedure of the method is that a known positive serum sample is mixed with the patient serum to be tested. The result from a false positive sample will be one precipitin line towards virus and one nonspecific line. If the serum sample is a true positive one, the antibodies originating from the patient serum will be added to the antibodies in the standard positive serum giving only one precipitin line. The system is further extended by testing the serum samples towards an antigen preparation containing all the cellular components but free from virus.

Applied and Theoretical Electrophoresis, 3, p. 83-84, 1992. 1 fig., 5 refs. Author's abstract.

***cis*-acting sequences in the Aleutian mink disease parvovirus late promoter important for transcription: comparison to the canine parvovirus and minute virus of mice**

Torben Storgaard, Jesper Christensen, Bent Aasted, Søren Alexandersen

We are currently investigating the regulation of transcription of the Aleutian mink disease parvovirus (ADV). ADV causes a chronic immune complex-mediated condition known as classical Aleutian disease, characterized by slow viral replication. This slow replication is an intrinsic property of ADV and distinguishes it from the more prototypic parvoviruses such as minute virus of mice (MVM) and canine parvovirus (CPV). We have previously suggested a role for the weak ADV promoters in the slow replication and thereby the absence of acute cytopathology and instead establishment of persistent ADV infection with progressive immune complex-mediated chronic lesions. In this study, we have mapped the *cis*-acting sequences around the ADV P36 promoter responsible for both constitutive transcription and transactivation mediated by the nonstrucutral protein 1. The mapping was performed by using endpoint deletions of the ADV P36 promoter and by making chimeras between the ADV P36 and MVM P38 promoters. We found the weak constitutive activity of the ADV P36 promoter to be caused by suboptimal promoter proximal sequences, while the low level of transactivation was caused mainly by an upstream region including sequences with homology to the transactivation responsive element (*tar*) of the H-1 parvovirus (M.-L. Gu, F.-X. Chen, and S.L. Rhode, Virology 187:10-17, 1992). We also found the corresponding regions in the MVM and CPV P38 promoters to be important for transactivation of these promoters by making 5' deletions of the promoter region. In addition, it was found that MVM *tar*-like and upstream sequences could transfer high nonstructural protein 1 responsiveness to the ADV promoter even though the distance between the *tar*-like element and the TATA box was significantly changed. On the basis of comparative data for ADV, MVM, CPV, and H-1, a new clustered motif (TTGGTT) is proposed to be the responsive *cis*-acting element for transactivation. Homology comparison of the specific transcriptional elements of the ADV P36, MVM P38, and CPV P38 promoters suggests that few, but crucial, changes in the ADV P36 promoter and upstream region are responsible for the weak constitutive activity and low level of transactivation of the ADV P36 promoter.

Journal of Virology, Vol. 67, No. 4, p. 1887-1895. 6 figs., 42 refs. Authors' abstract.

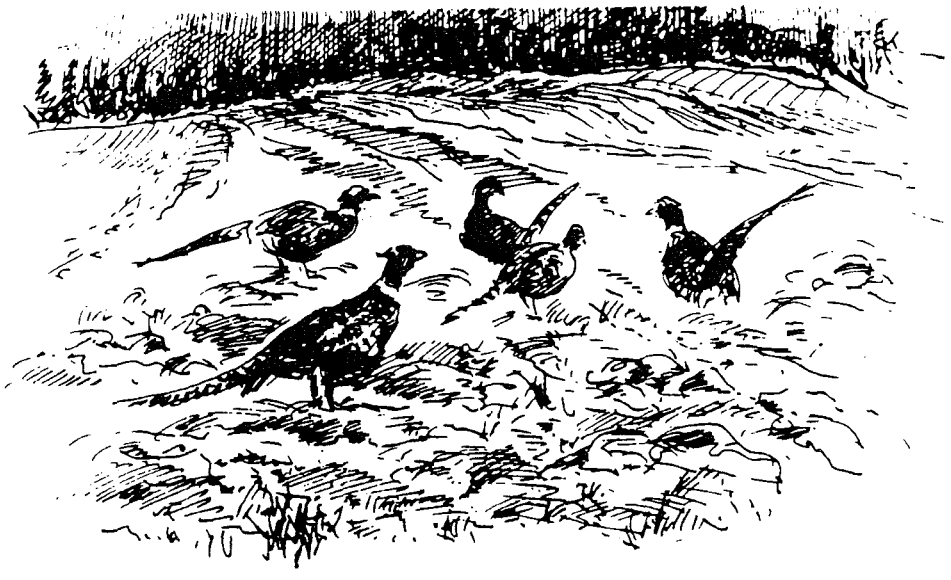
The monomer covalently closed linear replicative form DNA of Aleutian disease parvovirus is infectious after transfection into permissive cells

U. Truyen, Ch. Schelp, M. Löchelt, O.-R. Kaaden

The recently described monomer covalently closed linear replicative form DNA (Mccl RF DNA) of Aleutian disease parvovirus (ADV) is

an infectious intermediate of the viral DNA replication cycle. Transfection of highly purified Mccl RF DNA into susceptible feline kidney cells (CCC clone 81 cells) resulted in viral DNA replication, expression of viral proteins and synthesis of infectious progeny virus. Mccl RF DNAs generated under permissive (32°C) or non-permissive (37°C) conditions were shown to be biologically indistinguishable. The accumulation of the Mccl RF DNA form at the non-permissive temperature *in vitro* strongly resembles that in bone marrow cells of naturally infected mink and may reflect one mechanism contributing to virus persistence of ADV *in vitro*.

J. Vet. Med. B 40, p. 66-72, 1993. 4 figs., 25 refs. Authors' summary.



Ferrets as laboratory animals; a bibliography

K.J. Clingerman, J.G. Fox, M. Walke

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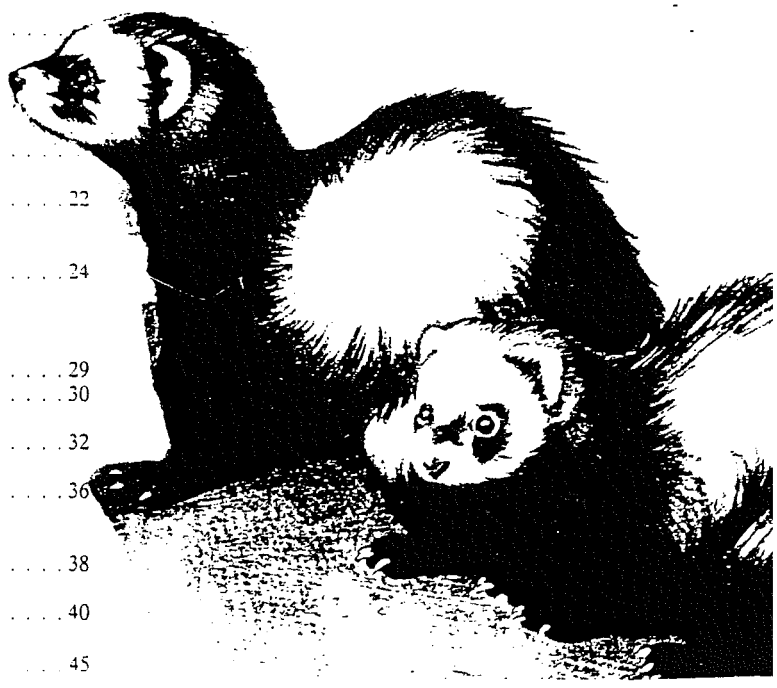

A guide to the dissection of the mink

James S. Schlough

54 p, with illustrations. Published by Nasco, Fort Atkinson, Wisconsin 53538, 1971.

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A Guide to the Dissection of the Mink

Second Edition

James S. Schlough

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Published by Nasco

Fort Atkinson, Wisconsin 53538

ENDOCRINOLOGY OF REPRODUCTION

OF FUR BEARING ANIMALS.

ЭНДОКРИНОЛОГИЯ
РАЗМНОЖЕНИЯ
ПУШНЫХ ЗВЕРЕЙ

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Preface

This collection of papers is the second issue in the series devoted to problems of hormonal regulation of reproduction in fur bearing animals.

Various problems of endocrinology of reproduction which present interest as to specialists studying fundamental problems of reproduction, as to breeders and agricultural students, are considered. Special attention is paid to the role of sexual steroid hormones in the regulation of reproduction and to their relation with fertility as well as to changes in the functional state of the endocrine system occurring under different environments. The authors present novel data obtained at the Laboratory of evolutionary genetics of the Institute of Cytology and Genetics of the Siberian Division of the Russian Academy of Sciences.

Introduction

The second issue in the series "Endocrinology of reproduction of fur bearing animals" is devoted to various aspects of hormonal regulation of reproduction of silver foxes, blue foxes and mink. Studying the bases of reproduction of economically valuable animals, particularly the hormonal links in the reproduction system, seems very actual due to the exclusive role of hormones in regulation and integration of physiologic and biochemical functions of cells and of the whole organism. This study seems very valuable for further development and use of new methods in fur animal rearing and breeding (embryo techniques, artificial insemination, hormonotherapy) and for establishment of new prognostic criteria in breeding.

Peculiarities of modern investigations into the reproduction endocrinology of fur bearing animals are seen in the fact that there is no complex arrival to analysis of the whole hypothalamic-hypophyseal-gonadal system. Development of the reproduction system during ontogenesis is not practically studied, as well as the process of steroidogenesis and mechanisms which regulate it. Still there are some unsettled problems of hormonal regulation of sexual behaviour. The role of hormones in male sterility and embryo mortality is also unclear.

However, there is an obvious progress in the study of genetic-endocrine aspects of fur animal breeding, particularly in the study of the pleiotropic effect of mutations of genes responsible for fur coloration on hormonal state and sexual system.

Progress in endocrinology achieved over the last years, and development of highly sensitive radio-enzyme-immuno assay systems did not only stimulate investigations into the hormonal state of fur bearing animals, but displayed new possibilities in the study of hormonal reactions to environmental factors (light conditions, feed rations) which significantly influence the sexual cycle, development of sexual system during ontogenesis, fertility etc.

In modern fur breeding science there is still a gap among basic and applied investigations. In this very book the contributors, without running into special scientific details in endocrine regulation, offer the ways of practical utilization of basic knowledge. In this country there are only a few published series dealing with the modern state of investigations in the field of regulation of reproduction in fur bearing animals. Thus, materials used in the present issue are of additional worth.

Endocrine gonadal function and spermatogenesis in low-fertile silver fox males

L.V. Osadchuk, A.I. Zhelesova

Analysis of the hormonal function of gonads of fertile and low-fertile silver fox males at the post-pubertal period did not show any significant alterations in the basal plasma testosterone (T) concentration. Moreover, low-fertile males did not show any endocrine response to females. The histologic test of gonads carried out before the mating season, showed a delay in the onset of meiosis in low-fertile males. At the end of the reproductive period these animals had lower excretion of spermatozoids into seminal tracts.

Low fertility of silver fox males is supposed to be due to abnormalities occurring during ontogenesis of the hypophyseal-gonadal regulatory system.

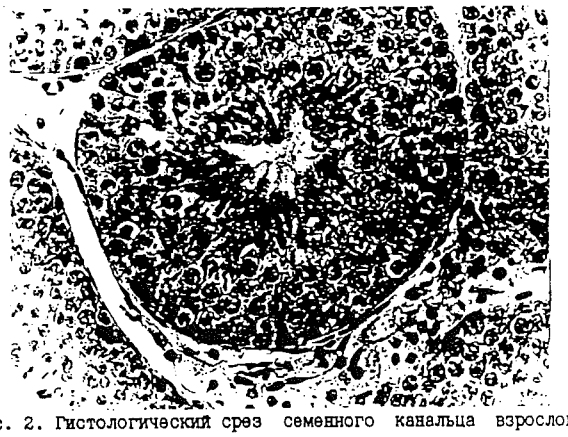

Рис. 2. Гистологический срез семенного канальца взрослого фертильного самца серебристо-черной лисицы. Декабрь. Увеличение × 500

In RUSS, Su. ENGL. Endocrinology of Reproduction of Fur Bearing Animals, Issue 2, 1994. pp 8-26. 4 tables, 3 figs., 19 refs. Authors' summary.

Folliculogenesis of Sapphire mink at postnatal ontogenesis

D.V. Klotchkov

Follicles of different types (primordial, growing, maturing antral, atretic) were calculated monthly (July-November) in three groups of young standard and sapphire mink (3 months of age) exposed to different photoperiods: 1st group - permanent illumination throughout a month from 21 June to 20 July + 8 hours of short daylight from 21 July to 10 October; 2nd group - 8 hours of daylight from 21 July to 10 October.

The control animals (3rd group) were maintained under conditions of natural daylight. In standard and sapphire mink from different groups were noted parallel seasonal changes in number of follicles of different types in ovaries with a tendency to minimum in September. The number of primordial, antral, atretic follicles was lower in sappire mink than in standard ones. There was no differenc in number of graafian follicles among standard and sapphire mink, but in October the number of graafian follicles in sapphire females (5.5±1.1) surpassed that in standard ones.

Thus, imitation of the earlier coming of autumn by regulation of the photoperiodic conditions inhibits the development of follicles in sapphire mink.

In RUSS, Su. ENGL. Endocrinology of Reproduction of Fur Bearing Animals, Issue 2, 1994. pp 27-37. 2 tables, 2 figs., 7 refs. Author's summary.

Development of the gonadal endocrine function in mink influenced by artificial photoperiod

R.G. Gulevitch, D.V. Klotchkov

Maintenance of 2-5 month old mink under the artificial light conditions imitating early autumn (additional illumination from 20 June till 20 July and 8-hour daylight from 21 July till 10 October - photoregime I; 8-hour daylight from 21 July till 10 October - photoregime II) induced prolonged modification of the balance of sexual steroids in mink males and females. The elevation of plasma testosterone concentration in prepubertal period was accompanied by its earlier decreasing by the mating period in experimental males of both groups than in control mink. The oestradiol concentration in blood of females increased on the eve of the mating period (January, February) and the progesterone concentration exceeded in preimplantation period of pregnancy under the influence of photoregime I. These hormonal changes were connected with an increase of fertility as compared to control. The condition of photoregime II involving only short daylight had less effect on sexual steroid concentration in blood of females. Under this conditions the fertility of females did not change. The gonads reaction on hCG injection was enhanced at the beginning of the pubertal period (November) in males under the influence of the photoregime I and in females under both photoregimes as compared to control animals.

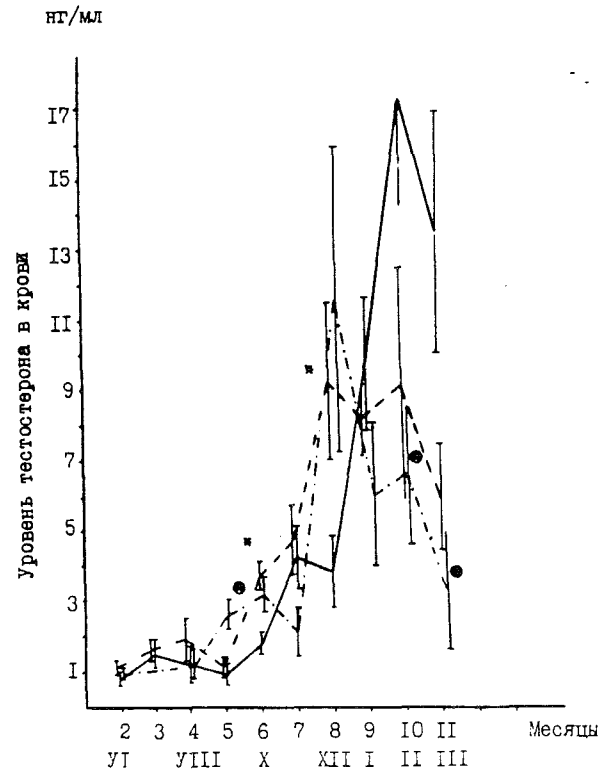

Рис. 2. Влияние световых режимов на уровень тестостерона в крови у самцов норок в постнатальном онтогенезе
У самцов контрольной группы уровень гормона обозначен сплошной линией, у самцов I группы (ДО + (8С-16Т)) прерывистой линией и у самцов II группы (8С-16Т) прерывистой с точками
* $P < 0,05$ при сравнении I группы с контролем.
⊛ $P < 0,05$ при сравнении II группы с контролем

In RUSS, Su. ENGL. Endocrinology of Reproduction of Fur Bearing Animals, Issue 2, 1994. pp 38-50. 1 table, 6 figs., 7 refs. Authors' summary.

Preservation of predators gene pools: cyropreservation of ermine embryos

S.Ya. Amstislavsky, L.F. Maximovsky, Yu.G. Ternovskaya, D.V. Ternovsky

The possibility of ermine embryos being successfully cryopreserved has been shown. The influence of the freezing program and the stage of embryo development on the survival of embryos was investigated. The frozen-thawed ermine embryos of the early stages of development were transferred to the right uterine horn of the recipient stoat and were cultured there during 26 days. Some of these embryos developed in vivo to the large delayed blastocysts.

In RUSS, Su. ENGL. Endocrinology of Reproduction of Fur Bearing Animals, Issue 2, 1994. pp 51-60. 2 tables, 3 figs., 15 refs. Authors' summary.

Effect on hormonal state of blue foxes of new protein substitutes added into the feed

O.V. Papafilova, V.G. Selyatitskaya, G.A. Zudova

A month's substitution of 30% of meat and fish products for the flour made of housefly larvae has changed the dynamics of excretion with urea of adrenalin, noradrenalin, testosterone and corticosteroids in 80-days pups of the blue fox, but had no negative influence on their growth, development and fur quality.

Feeding of 117-days pups with the same flour ration during 3 months has brought about an increase in their body weight by 1.34 kg with simultaneous increase in body size without aggravation in health and deterioration of fur quality. In these animals an increased concentration of testosterone and lowered concentration of corticosteroids in the blood was noted.

In RUSS, Su. ENGL. Endocrinology of Reproduction of Fur Bearing Animals, Issue 2, 1994. pp 61-75. 7 tables, 7 figs., 8 refs. Authors' summary.

Concentration of melatonin and enzymes of its biosynthesis in epiphysis of silver fox males and females

L.A. Kolesnikova, K. Yaga, A. Hattory, R. Reiter

Peculiarities of melatonin biosynthesis in silver foxes have been studied. Results of investigations carried out at the period prior to the onset of the mating period demonstrated that there are sexual variations in the regulation of the reproductive system by hypophysis. The plasma FSH concentration in females was reliably higher than in males.

The activity of enzymes which synthesize melatonin and the concentration of melatonin in epiphysis, as well as its plasma concentration in males and females at this period were practically the same. In animals of both sexes the concentration of melatonin in the retina was higher than in plasma. Moreover, melatonin concentration in the retina of males was higher than that of females.

In RUSS, Su. ENGL. Endocrinology of Reproduction of Fur Bearing Animals, Issue 2, 1994. pp 76-83. 2 tables, 15 refs. Authors' summary.

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