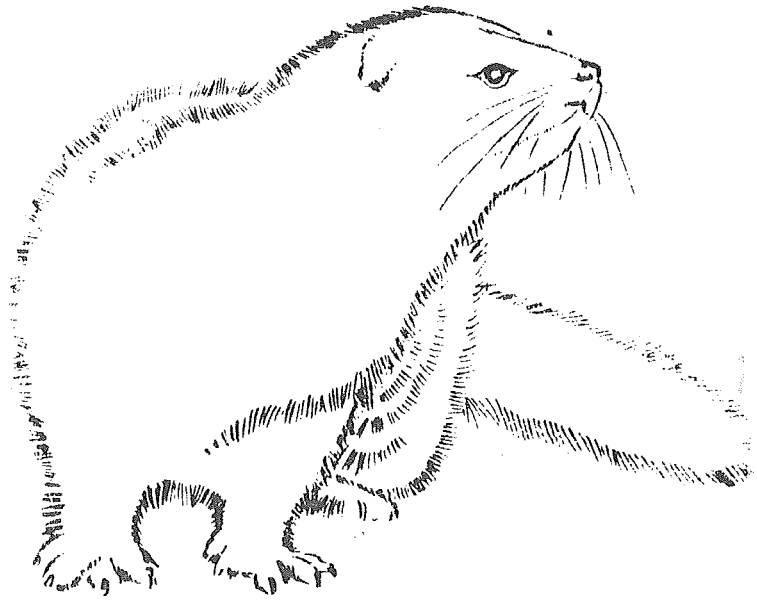

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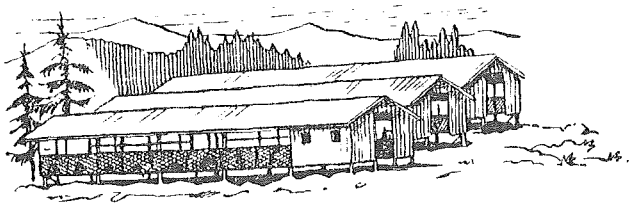

NOTES

SCIENTIFUR, VOL. 9, NO. 1, 1985.

Again we apologize for the delay of SCIENTIFUR - but the fact is that the day has only 24 hours and some of these have to be used for sleeping. The time we started SCIENTIFUR, the scientific staff at our institute consisted of 2 scientists. Today we are 7, so your editor has got much more work from the side for which he got his salary.

This together with some disappointment regarding the reactions - or the absence of reactions - regarding our advertisement of the English translation of the famous Danish book MINK PRODUCTION has made the work harder tha previous.

At the 3rd International Scientific Congress in Fur Animal Production, Paris 1984, I gave a speach regarding further improvement in cooperation on communication in the scientific and production aspects of fur animal production. The same aspect I tried to bring up in American and Scandinavian connection.

Everybody is more or less positive because it is evident that every cooperation has to be organized in one or another way. After all discussion I have to realize that no international cooperation in the area I have proposed will be organized, if I not have the energy and power to do it myself.

The first step was the international scientific congresses and SCIENTIFUR. The next step is through other publication service to show the importance of my ideas, and to establish the economical basis for a more permanent solution. Therefore, it was - and is still my hope - that the English translation of MINK PRODUCTION and the next book "BEAUTIES OF FARM BRED FUR ANIMALS - mutations and combinations" should be a success both public and financial.

At present, we have approximately 250 signed order for MINK PRODUCTION of the amount of 2000 copies necessary to reach the economal zero point of the translation, printing and postage costs. At least, the book will be delayed until we have received a more massive response from the main marked areas, USA and Canada.

The received comments regarding the price of the book tell us that people do not realize the costs of production of books and other materials in small numbers.

IF THE ORGANIZATIONS AND SINGLE BREEDERS IN THE ENGLISH SPEAKING PART OF THE WORLD WILL NOT REALIZE THE COSTS OF SUCH SERVICE, AND NOT WILL PAY THE PRICE FOR IT, PERHAPS OUR COMMON FRIEND, MR. TONY RIETVELD OF ILLINOIS, WILL BE RIGHT IN HIS THINKING THAT IN FEW YEARS THERE WILL NOT AT ALL BE NEED FOR USE OF THE ENGLISH LANGUAGE IN COMMUNICATION REGARDING FUR ANIMAL PRODUCTION.

This was the negative part of these Notes. The positive side will be the presentation of the first commercial and supporting announcement in SCIENTIFUR.

We thanks the SCHERING CORPORATION for the support, and at the same time we promise our readers, that SCIENTIFUR still will be the scientific communication link in fur animal production. We shall invite other international companies to support the further development of SCIENTIFUR and related services through announcement.

The price for such a service is as follows:

1. 2 pages (1 leaflet A-4, 29.7 x 21 cm, max. 9 gram) ready printed for including as a page in SCIENTIFUR: US$ 1000 for 1 issue, and US$ 3000 for 1 volume (4 issues).

   These announcements can be different, for each issue we need 500 copies delivered before the 1st of February, May, August, and November.

2. Folders of 4 or more pages, max. 27 grams, the price will be:
   Max. 18 grams = US$ 1500.
   Max. 27 grams = US$ 2000.

As you will see from this issue of SCIENTIFUR we bring the addresses

of the authors on separate pages instead of in connection to the actual abstract or title. It will help us a little bit, and give more space for informative matters. We also hope through that system to be able to - during the time - to bring the correct addresses of all authors cited in SCIENTIFUR, so it can be as easy as possible for the readers to contact the authors.

In this issue you will find 4 original reports, and until now we have received 2 for the next issue. We hope that the number of original reports will increase, and that we will be able to find space to bring them.

Among others, the support from announcements will help us to produce a better SCIENTIFUR in the future to a reasonable subscription price.

PLEASE, PRE-ORDER YOUR COPY OF MINK PRODUCTION BEFORE APRIL 1st 1985. Use the already received order form or the order form on page no. 71 in this issue of SCIENTIFUR.

The best wishes for a good year and a good future.

Your editor

Gunnar Jørgensen

Original Report

Effects of Housing Conditions on Circulating Eosinophil Leukocyte Levels in Male and Female Minks from four different Farms

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Recent studies on minks indicate that experimental stress may be easily assessed by determinating circulating eosinophil leukocyte levels. A single 1 h immobility stress session leads to acute drops in circulating eosinophil levels, whereas repeated immobility stress sessions have the opposite effect (Heller and Jeppesen, in prep.).

This does not imply, however, that eosinophil determination could be used as a method for stress assessment in general, since we do not know whether stress experienced under normal production conditions affect circulating eosinophil levels in the same way as immobility stress in the above cited study.

The purpose of the present study was to compare circulating eosinophil levels in minks obtained from four different farms and subjected to variable social housing conditions.

Twenty males and 20 females (six months old) from each of three different farms (A, B and C) were housed in pairs since weaning at one farm in alternating neighbouring cages, whereas 48 males and 24 females of the same age from a fourth farm (D) were housed singly.

Fifty mm^3 bloodsamples were collected and individual eosinophil leukocyte levels were determined according to the method described in Zarrow et al. (1964).

The results are presented in Table 1 which shows the mean eosinophil levels of male and female minks from the four different farms.

Mann-Whitney U tests and Kruskal-Wallis one-way analysis of variance (Siegel, 1956) applied on individual data revealed that (1) female minks had significantly ($P < 0.001$) higher eosinophil levels than their male cagemates; (2) there were no sex-differences in eosinophil levels in singly housed animals; (3) there were significant differences between animals from farm A, B and C, males ($P < 0.001$) as well as females ($P = 0.03$); (4) singly housed minks of both sexes had generally lower eosinophil levels than animals housed in pairs ($P < 0.01$ for males and $P < 0.001$ for females).

The eosinophil levels in female minks cohabiting with males in the present study are identical to those revealed by males subjected to repeated immobility stress in previous experiments (Heller and Jeppesen, in prep.), whereas the levels of singly housed females found here do not exceed the levels previously found in untreated control animals.

It is tempting to suggest, therefore, that female minks cohabiting with males experience stress imposed by the presence of the male conspecific. This suggestion is supported by numerous studies on common laboratory animals, in which females ordinarily appear subordinat to males under restricted housing conditions and as a consequence experience more social stress than cohabiting males (Broverman et al., 1974). The validity of this interpretation has, however, to be tested by more detailed analysis of the relationships between experienced stress and circulationg eosinophil levels.

The differences in circulating eosinophil levels in pairs from different farms observed here may reflect variations in pre-weaning experience or may be due to genetic variations. If the observed levels of circulating eosinophils will be proven to reflect stress levels, several events could account for the differences recorded. Genetic variation in stress sensitivity in minks from different farms is an obvious interpretation, but differences in neonatal housing or handling conditions could be equally important. It is well known from laboratory animals neonatal handling or neonatal stress may reduce future physiological and behavioural reactivity in stressfull situations (Ader et al., 1968); Ader and Grota, 1969). Provided similar effects occur in minks, the relative high eosinophil levels found here in both males and females from farm C could very well be due to particular low neonatal stress conditions on that farm.

Summarizing the results of the present study, it can be stated that circulating eosinophil levels reflect differences in housing conditions in minks, and that those conditions which may be regarded most stressfull

	Males and females housed in pairs		Males and females housed singly	
	male (n = 20)	female (n = 20)	male (n = 48)	female (n = 24)
Farm A	188.1	275.6		
Farm B	210.4	275,3		
Farm C	259.0	314.2		
Farm D			172.1	176.0
Mean of A, B and C	219.1	288.4		

Table 1. Effect of sex and housing condition on mean no. of eosinophil leukocyts per mm³ in animals from four different farms.

accompany highest circulating eosinophil levels. The present study, therefore, lends additional support to the suggestion that eosinophil determination could be used as a method for stress assessment in minks.

Thanks to The National Institute of Animal Science, Dept. of research in Fur Animals for the oppurtunity to do experiments with the minks at Trollesminde research farm.

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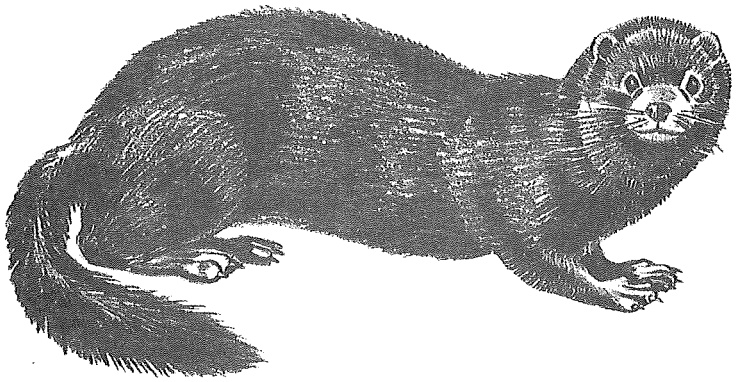

Original Report

Thermophysical Properties of Nests of farmed Mustelids: Effect of Wind and Ventilation

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Summary

In order to clarify effects of ventilation on thermal protection of nests for farmed mustelids, the mink *(Mustela vison)* and the polecat *(Mustela putorius)*, ventilation rates (m^3/h) of a styrofoam-covered, plastic nest and a wooden one were evaluated by using an oxygen tracer technique. Different bedding configurations and wind speeds were used. Heat loss from respiratory tracts amounts to about 17% of the total heat production of a mustelid couple. Nest ventilation accounts for a major part of their total heat loss explaining about half of their heat loss, even in still air conditions. Without bedding, ventilation was of the same order of magnitude both in styrofoamprotected and wooden nests. Wind clearly increased nest ventilation being more effective if the nest opening was directed towards the wind. Bedding material in an open nest configuration (no material above an animal model) did not reduce ventilation rate, whereas bedding material in a closed configuration (material above the animal model) decreased it.

A board on top of the wooden nest more than halved ventilation rate under calm conditions but did not reduce the forced convection caused by wind. The dependence of the cooling rate of a animal model inside the nest on the ventilation can be described by a S-shaped curve; ventilation rates around 1 m^3/h produced most marked changes in the heat loss.

Introduction

Experimental data (Korhonen et al. 1983) and farmers experience support the assumption that farmed mustelids, the polecat *(Mustela putorius)* and the mink *(Mustela vison)*, cannot survive winter in Finland without thermal protection provided by a nest. In our previous work we demonstrated that the nest constructions are able to shift the lower critical temperature (T_{lc}) of mink and polecat from +20 . . . +25° C, typical values for unprotected animals, to about +2 . . . +7° C (Korhonen and Harri 1984). If more effective thermal insulation is needed, it can be achieved by addition of bedding material. When 200 g of straw is added to a nest, T_{lc} is shifted to ÷41° C, a value which gives sufficient protection against the cold of Finnish winter. These data were, however, derived from measurements in a climatic chamber under calm conditions. In this situation, the main factor influencing thermal insulation, is the effective thickness of dead air produced by the insulative material (e.g. Tregear 1965; Davis and Birkebak 1974; Cena and Clark 1979; McArthur and Monteith 1980; Kaufman et al. 1982). However, insulation is always decreased by the effects of wind. Because it is rarely calm in field situations, it was necessary to evaluate the effect of wind on thermal protection provided by different nest models.

Materials and methods

The nest types examined in this study were those most commonly used by Finnish fur animal breeders: a wooden nest measuring 30 cm x 22 cm x 40 cm (length x width x height) and a cylindrical styrofoam-covered plastic nest with an inner diameter af 20 cm and a height of 32 cm. Both nest boxes had a round opening (diameter 10 cm) whose lowest edge was situated about 25 cm above the bottom. The roof of the nest was wire-mesh net. For experimental purposes the wooden nest was also covered with a board, as breeders often use this kind of protection during cold weather. A more detailed description of the nest constructions is given in our previous paper (Korhonen and Harri 1984).

Dry oat straw was used as a bedding material, 200 g for the styrofoam nest and 300 g for the wooden nest. The beddings were first placed into outdoor cages inhabited by a polecat couple. The animals arranged the material in the preferred form for mustelids. One bedding configuration was the covered form; i.e. there was about 5 cm straw above the animals in addition to material below them. This is the typical winter bedding configuration. In the open type nest construction, all straw above the animals was removed. This is a natural bedding configuration in warm seasons.

A polecat model was made by inserting a plastic bag containing 5% agar gel in water into a tanned polecat skin. This model animal was heated to about 37° C before it was coiled into the form of a sleeping polecat. It was then placed into the nest. The tracer technique of Birnbaum and Crockford was employed for measurement of the ventilation rate of nest constructions (for description of the method see Cena and Clark 1979). We employed atmospheric oxygen as a tracer. The air inside the nests was first replaced by nitrogen. The ventilation rate was then estimated from the subsequent exponential return of the oxygen concentration to its natural value, 21%. This proces was followed by means of an oxygen sensor (Beckman OM-14) placed in the middle of the coiled model animal and recorded on a Servogens chart recorder. The fractional ventilation rate, in units of time, was obtained as the slope of a graph of the $\ln(\%\ O_{2\,air} \div \%\ O_{2\,nest})$ plotted against time. Laminar air flow (»wind«) was produced by a fan placed at different distances from the nest. The air stream velocity was measured by means of a hot wire anemometer.

In a second experiment the cooling rate of the polecat model, heated first to 37° C, was measured under different climatic conditions. Cooling constant of the model was measured by the method of Morrison and Tietz (1957). The cooling constants were then converted into units of heat transfer coefficient, in $W/kg^{0.75}$ per °C, by employing the specific heat of the water-agar jelly , 1.0 cal/(g x °C), and its weight (kg). Our previous experiments have shown that thermal conductivity of the model was comparable to that of the animal body (Korhonen and Harri 1984). The lower critical temperature for the model was obtained as the temperature where the slope of the line of heat transfer coefficient on ambient temperature crosses the resting heat production value of live polecat, if both values are expressed i terms of $W/kg^{0.75}$ and if the line is extended to the same point where the line describing the increase in heat production of live polecats below thermoneutrality is extrapolated to the x-axis (Korhonen and Harri 1984).

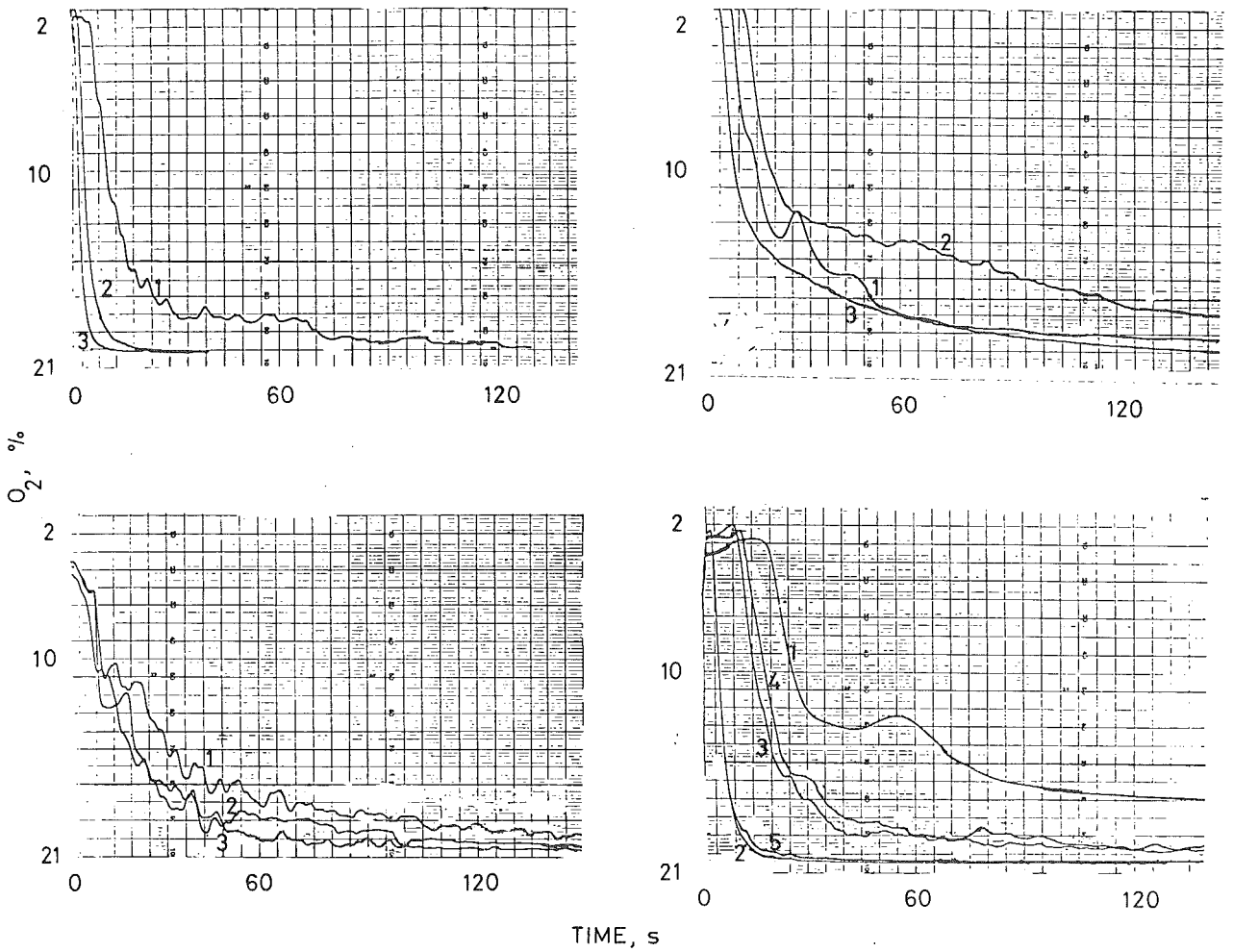

Fig. 1. Examples of original curves of oxygen concentrations. (1) calm, (2) wind 1 m/s, (3) wind 3 m/s, (4) wind 1 m/s, covered with board, (5) wind 3 m/s, covered with board. Up left: styrofoam nest, no bedding, opening against wind. Up right: styrofoam nest, covered configuration with 200 g bedding, opening against wind. Down left: wooden nest, no bedding, opening fair wind. Down right: wooden nest, covered configuration with 300 g bedding, opening against wind.

Results

Typical original records of oxygen concentrations against time obtained during measurement of ventilation rates of various nest constructions are shown in Fig. 1. The fractional ventilation rates calculated from the recovery phases of the curves were converted to m^3/h by multiplying them by the volumes of the nest chambers. The results are summarized i Table 1. Without bedding, the ventilation rate was of the same order of magnitude both in styrofoam protected and wooden nest. Wind greatly increased ventilation rate being more effective if the nest opening was directed against the wind. Bedding material in an open form (no material above the animal model) reduced ventilation rate, the protection being still more effective if the bedding material was formulated in a covered form (bedding covers the animal). Placing a board on top of the wooden nest more than halved the ventilation rate in calm conditions. However, it was less effective in wind. In this situation, bedding produced far more effective shelter against the forced convection than did the board.

The thermal protection provided by different nest constructions and the effect of wind upon it is shown by the heat transfer coefficients and the calculated T_{lc}-values (Table 1). They show that the wooden nest provided as good a thermal protection as did the styrofoam one. As expected, the more the wind increased ventilation rate of the nest box air the more it increased the heat transfer coefficient of the model. This dependence can best be described by a S-shaped curve (Fig. 2) which shows that ventilation rates around 1 m^3/h produced most marked changes in the heat loss of the model.

Generally, the insulative value of the nest was more dependent on the amount and configuration of the bedding rather than on the insulation of the nest box wall and bottom. However, the importance of the nest wall insulation became apparent in windy conditions. Under calm conditions the cooling rate of the model was practically the same whether or not the nest box had styrofoam shell. When a mild wind at a rate of 3 m/s was blowing the heat loss was higher for the nest without styrofoam shell than for that with it. However, even under these circumstances, the heat loss of the model was 32% higher with styrofoam shell but without bedding than with bedding but without styrofoam covering.

Nest	Bedding	Wind (m/s)	Direction of nest box opening	Ventilation[1] (m^3/h)	Heat transfer coefficient[2] ($W/kg^{0.75}$ per ° C)	T_{lc} (° C)
None		0			0.158 ± 0.016	+ 22
Styrofoam	None	0		1,2 ± 0.2	0.094 ± 0.013	+3.8
		3	Fair wind	1.7 ± 1.2	0.096 ± 0.011	+4.9
		3	Aginst wind	6.9 ± 0.9	0.103 ± 0.018	+8.5
	Open type	0			0.061 ± 0.007	÷ 25
		3	Fair wind		0.073 ± 0.009	÷ 11
		3	Against wind		0.095 ± 0.012	+4.4
	Covered type	0		0.2 ± 0.1	0.051 ± 0.008	÷ 41
		3	Fair wind	0.4 ± 0.1	0.050 ± 0.015	÷ 43
		3	Against wind	1.0 ± 0.8	0.064 ± 0.009	÷ 21
Without styrofoam shell		0		0.2 ± 0.1	0.052 ± 0.018	÷ 40
		3	Fair wind	0.4 ± 0.1	0.059 ± 0.019	÷ 27
		3	Against wind	1.0 ± 0.8	0.078 ± 0,020	÷7.0
Wooden	None	0		1.3 ± 0.4	0.096 ± 0.009	± 4.8
		3	Fair wind	1.2 ± 0.6	0.098 ± 0.013	+5.8
		3	Against wind	3.8 ± 2.6	0.103 ± 0.015	+8.5
	Open type	0			0.066 ± 0.013	÷ 19
		3	Fair wind		0.073 ± 0.019	÷ 11
		3	Against wind		0.089± 0.009	+0.8
	Covered type	0		0.3 ± 0.1		
		3	Against wind	0.3 ± 0.1		
Top covered with board	None	0		0.6 ± 0.2		
		3	Against wind	3.1 ± 1.8		
	Covered type	0		0.3 ± 0.1		
		3	Against wind	0.8 ± 0.3		

[1] Mean ± SD of 5 measurements
[2] Mean ± SD of 3 measurements

Table 1. Ventilation rate in different nest constructions with different bedding and wind combinations and heat transfer coefficient and calculated lower critical temperature (T_{lc}) for a heated model inside the nest.

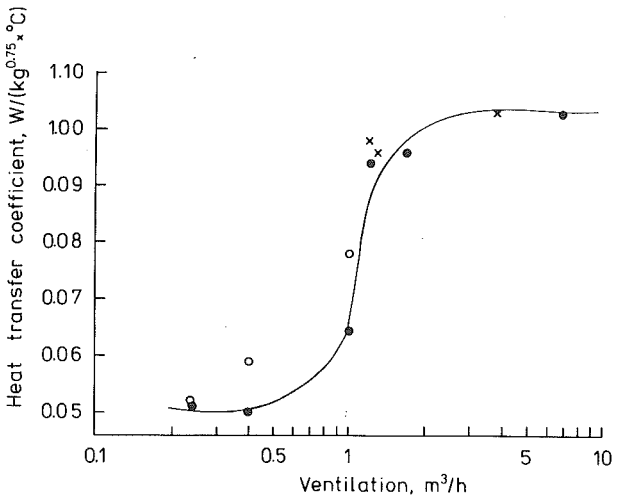

Fig. 2. Relationship between heat transfer coefficient of a heated model and ventilation rate of styrofoam nest with (●) and without styrofoam shell (o) and of wooden nest (x) with different combinations of wind and bedding.

Discussion

A mustelid nest should provide thermal protection such that inside it the animals should be able to maintain homeothermy without increasing their heat production above the resting level. If a male and female polecat are placed into a nest and if the resting metabolic rate (RMR) is 5.0 W/kg^{075} (Korhonen et al. 1983), total heat production for the couple (male 2000 g, female 850 g) is 11 W.

Heat is exchanged with the environment through the four channels of evaporation, radiation, convection and conduction. Based on our present and earlier data (Korhonen and Harri 1984) and known physical data, we can estimate the importance of these four channels as heat loss avenues for a standard polecat couple inhabiting a certain nest construction. Let us assume that ambient air temperature lies at ÷20° C, a typical situation in the Finnish winter. Let us further assume that partial pressure of oxygen (at STP) is 150 mm Hg in the inspired air and 116 mm Hg in the expired air (Ganong 1979). This means that to maintain a metabolic rate of 11 W, the animals must consume 1.98 ml O_2/h, and, with the above mentioned oxygen extraction rate, they must breathe 36 l air/h. The lowest ventilation rate that we measured in this study was 220 l/h. This greatly exceeds the minimum ventilation rate required to guarantee a sufficient oxygen supply. The 36 l of inhaled air must be heated from ÷20° C to about 35 ° C, the temperature of the exhaled air. The product of the density and the specific heat of air generates a value of 1298 J/m^3 per ° K at STP (Cena and Clark 1979). Thus, a heating power of 0.71 W is needed to heat the inspired air from ÷20 to +35° C. The inspired air, even if it is saturated with water vapour, can not carry more tha 2 g of water/m^3 at ÷20° C while the expired air, which is always saturated with water vapour, contain 44 g of water/m^3. Furthermore, each g of water when evaporated binds 2.5 kJ heat. This gives a total power output of 1.2 W for the humidification of exhaled air. Thus, the total heat loss from respiratory tracts amounts to about 1.9 W which is 17% of the polecat's heat production. This value is close to the 20% figure calculated for a man at 0° C (Mount 1979).

Convective heat transfer in nest situations is proportional to the rate of air exchange and the temperature difference of incoming and outgoing air. Our previous measurements have shown that at ÷20° C the inside air temperature at a height of 10 cm above the animals is 10° C higher (Korhonen and Harri 1984). It should be kept in mind that this is a rough estimate as we do not know whether each unit of volume of the nest air is heated to that temperature. The air temperature around the animals must be even higher, and this warm air is then mixed with cold incoming air to give an average value of 10° C for incoming-outcoming temperature difference at the half way point inside the nest. A usage value of 1298 J/m^3 per°K for the volumetric specific heat of air, gives total heat loss values of 4.3 W from styrofoam nests without bedding in calm conditions (ventilation rate 1.2 m^3/h) and 3.6 W from the covered bedding configuration in a wind of 3 m/s blowing against the nest opening (ventilation rate 1.0 m^3/h.) Thus, heat losses of 6.2 to 5.5 W from evaporation and convection can be calculated for a polecat couple at ÷20° C. These values are slightly more than half of the measured total heat loss 11 W of our standard polecat couple. This means that a heat loss of an order of 4.8-5.5 W cannot be explained by these calculated figures. The heat loss through the walls and bottom of the styrofoam nest seems unimportant, because removal of the styrofoam insulation produced only small change in the heat loss values of the heated model. It seems more probable that the ventilation rate measured for the nest box with a dead model is smaller than when the nest is inhabited by live animals. Animal movements and respiratory air pumping increase convection inside the nest and the active heat production, which does not occur in the model, causes an upward air streaming. Thus the ventilation rates, and accordingly, the heat loss values are higher for nests inhabited by live animals than those measured here for a dead model. Further experiments are needed to evaluate the effect of ventilation on thermophysical properties of nest constructions in natural conditions.

The importance of conduction and radiation as the heat loss routes cannot be estimated from our measurements. Because radiative heat exchange is proportional to the differences in absolute temperatures of the nest walls and the surroundings and because the nest wall temperatures are not very much higher than those of surroundings, it is tempting to conclude that radiations is unimportant as a source of heat loss for an animal inside a nest. Radiative heat exchange which occurs inside the nest is already included in the heat loss

calculated from the nest-ambient air temperature difference and ventilation rate.

The dependence of the heat loss value of the model in the nest box on the ventilation rate was clearly demonstrated by our results. Wind markedly increased the ventilation while bedding and its configuration most effectively reduced it. Insulation of the nest box walls and bottoms or placing a board on the top of the box are of less importance in producing warmth. This leads us to a second problem, besides warmth, which greatly affects justification of the properties of various nest constructions. That in moisture. As stated above, a polecat couple inhabiting a nest evaporates about 40 g of water in humidification of the 864 l of air it exhale during a winter day. During a ten-day follow up period, we found that 55 g of water was retained by straw bedding (Korhonen and Harri 1984); i.e. 14% of the total water produced. Because the capacity of air to carry water depends on its water vapour pressure and temperature, the maximum amount of water the exhaled mustelid air can contain, is 44 g/m^3 while the ambient air at ÷20° C can carry a maximum of 2 g/m^3. In a temperature gradient which results from the metabolic heat production of the live animal inside a nest, the relative humidity rises until it reaches 100%. When temperature falls below this point, water condenses. This is what happens when air containing moisture moves through a temperature gradient for example in clothing, animal coats, or nests (Belding et al. 1947). Moisture in the bedding greatlys increases its conductivity and heat capacity, and accordingly, heat loss of an animal lying on it (c.f. Korhonen and Harri 1984). This has been demonstrated for caribou pelt by Lentz and Hart (1960), where about 12% water sprayed on the pelt doubled the rate of heat transfer through the material. This was evidenced also by our previous experiments where 17% water by weight in straw bedding decreased the T_{lc} of the animal inside this bedding from ÷41 to ÷23° C (Korhonen and Harri 1984). Air movement is the only factor that leads to the replacement of vapor-laden air near the animal by drier air, but with the negative expence of enchanced heat loss. Both problems can be avoided only by changing the bedding material frequently or alternately, by giving the animal more bedding.

Acknowledgments

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Original Report

Investigations over the Relationship between Occurrence of Mineral Elements in Blood Serum and Hair of Black-Silver-Foxes

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Summary

A series of investigations aiming at determining interdependence between occurrence of mineral elements Ca, Na, K, Mg, Zn, Fe and Cu in blood serum and hair of black-silver foxes were carried out. The blood and hair was taken to analysis from 18 foxes three times in a year. The results of the investigation pointed out to some relationship between the level of P and Na as well as Na and Fe in the blood serum on one hand and the level of Ca and Mg, Ca and K, Ca and Na, Mg and K, Mg and Na, Mg and P, K and Na, K and Fe in the hair of foxes, on the other hand.

However, no positive and statistically relevant interdependences between the levels of the same mineral elements in the blood serum and hair of the animals were revealed. The stated levels of the elements in the blood serum and hair of black-silver foxes may be considered referrential for the local conditions of feeding and care.

Investigations aiming at determining the mineral supply of alive animals, including the fur-bearing animals so far consisted mainly in stating the level of these elements in blood. In the latest investigations, however, some attention is also paid to the possibility of employing for the same purposes the mineral analysis of hair/1,2,3,5/. This method is particularly advantageous, due to the fact that taking material to analysis from alive animals in such a case is very easy. It has been stated that the content of mineral elements in the hair of animals reflects the real state of mineral supply in a longer period of time.

It is quite obvious that mineral elements in the hair of alive animals come only from the capillary vessels of blood circulation system. However, results of the investigations carried out in order to find out the interdependence between the concentration of mineral elements in blood and hair are rarely successful /2,3/. This is among other things, due to the fact that melanin, the hair dye has selective ability to assimilate some elements /3/.

Hence, it would seem interesting to find out the interdependence between the levels of mineral elements in blood serum and hair of black-silver foxes.

Material and methods

Our investigations were carried out in one of the fur-bearing farms in the Siedlce province. The material for the investigations were 18 mature black-silver foxes, 9 males and 9 females. The animals were fed ad lib. and had permanent access to water. They were fed with traditional feeds with permanent admixture of mineral and vitamin premixes. Blood and hair was taken to analysis three times a year. Before taking the samples, animals were kept hungry for 12 hours. Blood was taken from the foot vein, and hair was taken from the dorsal part at the height of the scapula according to Brochart's recommendations /3/.

The content of the mineral elements Ca, Na, K, Mg, Zn, Fe and Cu in blood serum and the content of Ca, Na, Mg, K, Zn, Fe, Cu and Co in hair was established with the method of atomic absorption spectrophotometry by means of the apparatus of the firm PYE-UNICAM. The level of P in blood serum and hair of the animals was established colorimetrically according to Fiske-Subbarov's recommendations /4/.

The obtained results were later analysed statistically in order to establish the average standard deviation and correlation coefficients.

Results and description

The content of mineral elements in blood serum of foxes is given in table 1 and the content of those elements in hair of foxes in table 2. The data included in table 1 show that the quantitative sequence of occurrence of chemical elements in blood serum of foxes is as follows:

$$Na > K > Ca > P > Mg > Zn > Fe > Cu$$

The sequence of quantitative occurrence of mineral elements in the hair of foxes was similar and it went as follows:

$$Na > Ca > K > Mg > P > Zn > Fe > Cu > Co$$

The presented sequences of occurrence of macro- and microelements in blood serum and hair were generally similar to those estimated by other authors and to those stated in our earlier investigations on polar blue foxes and black-silver foxes /5,6,7,8/.

Table 1. Content of mineral elements in blood serum of black-siver foxes

Name of chemical element	Ca mmol/l	P mmol/l	K mmol/l	Na mmol/l	Mg mmol/l	Zn mmol/l	Fe mmol/l	Cu mmol/l
$\overline{X}$	6,3	2,2	16,2	211.0	1,03	30,5	34,4	6,8
SD	0,9	0,3	3,8	14.5	0,1	9,9	13,0	2,7

Explanation:
$\overline{X}$ - concerns the whole period of investigation.

Table 2. Content of mineral elements in the hair of black-silver foxes

Name of chemical element ppm	Ca	P	K	Na	Mg	Zn	Fe	Cu	Co
$\overline{X}$	885,0	211,1	491,7	1005,6	256,7	53,4	48,2	12,6	0,54
SD	118,6	31,4	96,9	69,9	38,8	3,7	7,0	1,1	0,04

When estimating the height of correlation coefficient between the levels of individual mineral elements in the blood serum, at the level of relevance 0,05 it was stated that these elements did not occur in large numbers and that their occurrence was not regular. Positive and statistically relevant correlations occurred only between the levels of phosphorus and sodium as well as sodium an iron. Unlike in the blood serum, the correlations between the content of individual min ·ral elements in hair were more numerous and more regular. Some positive interrelations between the levels of calcium and magnesium, calcium and potassium, magnesium and sodium, magnesium and sodium, magnesium and phosphorus, potassium and sodium, as well as between the levels of potassium and iron could be found.

When determining relevant correlations between the content of macro- and microelements in the blood serum in relation to their level in hair of the animals it was stated that they existed only between the levels of magnesium and cobalt, iron and calcium, iron and magnesium as well as between iron and potassium. No relevant interdependencies between the content of the same/analogical/elements in the blood serum and hair were stated.

When discussing our observations it seems necessary to mention the results of Brochart's investigations /2/, who after applying for some time differentiated levels of mineral elements in the feed given to rats stated that the greatest and quickest changes in the blood serum were shown for magnesium and potassium, slower for phosphorus, while calcium and sodium did not show any changes.

The dynamics of changes was different for hair; the quickest changes were observed for the level of sodium, moderate for calcium, magnesium and phosphorus and the slowest for potassium.

Very interesting are also observations of Brochart /3/ and Brochart and Chassague /2/. They stated that there is more calcium, magnesium and phosphorus in black hair than in white hair of foxes, and that the content of melanins in the same phenotype is differentiated which may influence the content of elements in hair of the animals.

On the basis of our present investigations and the accessible literature it is not possible to draw any conclusions concerning usefulness of hair as a means for determining mineral supply of foxes. We may, however, assume with high level of probability that there exist some differentation between the levels of mineral elements in the hair of individual varieties of foxes, which makes it impossible to assume one fixed physiological level and which, what follows, demands further comparative analyses.

It should surely be noted, however, that when taking material to analysis, attention should be paid to the colour of hair. In order to avoid the a.m. selective action of melanin the hair samples of the same colour should be taken to analysis.

Conclusions

1. The stated levels of mineral elements in the blood serum and hair of black-silver foxes may be considered physiological for thes species.
2. No relevant and positive dependencies between the levels of the same/analogical/ elements in blood serum and hair of foxes were stated.
3. A tendency for some positive dependencies between the levels of some elements in blood serum on one hand and hair on the other hand was noted.
4. Because of existing differences in mineral supply depending on the colour of hair it seems necessary to carry out comparative investigations over the content of mineral elements in the hair of individual varieties of foxes.

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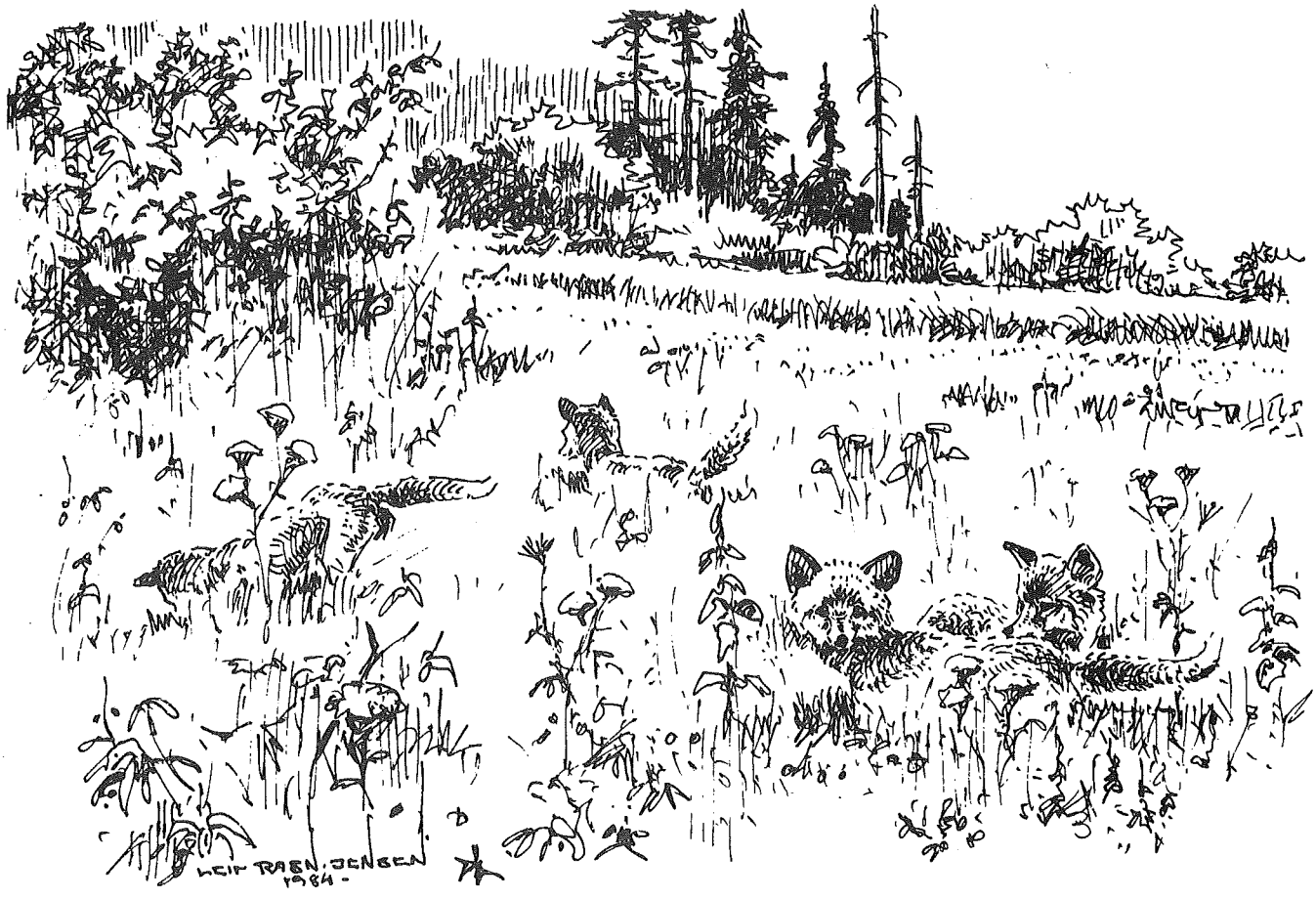


EFFECT OF COVERING TERM ON PREGNANCY LENGTH AND SIZE AND SEX FORMING OF MINK CAST OF STANDARD SPECIMEN.

(Wplyw terminu krycia na dlugoŝĉ ciacy oraz na ksztaltowanie sie wielkoŝci i plci miotòw norek odmiany standard).

Stanislaw Kubacki, Henryka Bernacka, Janusz Zaluska.

Three cover terms were investigated: A group was covered before March 9, B during the period March 10 to 15 and C after March 15. The early covered A group had the longest pregnancy /55, 51 days/, the smallest casts/average 4.69 specimens/ as well as the least succesful raise /4.55 specimens. Group B was characterized by best results with average length of pregnancy/ 46.67 days and 5.20 and 5.12 specimens/. The shortest pregnancy/ 46.67 days and 5.20 and 5.12 speciemens/. The shortest pregnancy was connected with the late cover/group C 42.89 days/ and the results were intermediate ones. It was acknowledged that the proportional participation ofmales in the cast decreased with the shortening of pregnancy period.

Akademia techniczno-Rolnicza IM. Jana i Jedrzeja Śniadeckich w Bydgoszcy Zeszyty Naukowe nr. 111, Zootechnika, 9, 1984. 34-38.
2 tables, 4 references. Authors summary.
In POLH. Summary in ENGL + RUSS.

INFLUENCE OF POLAR VIXENS AGE ON NUMBER OF PUPPIES IN LITTERS AND ON CHANGES OF SELECTED BLOOD INDICATORS DURING PREGNANCY AND LACTATION.

(Wplyw wieku lisic polarnych na liczebnoŝĉ miotòw oraz na zmiany wybranych wskźnikòw krwi w czasie ciazy i laktacji).

Barbara Stanislawska, Henryka Bernacka.

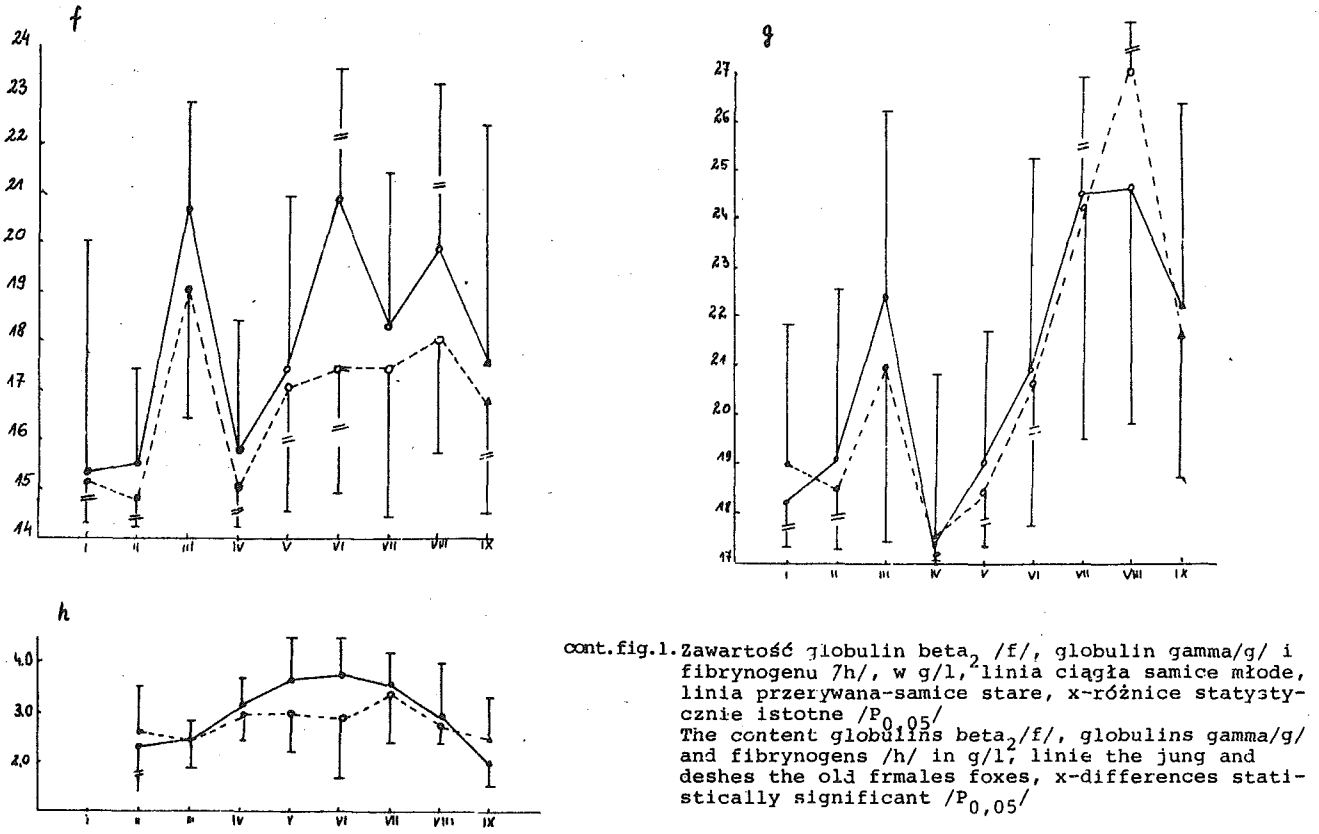
In the first part of the research, the influence of age on number of puppies in litters was analysed. The analysis covered 390 cubbed vixens, and 3071 born puppies and 3021 weaned ones. The greatest number of puppies were born and fed by two or three-year-old. Four and five-year-old vixens bore fewer puppies but the difference appeared to be statistically insignificant. With six-year-old vixens the number of puppies born was lowest and significantly different as compared to the num-

ber of puppies born by vixens aged 2,3,4 or 5 years. In the second part of the research, 18 vixens were chosen. They got pregnant at the same time. 2-3-year-old animals belonged to one group, 4-6-year-old ones to the other. Blood samples were taken from the vixens once a fortnight during their pregnancy and lactation, and once after weaning the puppies. The level of total protein, plasma fractions, the content of Ca, K, Na, Mg and nonorganic P were found. Apart from that, the level of hemoglobin, hematocrit value, erythrocytes sedimentations, number of leukocytes, neutrocytes segments and nonsegments ones, eozynocytes, basocytes, limfocytes and monocytes were examined. With 2-3-year-old female foxes a lower hemoglobin level, higher total protein level and plasma protein fractions level, and a lower magnesium level were found during lactation. In 4-3-year old vixens a lower level of nonorganic phosporus and greater number of eozynocytes were found.

Akademia Techniczno-Rolnicza Im. Jana i Jedrzeja Śniadeckich w Bydgoszcz Zeszyty Naukove nr. 111, Zootechnika, 9, 1984, 20-33.

3 tables, 6 figs., 10 references.

In POLH. Summary in RUSS and ENGL. Authors' summary.



cont.fig.1. Zawartość globulin beta$_2$ /f/, globulin gamma/g/ i fibrynogenu 7h/, w g/l, linia ciągła samice młode, linia przerywana-samice stare, x-różnice statystycznie istotne /$P_{0,05}$/
The content globulins beta$_2$/f/, globulins gamma/g/ and fibrynogens /h/ in g/l, linie the jung and deshes the old frmales foxes, x-differences statistically significant /$P_{0,05}$/

OLFACTORY PREFERENCES IN NORMAL AND CASTRATED FERRETS.

R. Apfelbach, J. Bensko, B. Rehn.

Electrocardiogram (ECG) activity was tested for use as a physiological indicator of responsiveness of ferrets to olfactory stimuli. Preliminary results indicate that for known prey odour, ECG activity is a reliable measure of the reaction of ferrets to an olfactory stimulus. A second study was designed to examine the reactions of normal (intact) and castrated male ferrets to female ferret odour using ECG activity in addition to behavioral observations as a measure of response. There were no significant differences between groups in rate of response to nonestrous female odour. Castrate males showed a significantly higher level of response than intact males to estrous female ferret odour. Results are discussed within the framework of a multisensory approach to understanding behavior.

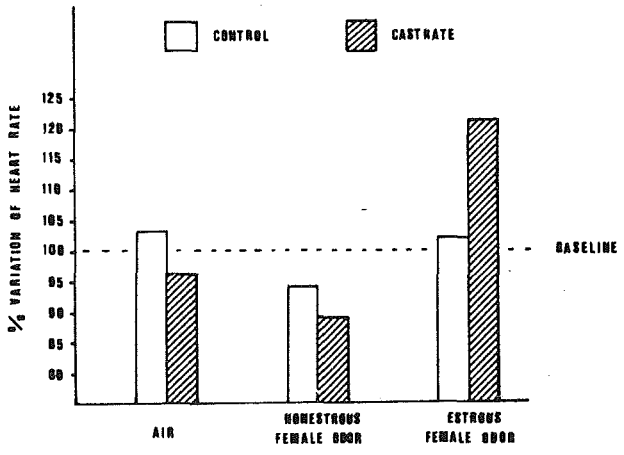


Figure 2. Heart rate for the first minute following presentation of air, nonestrous and estrous female ferret odor, expressed as a percent variation from the mean baseline heart rate.

Olfaction and Endocrine Regulation, W. Breipohl (ed.), pp. 173-179, 1982.
2 figs., 11 references. Authors abstract.

CHARACTERISTIC OF SOME HAIR COAT FEATURES IN NUTRIA /MYOCASTOR/COYPUS/ OF GREENLAND VARIETY.

(Charakterystyka niektórych cech okrywy wlosowej nutrii /Myocastor Coypus/ odmiany Grenlandzkiej.)

Stanislaw Kubacki, Krzysztof Bala, Henryka Bernacka.

26-month-old nutria of Greenland specimens /13 males and 13 females/ were investigated. Specimens taken from two parts of the body of each animal /back and abdomen/ were evalueated, calculated and counted-700 hair specimens for each test. It was acknowledged that the females showed a greater participation of hair of inner coat in relation to the coverts and thinner hair and narrower pithy canal in all types of hair than the males. The hair cover of the belly in comparison with the back was characterized by higher values of utility, independently of sex. These results confirmed those of a subjective evaluation.

Akademia Techniczno - Rolnicza Im. Jana i Jedrzeja Sniadeckich w Bydgoszczy zeszyty Naukowe nr. 111 - Zootechnika 9, 1984, 39-42.
1 table, 10 references. Authors summary.
In POLH, Summary in ENGL and RUSS.

INVESTIGATION INTO ANIMO ACID COMPOSITION - CHINCHILLA HAIR.

(Badania skladu aminokwasowego okrywy wlosowej szynszyla malego /chinchilla velligera/.)

Romual Rajs, Henryk Bieguszewski, Malgorzata Korbańska,
Andrzej Kowalski.

Investigation into amino acid composition of the rabbit /Chinchilla velligera/ hair proteins were carried out from January till July. The separation of amino acids was performed by the high voltage electrophoresis method and ascending paper cromatography. The winter and summer hair had the same qualitative composition, but it had statistically significant differences in amino acids contents in particular periods

of the year. The cystine with cysteine and glutaminic acid were in considerable quantities.

Akademia Techniczno - Rolnicza Im. Jana i Jedrzeja Sniadeckich w Bydgoszczy Zeszyty Naukowe nr. 111 - Zootechnika 9, 1984. 43-50.
3 tables, 20 references. Authors summary.
In POLH. Summary in ENGL and RUSS.

BASILAR ARTERIES OF BRAIN IN MUSKRATS.

(Tetnice podstawy mózgowia u piźmaka /ondatra zibethica L./)

Ryzard Jablonski, Witold Brudnicki.

Thirty cerebra of muskrats of various age and sex were investigated. Their arteries were filled with latex inserted into the common carotids. The preparations being consolidated, the muscles were removed and the bones decalcified in 5% nitric acid solution. The meninges were prepared and the cerebrum basilar artery bared. It has been ascertained that the cerebrum arterial circle of the muskrat is the source of vasculature to which blood is supplied by internal carotids as well as by the basilar artery originated from the combination of bilateral vertebral arteries. The internal carotids pass to the cerebrum surface at an acute angle. Directly after being penetrated into the fossa, the cerebrum back arteries separate from them. On fron edge of the optic nerves, the internal carotid is divided into the middle cerebral artery and the front cerebral artery. The caudal communicating artery was always strongly reduced and in 16.7% cases its absence was ascertained and thus the separation of the embranchement system of the basilar artery from the arterial system of the internal carotid should have been accepted. In the arterial structure of the muskrat there was found the connection variability of the anterior cerebral artery and of vertebral arteries. The variability of deviation was observed by the deviation of the caudal cerebellar artery, caudal cerebellum artery and caudal communicating arteries.

Akademia Techniczno-Rolnicza Im Jana i Jedrzeja Śniadeckich w Bydgoszczy Zeszyty Naukowe nr. 111 - Zootechnia 9, 1984.
6 figs., 15 references. Authors' summary.
in POLH. Summary in ENGL and RUSS:

DISTRIBUTION OF METALS IN TISSUES OF BEAVER, RACCOON AND OTTER FROM ONTARIO, CANADA.

Christopher D. Wren.

Mercury and selenium concentrations were positively correlated in liver tissue of beaver, raccoon and otter from an undisturbed watershed in south central Ontario. Selenium accumulation in piscivorous mammals may represent a protective mechanism against methylmercury toxicity to animals exposed to high mercury levels in their diet. This paper also reports the levels of several other metals in tissues of three wild furbearing mammal species.

The Science of Total Environment. 34, 177-184, 1984.
1 table, 1 fig., 24 references. Author's abstract.

COYPU: THE METHOD OF FIXATION AND BLOOD COLLECTION FOR LABORATORY PURPOSES.

(Nutrie - Technika fixace a odber krve pro laboratorni ucely).

J. Mouka, J. Konrád.

An original technique is proposed for special fixation and blood collection in coypu. The animal is immobilized in a "fixation tunnel" in the shape of frustum of pyramid, giving easy access - for the purpose of puncture - to the blood vessels of the pelvic limbs and tail in the horizontal and vertical, ventral and dorsal positions, without hazard of injury to man or to the animal examined. For blood collection as such, vena saphena parva, vena coccygica lateralis and arteria coccygica are recommended. The proposed methos of blood collection enables repeated collection of samples for haematological and biochemical examination and meets the hitherto obscure methodical requirements for the study of the metabolic processes of coypu.

Veterinarni Medicina, 29,(LVII) č 9, 1984, 569-576.
6 pictures, 21 references. Authors' summary.
In CZEC. Summary in RUSS and ENGL.

REPEATABILITY OF EXTERIOR TRAITS ESTIMATIONS IN DIFFERENT SPECIES OF FUR ANIMALS.

Grażyna Jeżewska, Janusz Mackiejowski.

A test was carried out for the repeatability of marks given to the fur animals of three species fox /silver/polar fox/blue/ and mink /standard/. The tested persons marked three times the same animals which were presented in the succession unknown to them. The repeatability of marks was evaluated for the group and individually for each tested person. Minks appeared to be the most difficult to mark and fluctiation of repeatability /r'/ were from 0.309 to 0.731. Silver foxes were easiest to mark from 0.861 to 1.00. the test showed a considerable individual differentiation of the tested persons' qualifications which could affect the selection efficiency if all of them received a licence to mark furbearing animals.

Proceedings from EAAP congres, Leningrad, 1982, 9 pp.
2 tables, 4 references. Authors' summary.
In ENGL. Summary in POLH and RUSS.

PBC METABOLITES IN THE URINE OF MINK (MUSTELA VISON L.) FOLLOWING EXPOSURE TO AROCLOR^{R} 1242.

Eugeni N. Ganchovski*, Robert K. Ringer, Richard J. Aulerich.

PBC metabolites in the urine of mink exposed to Aroclor 1242 were studied in male and female dark mink. Gas-chromatographic and mass-spectral analysis was used to identify the metabolites. A mono- and a dihydroxydichlorobiphenyl and a monohydroxytrichlorobiphenyl were established.

Bulgarian Academy of Sciences. - Ecology 11, 1983, 75-79.
2 figs., 24 references. Authors' abstract.

In ENGL. Summary in ENGL and RUSS.

SHELTER EXPERIMENTS WITH SILVER FOXES.

(Læforsøg med sølvræve).

H. Konnerup-Madsen.

Of silver fox female (75 per group) kept (1) in cages without protective screens or breeding nests (controls), (2) in cages with screens, or (3) in cages with breeding nests, 12.0, 5.3 and 10.7%, resp., were infertile, 0, 4 and 2 female aborted, and 9, 14 and 11 had kits which died. In the 3 groups, resp., litter size at birth averaged 3.15, 3.23 and 3.49, and that at weaning 2.81, 3.08 and 3.31. Litter size of young averaged 2.72 at birth and 2.49 at weaning vs. 3.57 and 3.35 resp. for adult female. Of female inseminated once, 27.3% were infertile, and litter size at birth and weaning averaged 2.27 and 1.82. For female inseminated twice at the same oestrous, the corresponding figures were 8.3%, 3.39 and 3.07, and for female inseminated 3 times they were 0%, 4.78 and 4.78.

Dansk Pelsdyravl, 46, 8, 443. 1983.
4 tables. CAB-abstract.
In DANH.

RESULTS OF TECHNOLOGICAL TRIALS.

(Resultat av tekniska försök).

Göran Östberg, Stig Moss.

For 71 mink female housed in pens with a floor covering of oat straw, the number of kits born per mated female averaged 2.8 and the percentage of infertile female 37 vs. 3.6 and 24 resp. for 72 female housed in pens with wood shavings. In another experiment, 88 female were housed in cages covered with bales of straw, and 77 female were housed in cages without wind protection. There were no differences between the 2 groups in litter size or the percentage of infertile female.

Finsk Pälstidskrift, 18, 4, 203-204, 1984.
1 table. CAB-abstract.
IN SWED.

PRODUCTION OF FUR BEARERS AND EXPERIMENTS INVOLVING FUR BEARERS IN DENMARK IN THE PAST, PRESENT AND FUTURE.

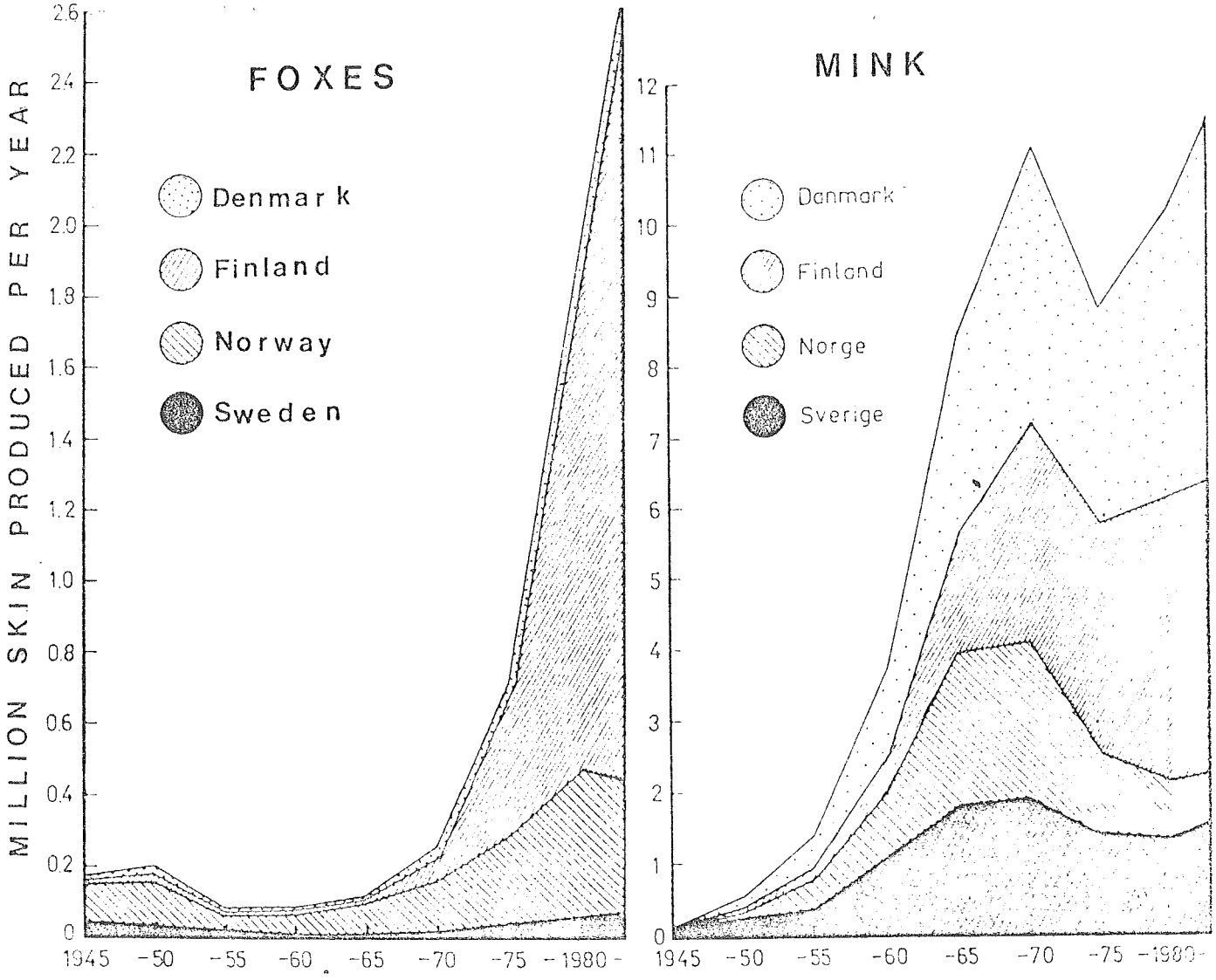
(Pelsdyrproduktion og pelsdyrforsøg i Danmark. Fortid - nutid - fremtid)

Gunnar Jørgensen.

An account is given of the production of mink, fox, chinchilla, polecat and raccoon dog pelts in Denmark, which together accounts for 5% of the total value of animal production in that country. The production of mink pelts exceeded 6 million in 1983, representing approx. 23% of world production. Details are given of research carried out in the fields of genetics, reproduction, nutrition, pelt quality, housing and domestication of fur bearers.

Dansk Pelsdyravl, 46, 10, 583-588, 1983.
3 fox, 1 table. CAB-abstract.
In DANH.

PRODUCTION OF FOX-AND MINKSKINS IN THE SCANDINAVIAN COUNTRIES 1945-1982.



Original Report

Chromosome Localization of the Biochemical Loci in the American Mink (Mustela vison)

A. A. Gradov, N. B. Rubtsov, O. L. Serov, Institute of Cytology and Genetics of the USSR Academy of Sciences, Siberian Department, Novosibirsk 90, 630090 USSR

Gene localization and establishment of linkage groups in different species of mammals are interested not only for comparison of genetic maps. The relevant information can be helpful in elucidating genome evolution of various species. At present, the method of somatic cell hybridization is being widely used for mammalian gene mapping. Maps have been built for about 30 species of mammals, but not fur animals (Roderick et al. 1984). We have previously used American mink x Chinese hamster somatic hybrids to locate 32 genes for constitutive markers on specific mink chromosomes (Rubtsov et al., 1984). This report presents data on chromosome localization of an additional 4 gene loci for superoxide dismutase 2, pyruvate kinase 1, glycaraldehyde-3-phosphate dehydrogenase, and nucleoside triphosphate adenylate kinase.

The following cell lines were used in the experiments: a cell line of the Chinese hamster, B14, an established cell line of the American mink, MV, and 25 American mink x Chinese hamster hybrid clones of independent origin. The production, characterization and chromosome analysis of hybrid clones have been previously described in detail (Rubtsov et al., 1981 a).

Starch gel electrophoresis was used to identify mink and hamster isozymes. Preparation of the cell lysates

Table 1. Segregation of mink chromosomes and mink SOD2, PK1, GADP and AK3 in 25 hybrid clones.

Chrosome		American mink enzyme							
		SOD2		PK1		GADP		AK3	
		+	÷	+	÷	+	÷	+	÷
1	+	10	0	4	6	7	3	7	3
	÷	0	15	3	12	11	4	7	8
2	+	2	4	3	3	5	1	3	3
	÷	8	11	4	15	13	6	11	8
3	+	7	3	4	6	7	3	8	2
	÷	3	12	3	12	11	4	6	9
4	+	7	4	4	7	9	2	7	4
	÷	3	11	3	11	9	5	7	7
5	+	6	4	4	6	8	2	8	2
	÷	4	11	3	12	10	5	6	9
6	+	9	6	5	10	10	5	9	6
	÷	1	9	2	8	8	2	5	5
7	+	3	3	6	0	4	2	3	3
	÷	7	12	1	18	14	5	11	8
8	+	3	4	2	5	4	3	5	2
	÷	7	11	5	13	14	4	9	9
9	+	7	10	5	12	17	0	9	8
	÷	3	5	2	6	1	7	5	3
10	+	7	10	5	12	11	6	10	7
	÷	3	5	2	6	7	1	4	4
11	+	6	3	4	5	7	2	5	4
	÷	4	12	3	13	11	5	9	7
12	+	7	6	5	8	9	4	13	0
	÷	3	9	2	10	9	3	1	11
13	+	7	7	2	12	9	5	8	6
	÷	3	8	5	6	9	2	6	5
14	+	9	8	6	11	13	4	9	8
	÷	1	7	1	7	5	3	5	3
X	+	10	13	7	16	16	7	14	9
	÷	0	2	0	2	2	0	0	2

was done by the standard technique (Rubtsov et al., 1981 a). Electrophoresis of the cell lysates was carried out in 14% starch gel containing 10% sucrose. Electrophoresis of mitochondrial superoxide dismutase (SOD2; EC 1.15. 1.1) and nucleoside triphosphate adenylate kinase (AK3; EC 2.7.4.10) was performed in Tris-EDTA-maleate, pH 7.0, system (Gradov et al., 1984). The gels were stained for SOD2 and AK3 activity according to Harris and Hopkinson (1976). Glyceraldehyde-3-phosphate dehydrogenase (GAPD; EC1.2.1.12) was separated and stained by the method of Wright et al. (1972). A Tris-citrate pH 6.7 buffer system (Shows and Ruddle 1968) was utilized for the electrophoresis of pyruvate kinase (PK1; EC 2.7.1.40). PK1 was visualized in the gels by the procedure of Imamura and Tanaka (1972).

Table 1 presents the results of the segregation of mink chromosomes and mink SOD2, PK1. GAPD, and AK3 in the 25 hybrid clones. Analysis of these data indicates that the gene for SOD2 is firmly associated with chromosome 1, the gene for PK1 with chromosome 7, the gene for GAPD with chromosome 9, and the gene for AK3 with chromosome 12.

Thus the results obtained, as well as previous our data, allowed us to locate now 36 gene loci on the 13 specific chromosomes of the American mink (Fig. 1).

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Gradov A. A., Puck S. D., Rubtsov N. B., Bochkarev M. N., Serov O. L. 1984. Subchromosomal localization of the loci for TK1, GALK, ALDC, and ESD on the chromosome 8 and chromosomal localization of the gene for TK2 in the American mink (Mustela vison). Biochem. Genet (in press).

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Imamura K. and Tanaka T. 1972. Multimolecular forms of pyruvate kinase from rat and other mammalian tissues. I. Electrophoretic studies. J. Biochem. 71: 1043-1051.

Roderick T. H., Lalley P. A., Davisson M. T., O'Brien S. J., Womack J. E., Crean-Golberg N., Echard G., Moore K. L. 1984. Report of the committee on comparative mapping. 37: 312-339.

Rubtsov N. B., Radjabli S. I., Gradov A. A., Serov O. L. 1981 a. Chinese hamster x American mink somatic cell hybrids: characterization of a clone panel and

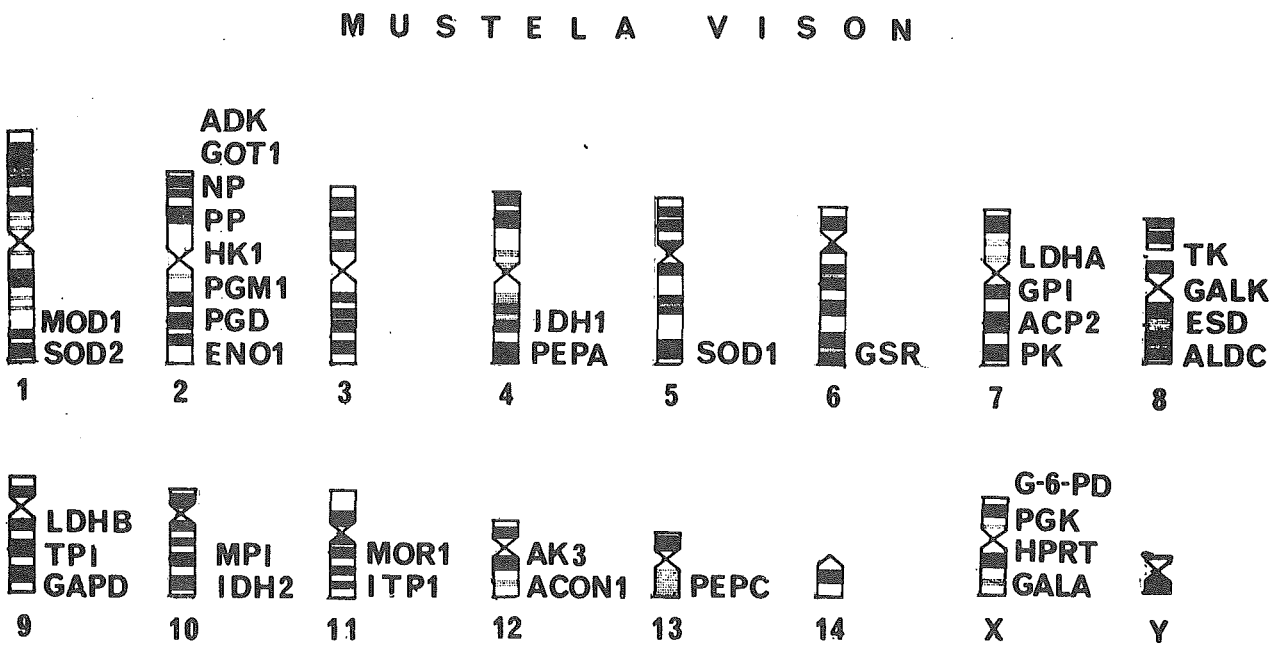

Fig. 1. Mink gene map of biochemical markers. Gene symbols: MOD1-malate dehydrogenase, NADP-1 (soluble), SOD2-superoxide dismutase 2 (mitochondrial), ADK-adenosine kinase, GOT1-glutamate-oxaloacetate transaminase 1 (soluble), NP-purine nucleoside phosphorilase, PP-inorganic pyrophosphatase, HK1-hexokonase 1, PGM1-phosphoglucomutase 1, PGD-6-phosphogluconate dehydrogenase, ENO1-enolase 1, IDH1-isocitrate dehydrogenase 1 (soluble, PEPA-peptidase A, SOD1-superoxide dismutase 1 (soluble), GR-glutathyone reductase, LDHA-lactate dehydrogenase A, GPI-glucosephosphate isomerase, ACP2-acid phosphatase 2, PK1-pyruvate kinase 1, TK1-thymidine kinase 1 (soluble), GALK-galactokinase, ESD-esterase D, ALDC-aldolase C, LDHB-lactate dehydrogenase B, TPI-triosephosphate isomerase, GAPD-glyceraldehyde-phospate dehydrogenase, MPI-mannosephosphate isomerase, IDH2-isocitrate dehydrogenase 2 (mitochondrial, ITPA-inosine triphosphatase, AK3-nucleoside triphosphate adenylate kinase, ACON1-aconitase 1 PEPC-peptidase C, G6PD-glucose-6-phosphate dehydrogenase, PGK1-phoshpoglycerate kinase 1, HPRT-hypoxanthne phosphoribosyltransferase, GALA- -galactosidase.

assignment of the mink genes for malate dehydrogenase, NADP-1 and malate dehydrogenase, NAD-1. Theor. Appl. Genet. 60. 99-106.

Rubtsov N. B., Radjably S. I., Gradov A. A., Serov O. L. 1981 b. Chromosome localization of three syntenic gene pairs in the American mink (Mustela vison). Cytogenet. Cell Genet. 31: 184-187.

Rubtsov N. B., Radjably S. I., Gradov A. A., Serov O. L. 1982 a. Chromosome localization of the genes for isocitrate dehydrogenase-1, isocitrate dehydrogenase-2, glutathione reductase, and phosphoglycerate kinase-1 in the American mink (Mustela vison). Gytogenet. Cell Genet. 33: 256-260.

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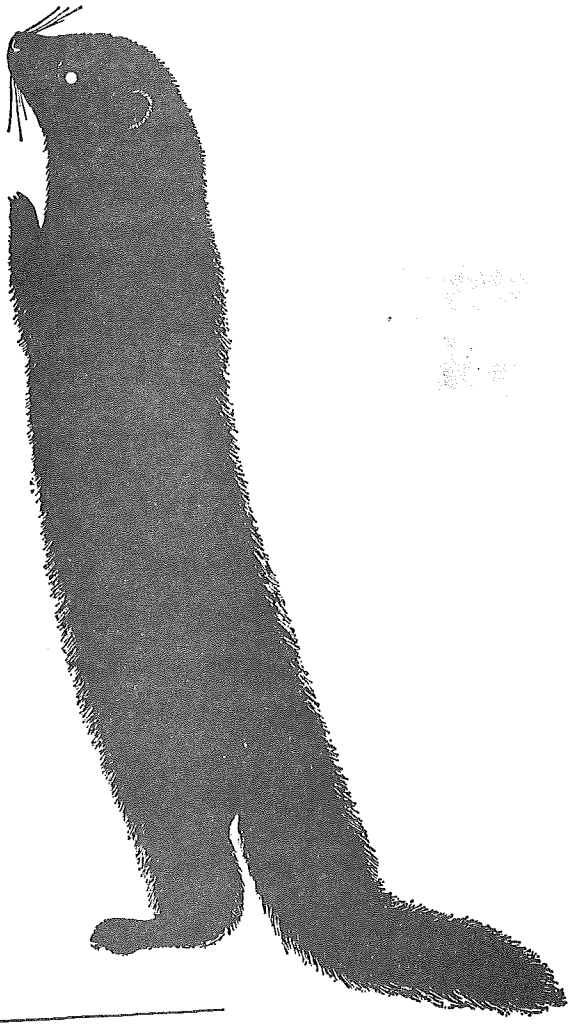


A FERTILE INTERGENERIC HYBRID IN THE FAMILY MUSTELIDAE.

(Mezhrodovoi fertil'nyi gibrid v semeistve Mustelidae).

D.V. Ternovskii, Yu.G. Ternovskaya.

Scientists at the Experimental Centre of the Biological Institute, Siberian Branch, Academy of Sciences USSR are developing theoretical principles for breeding valuable fur-bearing animals of the family Mustelidae. Regular reproduction in captivity has been achieved for the first time among individual species of these predators, and investigators have established laboratory populations. A central research task was to breed hybrid forms and to study them in detail.

By the beginning of the 1980 rut, the polemink progeny numbered 11 males and 11 females. The fur colouring of these hybrids is varied and unique. The study of their biology is continuing.

All-Union Conference on the Remote Hybridization of Plants and Animals. Main Botanical Garden, Academy of Sciences USSR. Report Summaries. The V.I. Lenin All-Union Academy of Agricultural Sciences. Academy of Sciences USSR. pp.524-525, 1981. Abstract G. Jørgensen.

ATTEMPTS TO PRODUCE A POLECAT-MINK HYBRID.

(Försök att framställa en iller-mink hybrid).

Gabrielle Lagerkvist.

Work on attempts to produce mink x polecat and polecat x mink hybrids is reviewed. No embryos were produced from the fertilization of 96 mink or with polecat spermatozoa, but some embryos were produced and survived up to 27 days from polecat ova fertilized by mink spermatozoa. The bibliography is not printed in the journal, but may be obtained from the author.

Våra Pälsdjur, 55(5-6), 177-180, 1984.
1 table. CAB-abstract.

IN SWED.

LOCALIZATION OF ALLOTYPES OF THE AMERICAN MINK IN IMMUNOGLOBULIN G CHAINS.

ЛОКАЛИЗАЦИЯ АЛЛОТИПОВ АМЕРИКАНСКОЙ НОРКИ НА ЦЕПЯХ *IgG*

I.I. Fomicheva, O.K. Baranov.

Mink antisera to 6 (1-6) allotypes of mink IgG were used to study their chain localization. Allotype 1 is the marker of the L chains of the IgG molecule, allotypes 2, 3, 4 and 6 belong to chains, being observed only in the molecule with the intact quaternary structure.

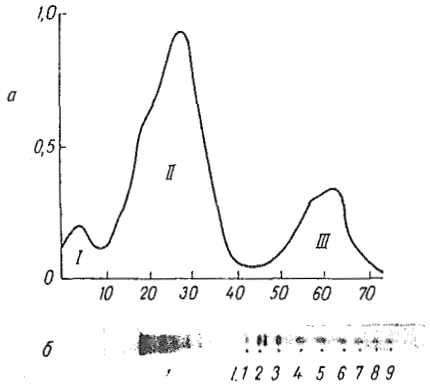


Рис. 2. Разделение тяжелых и легких цепей IgG на колонке с сефадексом G-100.

а — график элюции: I — пик не полностью расщепившийся и агрегированный материал; II пик — тяжелые цепи; III пик — легкие цепи.
По оси абсцисс — номера фракций; по оси ординат — экстинкция 280.
б — электрофорез в крахмальном геле фракций II и III пиков. L_1—L_9 — зоны легких цепей.

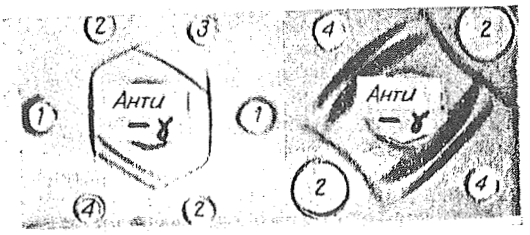


Рис. 3. Двойная иммунодиффузия препаратов тяжелых и легких цепей с кроличьей антисывороткой к IgG норки (анти-γ).
1 — IgG норки. *2* — тяжелые цепи. *3* и *4* — легкие цепи

Immunologiya, 0 (5). 25-28. 1982.

4 figs., 17 references

Authors abstract.

RUSS, SU: ENGL.

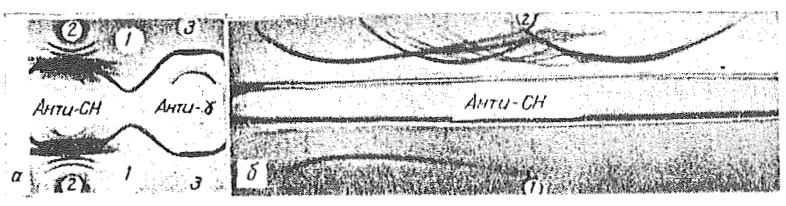


Рис. 1. Контроль очистки IgG норки.

а — двойная иммунодиффузия с кроличьей антисывороткой против сыворотки (анти-сн) и против IgG (анти-) норки. *1* — очищенный препарат IgG; *2* — контрольная сыворотка норки; *3* — контрольный IgG; *б* — иммуноэлектрофорез очищенного препарата IgG (*1*) и сыворотки норки (*2*) с кроличьей антисывороткой к сыворотке норки (анти-СН)

BLUE STAR IS NOT A NEW MUTATION.

(Blue Star er ingen ny mutant).

Norodd Nes, Jan Å. Fougner.

Following further investigations on 8864 cubs, it is concluded that the previously reported Blue Star fox mutation see ABA 50 3301 is not a new mutation, but the same as the Jotun mutation.

Norsk Pelsdyrblad, 57(9), 385-388, 1983.

4 figs. CAB-abstract.

IN NORW.

USE OF SILVER FOXES AND THEIR MUTANTS.

(Sølvræve, -mutanter og deres anvendelse).

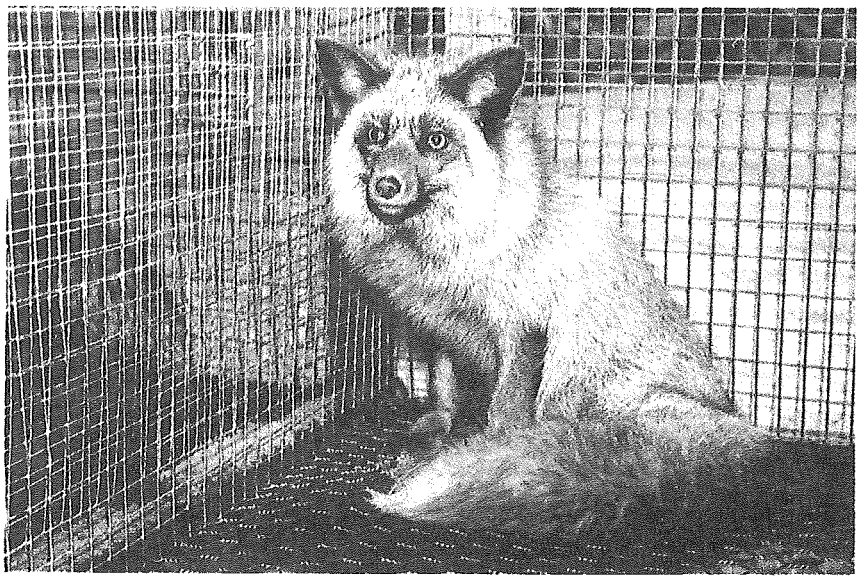
H. Konnerup-Madsen.

An illustrated account is given of some recessive and dominant colour mutations in silver foxes, and of mating plans to produce different colour types.

Dansk Pelsdyravl, 47(1), 28-34, 1984.

11 colourpictures. CAB-abstract.

In DANH.



PRODUCTION OF SCAN BROWN MINK USING DIFFERENT MATINGS.

(Produktion af scanbrownmink ved brug af forskellige krydsninger).

Eugenia Jørgensen, Outi Lohi.

Matings of Regal (bb ch ch) with Pearl (kk pp), Violet (mc mc aa pp) with Pastel (bb), silverblu (pp) with pastel, and Pearl with Pastel mink in 1982 resulted in 403 male mink, of which 68, 63, 98 and 86% resp., were Scan Brown. Pelts from male in the first 2 groups were rated slightly higher for colour and size than those of mink in the other 2 groups.

Dansk Pelsdyravl, 47, 2, 123-127, 1984.
4 figs., 5 tables. CAB-abstract.
In DANH.

BREEDING COMBINATIONS USED IN THE INSEMINATION OF FOXES AND CONCEPTION RATES IN THE 1983 BREEDING SEASON.

(Avelskombinationer använda i rävinsemineringen och dräktigheten under avelsperioden 1983).

Maija Valtonen, Ulla Katajamäki.

In 1983, in Finland, 570 fox female (of which 83% were blue foxes) were inseminated with semen from male of the same type. The CR for blue and silver fox female was approx. 32%, and that for 19 red fox female was 37%. Blue fox and Shadow female (2783 and 662 animals resp.) were inseminated with semen from male of other types, the majority being inseminated with semen from silver male, and the remainder with semen from red, Platinum and crossbred fox male. The overall CR was 43%.

Finsk Päsltidskrift, 18, 3, 145-146, 1984.
1 fig. CAB-abstract.
In SWED.

A KARYOTYPE ANALYSIS OF CHINCHILLA LANIGER.

青紫蓝鼠的染色体核型分析

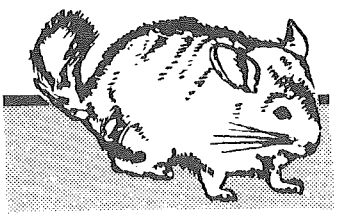
L. Hong, S.D. Jiang, G.Y. Feng, G.P. Bei, F. Zhang.

In cultured lymphocytes, the centromere index and relative chromosome length were 22.5-48.6 and 1.7-5.0 resp. for the 31 pairs of autosomes, 44.5 and 8.7% for the X-chromosomes, and 37.2 and 1.8% for the Y-chromosome. Autosome pairs 1-19 were metacentrics, pairs 20-29 were submetacentrics, and pairs 30-31 were subtelocentrics.

Hereditas, China. 24, 6, 31-32, 1982.
2 tables, 3 references. CAB-abstract.
In CHIN.

表 1 青紫蓝鼠染色体的着丝点指数、相对长度和类型

染色体编号 No.	着丝点指数 ($\bar{x}\pm S.E.$)%	相对长度 ($\bar{x}\pm S.E.$)	类型	染色体编号 No.	着丝点指数 ($\bar{x}\pm S.E.$)%	相对长度 ($\bar{x}\pm S.E.$)	类型
1	44.4±0.7	4.3±0.4	M	18	44.5±1.4	2.5±0.4	M
2	44.1±1.2	4.0±0.2	M	19	42.6±1.1	1.7±0.6	M
3	46.4±0.9	3.8±0.2	M	20	32.2±0.8	4.3±0.9	SM
4	43.1±1.1	3.7±0.2	M	21	36.3±1.0	3.6±0.2	SM
5	46.2±1.2	3.6±0.2	M	22	28.7±1.4	3.5±0.2	SM
6	45.7±1.4	3.2±0.1	M	23	36.6±1.3	2.9±0.6	SM
7	45.4±1.3	3.2±0.1	M	24	36.5±1.5	2.5±0.3	SM
8	46.4±1.3	3.2±0.2	M	25	32.5±1.5	2.2±0.4	SM
9	47.8±1.5	2.9±0.1	M	26	37.4±1.4	2.1±0.5	SM
10	44.4±1.3	2.9±0.1	M	27	30.0±1.5	2.1±0.8	SM
11	41.0±1.4	2.9±0.1	M	28	34.2±1.3	2.1±0.4	SM
12	42.1±0.9	2.7±0.2	M	29	31.1±1.5	1.8±0.3	SM
13	48.6±1.2	2.7±0.1	M	30	22.5±1.6	5.0±0.4	ST
14	47.5±1.6	2.7±0.1	M	31	24.8±1.7	2.2±0.4	ST 或 SM
15	46.4±0.9	2.5±0.3	M	X	45.5±0.8	8.7±0.5	M
16	43.1±1.3	2.5±0.3	M	Y	37.2±1.1	1.8±0.7	M
17	40.3±0.7	2.5±0.3	M				



STUDY OF PROLACTIN LEVELS IN THE FERRET.

S.V. Smith, I.A. Forsyth, B.T. Donovan.

The radioimmunoassy for canine prolactin has been used to measure prolactin in the ferret. Serial dilutions of extracts of ferret pituitary glands and of ferret plasma yielded curves that were parallel with the canine prolaction standard curve. The sensitivity, accuracy, reproducibility and precision of the assay were within acceptable limits. Plasma prolactin levels increased after the administration of thyrotrophin releasing hormone (TRH) or chlorpromazine, but not after giving luteinizing hormone releasing hormone. Female ferrets, which were anoestrous, oestrous or spayed, and male ferrets had similar basal prolactin levels when sampled under sodium pentobarbitone anaesthesia. These basal levels were higher than in conscious males and the latter also showed a lesser response to TRH. Hypophysectomy significantly reduced basal prolactin levels in female ferrets by 2h postoperatively and abolished the response to TRH.

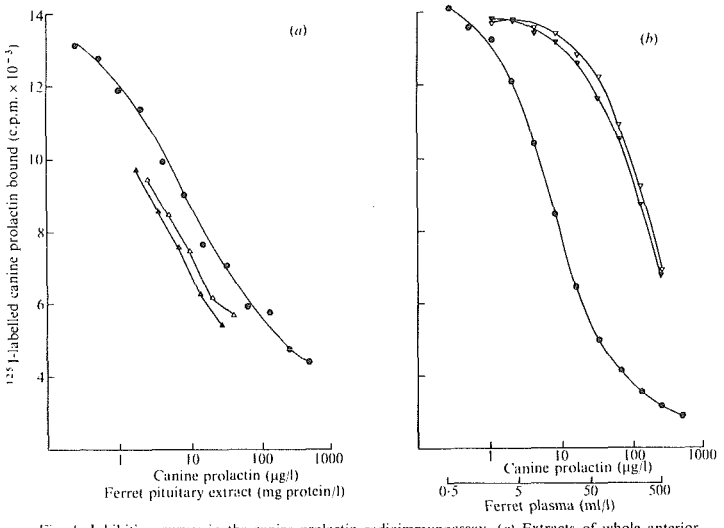


Fig. 1. Inhibition curves in the canine prolactin radioimmunoassay. (*a*) Extracts of whole anterior pituitary glands from a male ferret (▲) and a spayed female ferret (△); (*b*) serial dilutions of plasma from a male ferret 20 min (▼) and 40 min (▽) after the administration of 10 μg thyrotrophin releasing hormone. Dose response curves for canine prolactin are shown (●).

J. Endocr. 99, 415-421, 1983.

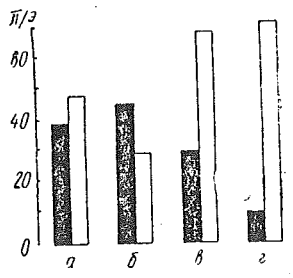
2 figs., 2 tables, 16 references. Authors' abstract.

SEX STEROIDS LEVELS IN BLOOD OF PREGNANT AMERICAN MINK.

СОДЕРЖАНИЕ ПОЛОВЫХ СТЕРОИДОВ В КРОВИ БЕРЕМЕННОЙ АМЕРИКАНСКОЙ НОРКИ

I.P. Petrova, A.G. Reznikov, V.M. Kolpakovsky, V.N. Demchenko.

Estradiol and progesterone levels in pregnant American mink blood plasma were studied by the radioimmunological method. Results were analyzed in accordance with embryogenesis periods. In the embryonic period progesterone concentration grew on the average 13 times as high, that on estradiol - 16 times. By the end of pregnancy progesterone level decreased, that of estradiol increased. It is supposed that the increased production of sex steroids is necessary to preserve pregnancy during the embryonic diapause. Determination of sex hormones, especially estradiol, in blood may be used for early pregnancy diagnosis.



Соотношение концентраций прогестерона и эстрадиола (П/Э) в плазме крови норок.
Черные столбики — беременные норки, белые — интактные. Периоды эмбриогенеза: *а* — зародышевый, *б* — флексии, *в* — предплодный, *г* — плодный.

Fiziologicheskii Zhurnal, 29, 4, 434-438, 1983.
1 table, 12 references. Authors' abstract.
In RUSS. Summary in ENGL.

EFFECT OF EXPOSURE TO LONG DAYS ON THE SECRETION OF OESTRADIOL, OESTRONE, PROGESTERONE, TESTOSTERONE, ANDROSTENEDIONE, CORTISOL AND FOLLICLE-STIMULATING HORMONE IN INTACT AND SPAYED FERRETS.

B.T. Donovan, Christine Matson, M.J. Kilpatrick.

The changes in concentration of plasma oestradiol, oestrone, progesterone, androstenedione, testosterone, cortisol and FSH were followed in intact female ferrets brought into oestrous by extension of the photoperiod from 8 to 16 h daily. An additional group of spayed females

was similarly exposed to the extended photoperiod. There was no change in the blood oestrone, androstenedione and testosterone levels in the spayed females; the concentration of oestradiol, progesterone and FSH fell, while that of cortisol rose after 6 weeks. The intact females showed no change in plasma oestrone and cortisol concentrations, a rise in plasma oestradiol associated with the onset of oestrus, and falls in the blood levels of testosterone, androstenedione, progesterone and FSH. These results indicate that the changes in plasma gonadal steroid levels after extension of the photoperiod differ markedly from those in rodents or ruminants.

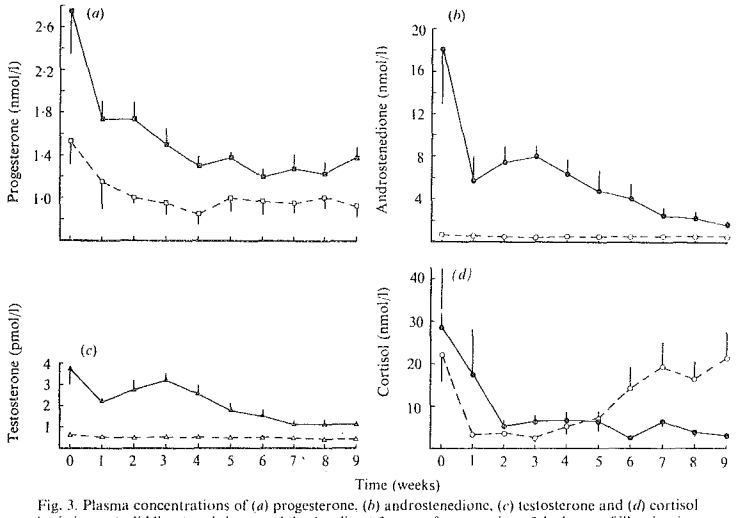


Fig. 3. Plasma concentrations of (*a*) progesterone, (*b*) androstenedione, (*c*) testosterone and (*d*) cortisol in six intact (solid lines) and six spayed (broken lines) ferrets, after extension of the hours of illumination from 8 to 16 h daily. Lighting was extended on the evening of the day on which the first blood samples were collected, week 0. Each point represents the mean ± S.E.M., except where the S.E.M. is smaller than the size of the symbols.

J. Endocr. 99, 361-368, 1983.

4 figs., 12 references. Authors' summary.

INTRA- AND INTERSPECIFIC EMBRYO TRANSFER.

Duane C. Kraemer.

The procedures that are collectively referred to as embryo transfer (ET) have many uses. They were firest used as research tools to study fetal-maternal physiology. Since the first successful mammalian embryo transfer in 1890, ET has been utilized for enhancement of genetic selection; diagnosis and treatment of infertility; control of infectious disease transmission; screening for genetic defects; propagation of rare and endangered species; and the study of developmental biology. Most of the embryo transfers have been intraspecific. A listing of the species

includes rabbit, rat, sheep, mouse, goat, cattle, pig, hamster, ferret, mink, horse, baboon, cat, dog, water buffalo. In two species, rhesus monkey and humans, the successful embryo transfers have been limited to within-animal, homologous replacement of the embryos. There have been a few successful interspecific embryo transfers. The most common were between Bos taurus and B. indicus cattle, Other interspecific transfers involved Bos gaurus and B. taurus, cattle; Ovis musimon and O. aries, sheep; Equus asinus and E. caballus, horses. There are several examples of intergeneric embryo transfers in which embryos implanted but did not develop to term: sheep and goat, mouse and rat. The factors that determine the degree of compatibility between embryos and uteri of various species and genera are not clearly understood. The ability to hybridize successfully is probably a dependable indication of compatibility for embryo transfer. The limits of tolerance for differences between the donor and recipient in such factors as placentals structure and gestation length have not been defined,but the recently developed technique of inner cell mass transfer will be very useful in such studies.

Journ. of Expt. Zoology, 228, 363-371, 1983.
2 figs., 58 references. Author's summary.

HISTOLOGICAL STUDIES OF MINK OVARY BEFORE AND DURING THE MATING SEASON.

(Studiul histo-morfologic al ovarului de nurca in perioada premergatoare montei si a montei).

E. Muresan, Cornelia Duca, M. Miclea, Z. Papay.

Histological studies of the standard mink ovary during pro-oestrum and oestrus were undergone. The work was aimed to establish the optimal time for mating in the rearing conditions of Transylvania. In some female mink a number of follicles reached maturity prior to mating season. This suggests that mating at the end of February in relatively premature for all individuals. And yet, taking in account the fact that in some females the follicles are alocady mature in February and the matings are repeated, a high percentage of gestations could be achieved in this mating season.

Buletinul Inst. Agronomic, Cluj-Napoca, 36, 7-10, 1982.
4 figs., 1 table, 8 references. Authors' summary.
In ROMN. Summary in ENGL.

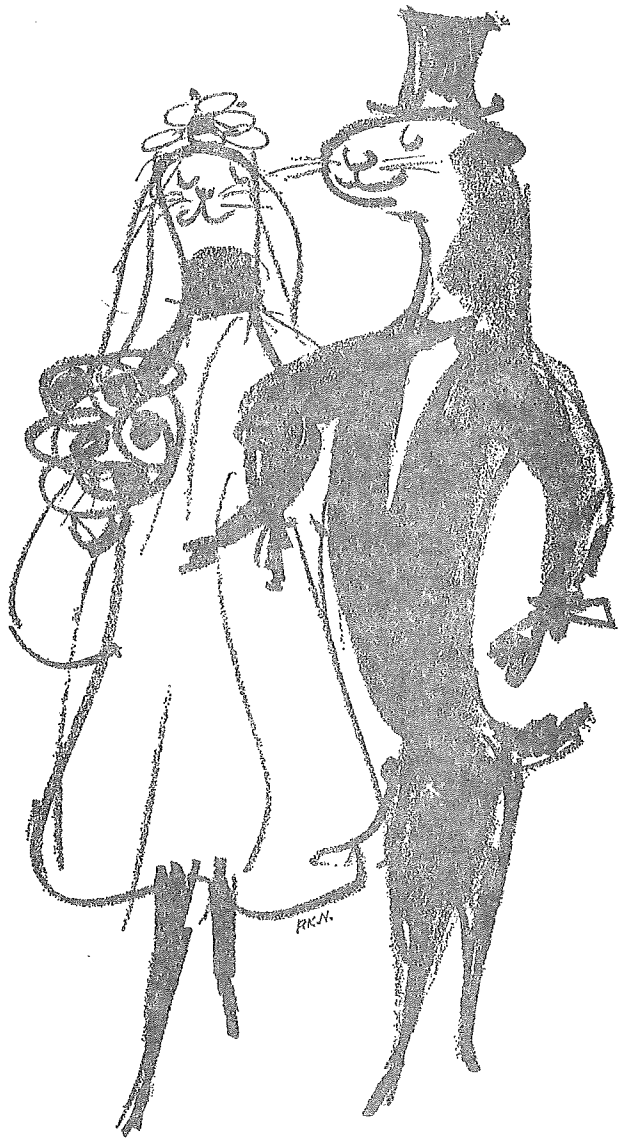
MINK FERTILITY COULD BE IMPROVED.

(Minkens valpresultat kan forbättras).

Tapio Juokslahti.

In 1983, in Finland, mink litter size averaged 3.44 kits and the percentage of infertile female 25.8 vs. 3.50 and 25.2 in 1982. Factors affecting fertility are discussed, and possibilities of improving fertility by means of selection, better mating techniques, and improved feeding are considered.

Finsk Pälstidskrift, 18, 4, 207-210, 1984.
1 table. CAB-abstract.
In FINN.



GROWTH TRENDS AND NUTRITION DURING POSTNATAL DEVELOPMENT OF YOUNG MINK:

ЗАКОНОМЕРНОСТИ РОСТА И ВОПРОСЫ ПИТАНИЯ В ПОСТНАТАЛЬНОМ ОНТОГЕНЕЗЕ МОЛОДНЯКА НОРОК

M.D. Abramov.

Level of feeding of young mink during rearing should be at the optimum necessary for meeting the requirements for growth. With level of feeding enough to ensure the minimum requirements, the mink maintains its health but can only achieve an insignificant growth rate. In contrast, when feeding is at the maximum level, many of the mink show signs of metabolic disorders, overloading of digestive organs and tissues and excessive fat deposition which adversely affect sexual function especially of the female. Moreover, the high plane of feeding leads to a considerable expenditure of feeds per unit of bodyweight.

Nauchnye Trudy Nauchno-Issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 26, 78-85, 1981.

2 tables, 2 figs., 3 references. CAB-abstract.

In RUSS.

OPTIMIZATION OF FEEDING PROGRAMMES FOR YOUNG FEMALE MINK.

ОПТИМИЗАЦИЯ РЕЖИМОВ КОРМЛЕНИЯ МОЛОДНЯКА НОРОК

N.A. Balakirev.

Young female mink were in 5 groups of 54 each. The 1st group had their daily ration once in the morning. Group 2 ate once a day from July 1 to 18 September, and from 19 September until slaughter in November ate twice daily. Group 3 ate once a day in the Morning from 1 July to 1 September and the ration was supplemented with orthophosphoric acid. Group 4 ate twice daily, alternating between feeding in the morning for 2 weeks and in the evening for another 2 weeks. The 5th group ate once daily, in the evening. Respective bodyweights on November 1 were 1829, 1999, 1889, 1827 and 1937 g. Percentage on non-

defective skins was 70.5, 74.4, 71.0, 75.6 and 88.7. The most effective programme was feeding once a day, in the evening.

Nauchnye Trudy Kazanskogo Gosudarstvennogo Veterinarnogo Instituta, 134, 164-166, 1981.

1 table. CAB-abstract.

In RUSS.

EFFECT OF TYPE AND FREQUENCY OF FEEDING ON REPRODUCTIVE PERFORMANCE OF FEMALE MINK.

ВЛИЯНИЕ РЕЖИМА И КРАТНОСТИ КОРМЛЕНИЯ САМОК НОРОК НА ИХ ВОСПРОИЗВОДИТЕЛЬНУЮ СПОСОБНОСТЬ

N.A. Balakirev, Yu A. Samkov.

From 1 July until 1 November female mink were fed daily or every 14 to 17 h or every 8 to 10 h. Respective percentage pregnancy was 96.7, 100 and 100, percentage of stillbirths 1.8, 3.6 and 5.8 and average litter size 5.92, 6.00 and 6.33; the differences were not significant. The diet given to the mink contained Korean cod (Theragra chalcogramma), succulent feeds 15, cattle heads 5, blood 6, milk 6, cottage cheese 5 to 6, barley 7 to 8, baker's yeast 0 to 3, krill 0 to 10, mixed fat 2.73 to 2.46, fish meal 0 to 2.8 and vitamin and protein concentrate 0 to 1.5; digestible protein was 8.6 to 9.0 (g)/100 kcal metabolizable energy.

Nauchnye Trudy Kazanskogo Gosudarstvennogo Veterinarnogo Instituta, 134, 112-115, 1981.

2 tables. CAB-abstract.

In RUSS.

VITAMIN E REQUIREMENT OF MINK WITH SPECIAL REFERENCE TO TOCOPHEROL COMPOSITION IN PLASMA, LIVER, AND ADIPOSE TISSUE.

J. Työppönen, J. Hakkarainen, T. Juokslahti, P. Lindberg.

Tissue responses of 4 different tocopherols found in a basal diet (BD) and the effect of 2 physiologic levels of dl-α-tocopheryl acetate (25 and 150 mg/kg) on tissue tocopherol content were studied in the mink.

The BD contained a total of 7.1 mg vitamin E/kg, with α-, β-, γ-, and δ-tocopherol in a ration of 1:0.07:0.55:0.10, respectively. The corresponding ratios in the tissues were: liver, 1:0.04:0.12:0; plasma,

1:0:0.13:0; and adipose tissue, 1:0:0.19:0. After mink were fed diets containing vitamin E, α- and γ-tocopherol were distributed in similar proportions in plasma and liver, but γ-tocopherol was in a slightly higher proportion in adipose tissue. Addition of 25 or 150 mg/kg of α-tocopheryl acetate to the BD decreased the γ-tocopherol levels in all 3 tissues; this was considered to be a dilution effect of other tocopherols in BD with added α-tocopheryl acetate. The β-tocopherol content in the liver remained unchanged, irrespective of the dietary amount of α-tocopheryl acetate.

Plasma α-tocopherol had a linear relationship to log dietary dose, with an apparent half-saturation of the vitamin E binding capacity at 13 mg vitamin E/kg diet. At the given dietary levels, liver and adipose continued to accumulate α-tocopherol. The correlation between total plasma lipids and plasma α-tocopherol was significant ($P<0.01$) only in the group fed the BD.

Vitamin E analysis of plasma could be used as a routine method for controlling the vitamin E status of mink. the liver and adipose tissue were, however, more responsive to physiologic doses of vitamin E, and were more reliable organs for the establishment of vitamin E status in the mink.

Seemingly, 30 mg of vitamin E/kg of diet was a satisfactory minimum to ensure an adequate vitamin E status in mink.

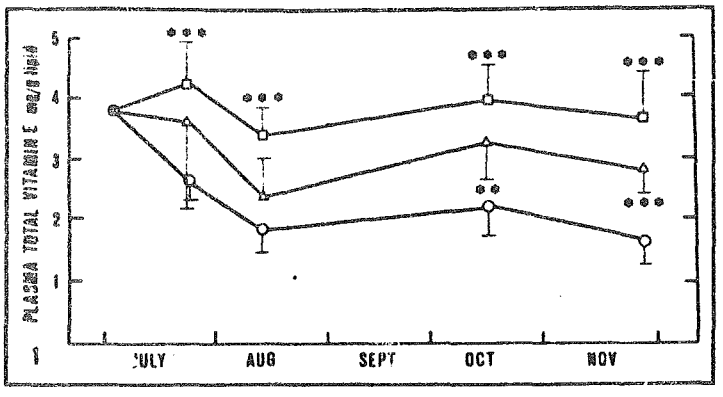


Fig 1—Total plasma tocopherols in mink fed vitamin E for 5 months. (○) Group 1, fed BD that contained 7.1 mg of total tocopherols/kg of feed; (△) group 2, fed BD + 25 mg of *dl*-α-tocopheryl acetate/kg of feed; (□) group 3, fed BD + 150 mg of *dl*-α-tocopheryl acetate/kg of feed. Data expressed as mean ± SD for 6 male mink. Statistically different from group 1 $^{**}P < 0.01$; $^{***}P < 0.001$.

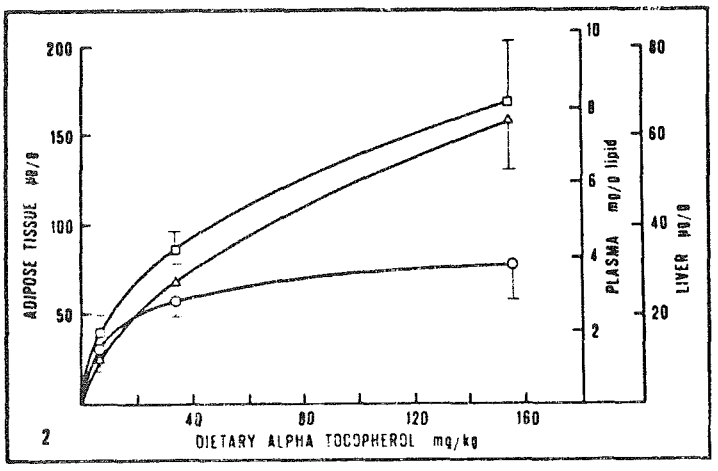


Fig 2—Tissue α-tocopherol responses to different dosages of dietary vitamin E. ○ = Plasma, △ = liver, and □ = adipose tissue. Data expressed as mean ± SD for 10 male mink.

Am. J. Vet. Res., Vol.45, 9, 1984.
4 tables, 3 figs., 24 references.

Authors' summary.

FAT TO CARBOHYDRATE RATIO IN DIETS FOR PREGNANT AND LACTATING MINK.

СООТНОШЕНИЕ ЖИРА К УГЛЕВОДАМ В РАЦИОНАХ БЕРЕМЕННЫХ И ЛАКТИРУЮЩИХ САМОК НОРОК

M.B. Babak, Yu A. Samkov.

For pregnant mink the ratio of fat energy to carbohydrate energy of 40:10 to 25:25 (in percent total dietary energy) in the diet had no adverse effect on fertility. During pregnancy and lactation mink could be given extruded grains at 12 g/100 kacl instead of the traditional cereal paste. With those fat:carbohydrate ratios in a diet with protein 9 g/100 kcal, milk yeild and development of the young were normal.

Nauchnye Trudy Nauchno-Issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 25, 72-79, 1981.

5 tables, 6 references. CAB-abstract.

In RUSS.

FEED VALUE OF GROUND HYDROBIONTS FOR YOUNG MINK.

КОРМОВЫЕ КАЧЕСТВА МУКИ ГИДРОБИОНТОВ ДЛЯ МОЛОДНЯКА НОРОК

N.Sh. Pereldik, G.G. Besedina.

Addition of hydrobiont (Benthos?) meal to the diet given to growing mink, from weaning until maturity of their winter fur, to provide 35 percent of animal protein, and at 22 g/day, ensured normal growth and formation of pelt of quality similar to that of mink reared on raw animal feeds. When added to provide 50 percent of dietary animal protein, hydrobiont meal slightly depressed growth of male mink and gave smaller skin surface area, compared to mink on raw fish and meat diets, but did not reduce pelt quality. Hydrobiont meal was, in nutritive value, closely similar to a high-grade fish meal when both were added to replace 34 percent of raw meat and fish feeds. Krill meal with a normal content of amino and ammonia nitrogen, 300 mg/100 g, was well accepted by mink if added to the diet to provide 20 to 25 percent of total animal protein.

Nauchnye Trudy Nauchno-Issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 25, 39-46, 1981.

7 tables. CAB-abstract.

In RUSS.

GROWTH, DEVELOPMENT AND PELT QUALITY OF MINK FED ON DIET WITH HOUSE-FLY LARVAE.

РОСТ, РАЗВИТИЕ И КАЧЕСТВО ШКУРОК ЗВЕРЕЙ ПРИ ИСПОЛЬЗОВАНИИ В РАЦИОНАХ МУХИ ИЗ ЛИЧИНОК КОМНАТНОЙ МУХИ

Sh.A. Nugaev.

A meal of house-fly larvae added to the diet given to young mink so as to replace 10, 20 or 30 percent of the meat and fish meals had no effect on feed intake, growth, development or yield of pelt.

Biologicheskaya Utilizatsiya Otkhodov Zhivotnovodstva i Puti Ispol'-zovaniya Produktov Pererabotki. Part of collective document, pp 71-74, 1982.
In RUSS. CAB-abstract.

FISH MEAL FOR MINK.

(Fiskmjöl för mink).

Niels Glem-Hansen.

Recent work carried out in Scandinavia on the effects of feeding fish meal on the reproductive performance of mink females, and on the growth rate and pelt characters of young mink, is discussed.

Finsk Pälstidskrift, 18, 1, 32-37, 1984.
7 tables, 1 fig., 13 references. CAB-abstract.
IN SWED.

DIFFERENT TYPES OF FAT FOR MINK. 1.

(Forskellige fedtstoffer til mink. - 1.)

Georg Hillemann, Heddie Mejborn.

Groups of 200 young mink were given a diet with 18.7% of energy from fat or that diet with 4.5% lard, poultry fat, tallow, soya oil, rapeseed oil, palm oil or a mixture of fats. Contents of linoleic acid were from 6 to 43% of total fat. Skin quality was best with most linoleic acid. Palm oil had a negative effect on colour of skin. Prices were highest

with soya oil. Feed intakes were similar in all groups given fat supplements and lower than in the group given no extra fat. It is recommended that the fat in the feed should contain at least 20% linoleic acid.

Dansk Pelsdyravl, 46, 7, 383, 385. 1983.
5 tables. CAB-abstract.
In DANH.

TRIALS WITH DRY PELLETS IN THE BREEDING PERIOD.

(Forsøg med tørfoderpiller i alvsperioden).

Georg Hillemann.

Groups of female mink were given a traditional feed or pelllets stirred up in water, Kemovit A with a relatively high and Kemovit B with a relatively low energy content. Breeding results were similar in all 3 groups. Both groups given pellets lost weight during the breeding and rearing season. Body weight of young at 42 days was normal when dams had been given Kemovit A but was lower with Kemovit B.

Dansk Pelsdyravl, 46, 11, 675, 1983.
3 tables. CAB-abstract.
In DANH.

EFFECT OF ADDITION OF FEED PRESERVED TO DIET ON MORPHOLOGICAL INDICES OF BLOOD ERYTHROBLASTIC SYSTEM IN POLAR FOXES.

(Wplyw dodatku prazy konserwowanej do dawki pokarmowej na morfologiczne wskazniki krwi ukladu erytroblastycznego lisow polarnych).

Henryk Bieguszewski, Manfred Oskar Lorek.

There was investigated the effect of replacement of 50% of animal foodstuffs in polar foxes diet by slaughterhouse blood conserved with sodium benzoate and sulphuric acid and by slaughterhouse waste materials conserved with formaldehyde on red blood cells haematocrit index and red blood cells sedimentation. An addition of conserved foodstuffs

to the diet had no negative effect on indices of blood erythroblastic system in polar foxes.

Akademia Techniczno - Rolnicza Im. Jana i Jedrzeja Śniadeckich w Bydgoszczy, Zeszyty Naukowe nr. 111 - Zootechnika, 9, 5-11, 1984.
2 tables, 10 references. Authors' summary.
In POLH. Summary in ENGL and RUSS.

BIOCHEMICAL AND MINERAL INDICES OF BLOOD PLASMA IN POLAR FOXES FED WITH DIET CONTAINING ADDITION OF FEED PRESERVED.

(Biochemiczne i mineralne wskaźniki osocza krwi lisów polarnych zywionych dawka pokarmowa z dodatkiem pasz konserwowanych)

Henryk Bieguszewski, Manfred Oskar Lorek.

There were investigated a concentration of glucose, urea, creatinin, cholesterol and activity of transaminase and fosfatase in blood plasma of polar foxes. The foxes were fed with a diet in which fresh blood /15% of total diet/ was replaced by slaughterhouse blood conserved with sodium benzoate and sulphuric acid. In place of 50% of fresh slaughterhouse waste materials, slaughterhouse waste materials conserved with formaldehyde were put.

It was indicated that the influence of conserved feed on biochemical indices depended on physiological state in pola foxes.

Some mineral elements of plasma in the blood of the control animals were assigned. There was no essential effect of differentiated diet on the mineral picture of blood plasma.

Akademia Techniczno - Rolnicza Im. Jana i Jedrzeja Śniadeckich w Bydgoszczy Zeszyty Naukowe nr. 111 - Zootechnika, 9, 13-19, 1984.
2 tables, 10 references. Authors' summary.
In POLH. Summary in ENGL and RUSS.

Tabela 2. Składniki mineralne osocza krwi lisów polarnych
Table 2. Mineral components plasma of blood polar foxes

Grupa zwierząt Group of animal	Wapń Calcium mmol/l	Magnez Magnesium mmol/l	Potas Potassium mmol/l	Sód Natrium mmol/l	Chlorki Chloride mmol/l
Doświadczalna Experimental	6,1 ± 0,8	1,3 ± 0,4	5,5 ± 0,9	172,6 ± 14,6	106,9 ± 3,1
Kontrolna Control	5,5 ± 1,0	1,4 ± 0,4	4,8 ± 1,1	156,3 ± 22,3	108,8 ± 2,6

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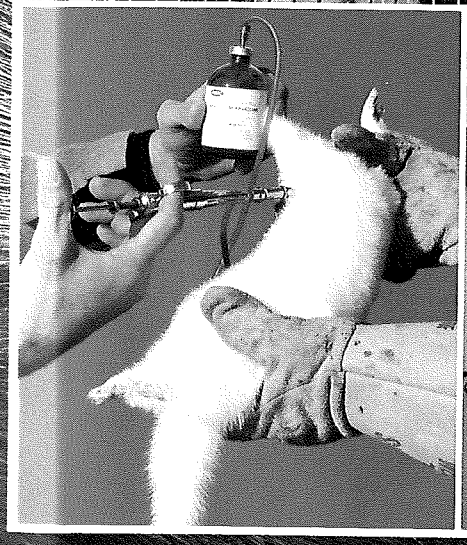

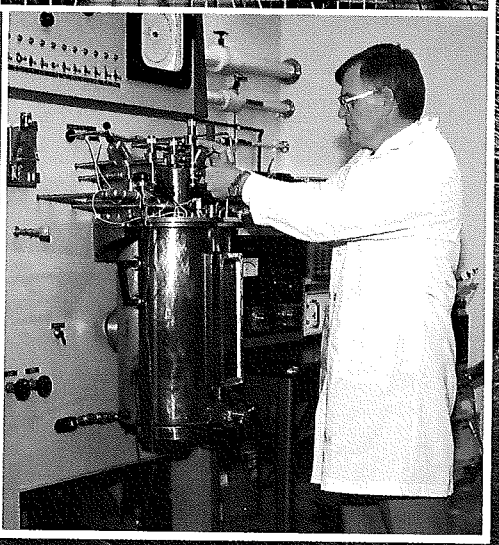

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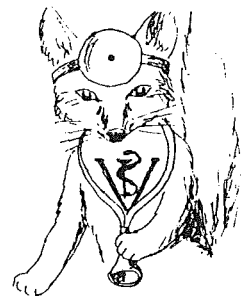


SEROLOGICAL SURVEY OF MINKS AND ARCTIC FOXES FOR TOXOPLASMOSIS.

ПРИМЕНЕНИЕ ХИМКОКЦИДА ПРИ ТОКСОПЛАЗМОЗЕ НОРОК

E. I. Drozdova.

Minks and arctic foxes were tested by the CFT for the presence of Toxoplasma antibodies at various fur farms in the USSR. At most of the farms the animals were seropositive.

Nauchnye Trudy NII Pushnogo Zverovodstva i Krolikovodstva, 26, 44-47, 1981.

3 tables, 5 references. CAB-abstract.

In RUSS.

EXPERIMENTAL TOXOPLASMOSIS IN PREGNANT MINK.

ЭКСПЕРИМЕНТАЛЬНЫЙ ТОКСОПЛАЗМОЗ БЕРЕМЕННЫХ НОРОК

E.I. Drozdova.

Experimental infection of pregnant minks with a strain of Toxoplasma of low virulence resulted in stillbirths, in the birth of weak, non-viable cubs and in the death of 91.7% of cubs in 3 weeks. Transplacental infection was demonstrated.

Nauchnye Trudy Nauchno-Issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 24, 44-47, 1980.

18 references. CAB-abstract.

In RUSS.

PATHOMORPHOLOGICAL CHANGES IN MINK CUBS WITH EXPERIMENTAL TOXOPLASMOSIS.

ПАТОМОРФОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ У ЩЕНКОВ НОРОК ПРИ ЭКСПЕРИМЕНТАЛЬНОМ ТОКСОПЛАЗМОЗЕ

N.S. Bukina, E.I. Drozdova.

Pregnant minks were infected with Toxoplasma in the first (group one)

or the 2nd (group 2) half of pregnancy. Cubs born in group one had severe changes in the parenchymatous organs (acute myocarditis, productive inflammatory foci in the liver and necrotic foci in the renal cortex). The pathological changes were less severe in group 2.

Nauchnye Trudy Nauchno-Issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 21, 50-52, 1980.

1 reference. CAB-abstract.

In RUSS.

A CONTRIBUTION TO THE STUDY OF THE ACTIVE PROTECTION OF MINKS (MUSTELA VISON VISON) AUJESZKY'S DISEASE.

E. Lapeevič, S. Paunovic, B. Vasic.

Our study proved that:

a) the results obtained subsequent to vaccination, revaccination and infection with Aujeszky's virus neither supported nor refuted the possibilities of active protection against this disease,

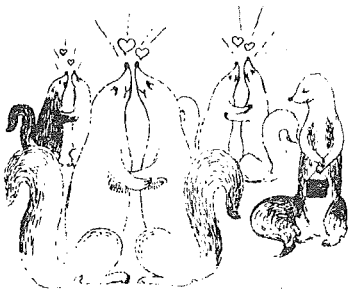
b) the vaccine, both our own and the original one, was innocuous, although it did not prove its full active properties,

c) the lyphilized (dry) vaccine is harmless to susceptible animals (minks), and

d) revaccination and vaccination develop a certain - partial resistance to parenteral infection, while strong infection, i.e. inoculation with 1000 LD_{50} of Aujeszky's disease virus leads to lethal consequences.

Belgrade Veterinarski Glasnik in Serbo-Croatian, No. 11, 1974, 851-855. English translation by: Emergency Programs, Veterinary Services, APHIS, USDA.

5 pp, 1 table, 4 references. Authors' conclusion.



DISTEMPER IMMUNIZATION.

(Staupe).

A. Mayr, G. Eissner, B. Mayr-Bibrack.

Handbuch der Schutzimpfungen in der Tiermedizin, Berlin. German Federal Republic, Verlag Paul Parey, 540-551, 1984.
13 references.
In GERM.

COCCIDIOSTATIC PREPARATIONS FOR COCCIDIOSIS IN MINK.

ИСПЫТАНИЕ КОКЦИДИОСТАТИЧЕСКИХ ПРЕПАРАТОВ ПРИ КОКЦИДИОЗЕ НОРОК

K. K. Nukerbaeva, M.D. Umurzakov.

A high proportion of young mink in the Novosibirsk region developed coccidiosis caused by Eimeia vison, E. furonis and Isospora laidlawi. It was controlled successfully with either "Clopidol-25" at 5 mg/kg of feed for 8 days (or a prophylactic concentration of 3 mg/kg of feed for 15 days), or "Khimokoktsid-6" (Chemococcid-6) starting at 6 mg/kg of feed for 8 days, then 3 mg/kg for 8 days.

Izvestiya Akademii Nauk Kazakhskoi SSR, Seriya Biologicheskaya, 4, 32-34, 1983.
1 fig. CAB-abstract.
In RUSS.

COCCIDIOSIS IN MINKS.

КОКЦИДИОЗ НОРОК

K.K. Nukerbaeva.

Between 1970 and 1980, 2183 minks were investigated for coccidiosis on various farms in Kazakhstan, the Altai territory and the Novosibirsk region, USSR. Eimeria vison, E. furionis, Isospora laidlawi and/or I. Eversmanni were found in 212 (9.7 percent) of the faecal samples examined. Analysis of data for one summer season showed the infection to be present on 8 of 11 farms with prevalences ranging from 3.3 to 22.7 percent. More young than adult animals were infected. The pathology of infection was studied in minks with experimental E. vison, E. furionis or I. laidlawi infections and is briefly described. I. laidlawi caused the least severe infection. In naturally infected minks,

Khimkoktsid-6 (Robenidine) at 0.06 percent of the feed twice daily for 7 days reduced infection intensity in 3 days, improved the condition of the animals and stopped mortality. 4 of 30 animals died in the untreated group.

Vestnik Sel'skokhozyaistvennoi Nauki Kazakhstana, No. 2, 86-88, 1983.
2 tables, 10 references. CAB-abstract.
In RUSS.

AN OUTBREAK OF CAMPYLOBACTER JEJUNI ABORTION IN MINK.

B.D. Hunter, J. R. Pettit, J. F. Prescott.

An outbreak of Campylobacter jejuni abortion occurred on a mink ranch with 1059 breeding females. Other animals on the ranch (15 cattle, 15 coon hounds, 15 silver foxes and a small flock of Pekin ducks) were unaffected. The owner fed the mink on a self-mixed ration of cereal base, tripe, liver, eggs and chicken offal, which he also supplied to three other mink farms, which were unaffected. A small pond adjacent to the well supplying drinking water to the mink was thus thought to be the source of infection, rather than the food.

The first abortion was observed on 10 April 1982 and dead mink kits were discarded. In late April and early May many mink went off feed for 2-3 days and developed grey mucoid droppings, occasionally tinged with blood. The mink remained bright and there were no adult deaths. Of the affected mink, 189 aborted (18% of breeding females) but another 312 failed to produce kits and probably included animals which resorped rather than aborted fetuses. Erythromycin in the feed appeared to prevent further abortions. C. jejuni Penner serotype 37 was isolated from all aborted fetuses in large numbers, from mink faeces, and from duck faeces, but not from other sources including the feed. Some people on the ranch developed diarrhoea but refused to be cultures.

Campylobacter II. Proceeding of the Second Internat. Workshop on Campylobacter Infections, Brussels, 6-9 September 1983. Ed. by A.D. Pearson and others, London, UK; Public Health Lab. Service, 129, 1983.
Only received abstract. Authors' abstract.

of crypt and goblet cells were decreased; (d) the remaining crypt cells were dilated, often with cellular and inflammatory debris (crypt abscesses); (e) multiple areas of mucosal ulceration were observed; (f) lesions occurred consistent with ulcerative colitis. Experimentally infected mink showed similar but milder histopahtological changes.

Campylobacter II. Proceeding of the Second Internat. Workshop on Campylobacter Infections, Brussels, 6-9 September 1982.
Ed. by A.D. Pearson and others, London, UK; Public Health Laboratory Service, 125-126, 1983.

Only abstract received. Authors' abstract.

"MENTAVAC" TRICHOPHYTON MENTAGROPHYTES VACCINE AGAINST RINGWORM IN NUTRIA.

ПРИМЕНЕНИЕ ВАКЦИНЫ МЕНТАВАК ДЛЯ ЛЕЧЕНИЯ ТРИХОФИТИИ НУТРИЙ

A.M. Litvinov.

36 4-month-old myocastor coypu with trichophyton mentagrophytes infection were divided into three groups of 12. One group was inoculated intramuscularly with the live ringwork vaccine, 2 ml repeated 8 days later. Another group was treated with an antifungal dintment, and the third group was not treated. The ringvorm lesions started to heal a week after the second inoculation of vaccine, while they persisted for 3 months in the untreated animals, and for 16-25 days in those treated with ointment.

Byulleten Vsesoyuznogo Instituta Experimental'noi Veterinarii, 42, 30-31, 1981.

In RUSS. CAB-abstract.

NORMAL BACTERIAL FLORA OF FREE-LIVING CHINCHILLA LANIGERA.

(Estudio de la flora bacteriana normal de Chinchilla lanigera silvestre)

Ximena B. Mathieu , Juan Carlos Durán R., Martha Rivas R.

From Auco, Illapel, Chile (31°30' Lat. S.; 71°6' Long. W.) 53 specimens of chinchilla (Chinchilla lanigera) were captured for biological studies. 18 animals were killed to make the parasitic and bacterial diagnosis of the trachea and alimentary tract (considering the different parts separately). A sample of the surface of penis of each male (33) was analized. Samples of nose aperture and anus were obtained from

all animals, in order to get a general knowledge from the common bacterial flora of this mammals species.

Quantitatively, the bacerial flora of wild chinchilla do not differs significantly from those species found in other mammals. The species more frequently isolated in all studies was Listera grayi, mainly in the digestive tract that probably constitutes a normal habitat for this microorganism. By inoculation of laboratory animals, we confirmed the nonpathogenic character of this bacteria.

Revista Latinoamericana de Microbiologia, 24, 2, 77-82, 1982.
4 tables, 8 references. Authors' summary.
In SPAN, Summary in ENGL.

THE PREVALENCE OF TRICHINELLIASIS IN FUR-BEARING ANIMALS IN THE MAGADAN REGION (USSR).

РАСПРОСТРАНЕНИЕ ТРИХИНЕЛЛЕЗА ПУШНЫХ ЗВЕРЕЙ В МАГАДАНСКОЙ ОБЛАСТИ

V.S. Lutsenko.

Trichinelliasis was recorded in cage bred blue arctic foxes and minks, and in wild arctic foxes, sables and foxes according to official data for 1971 to 1977. The authors' own data for 1975 to 1978 gave a prevalence of 0.9 percent (in 1978) to 2.9 percent (in 1975) in caged blue foxes; the one wild arctic fox and one fox examined were infected while caged minks, wild minks and the one marten examined were not infected. An analysis of the overall data shows a considerable decrease in prevalence for the caged blue fox (65.5 percent were infected in 1975) probably due to careful trichinoscopy of marine mammals' flesh used for feeding on fur farms.

Nauchnye Trudy Kazanskogo Gosudarstvennogo Veterinarnogo Instituta Im. N.E. Baumana, 132, 116-118, 1979.
1 table. CAB-abstract.
In RUSS.

THE PARASITE FAUNA OF MUSKRATS IN KIRGIZIA.

ПАРАЗИТОФАУНА ОНДАТРЫ В КИРГИЗИИ

A. V. Kharadov.

The species of acari known to parasitise muskrats (ondatra zibethicus) in Kirgizia, USSR, are listed on the basis of published work and of collections made by the author. The most frequent parasite was ondatralaelaps multispinosa (Banks) (laelaps multispinosa), a specific parasite of the animal, followed by haemogamasus ambulans (Thorell). The other parasites belonged to the families ixodidae, laelapidae and listrophoridae. Data are included on their seasonal dynamics.

Entomologischeskie Issledovanie v. Kirgizii, 15, 125-130, 1982.
1 table, 1 fig., 10 references. CAB-abstract.
In RUSS.

"It isn't just you, Wally, we've all been put on the endangered species list."

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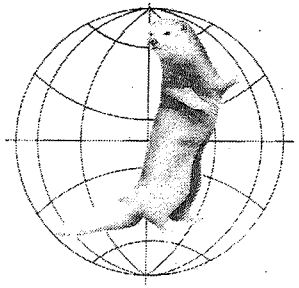

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Continued from SCIENTIFUR Vol. 8, No.3, pp 242-261.

VERSAILLES

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PARVOVIRUS INFECTION IN BLUE FOXES

Pirjo M-L. Veijalainen - Erkki Neuvonen and Jouni Kangas

National Veterinary Institute, PB 368, 00101 Helsinki 10, Finland.

For several years enteritis caused by feline panleukopenia virus (FPV) and mink enteritis virus (MEV) has been known to occur in cats and mink. Recently an apparently new viral disease of dog, associated with canine parvovirus type 2, has been recognized. When the first isolates of CPV were reported in Finland it was speculated that the virus might also cause disease outbreaks in fur animals. A serological survey was conducted among blue foxes. Antibodies were determined using hemagglutination inhibition test. A total of 1300 serum samples from 50 farms were examined. Blue foxes from 13 farms in three adjacent counties in western Finland reacted positively with high titers to CPV 2 and FPV/MEV. The first isolate of blue fox parvovirus was made in the summer 1983 from feces of a 12-week old kit with fatal diarrhoea. The virus could be seen in the electron microscope after aggregation with a specific CPV 2 antiserum. Particles were identical to those seen in dog, cat and mink enteritis. The isolate hemagglutinated 1% of blood cells optimally at pH 6.2 like FPV/MEV. At pH 7.0 it showed no hemmaglutination. The host range of blue fox parvovirus in cell cultures was determined. The virus was successfully propagated in a fox lung cell culture and in cell cultures of feline origin. Attempts to infect cell cultures from dogs, mink and ferrets failed. The antigenic relationship between blue fox parvovirus, CPV 2 and FPV/MEV were tested by HI with monoclonal antibodies to CPV 2 and FPV. The isolate was found to be antigenically closer to FPV/MEV than to CPV 2.

EFFICACY OF IVERMECTIN AGAINST ENDO - AND ECTOPARASITES IN CARNIVOROUS ANIMALS

Alojzy Ramisz

District Institute of Veterinary Hygiene, Crakow, Poland.

The study was carried out on animals naturally infected with endo- and ectoparasites. In a total number of 161 silver foxes, 35 raccoon dogs, 13 dogs and 14 cats the following parasites were found : silver fox, *Toxocara canis* and *Sarcoptes canis* ; raccoon dog, *Toxocara canis* and *Sarcoptes canis* ; dog, *Toxocara canis*, *Ancylostoma caninum*, *Trichuris vulpis*, *Sarcoptes canis*, *Demodex canis* and *Ctenocephalides canis* ; cat, *Toxocara cati*, *Ancylostoma tubaeforme*, *Notoedres cati*, *Demode cati* and *Ctenocephalides spp.* The extent and intensity of nematod infections were established using the Willis-Schlaaf method. Ivermectin was injected subcutaneously into the paracentral area of the thigh at a dose of 200 µg/kg body weight. Sterile equipement and needles were used. The studies demonstrate (table) that this new antiparasitic agent is highly potent against some common intestinal helminths and ectoparasites of carnivores. Ivermectin is an excellent broad-spectrum antiparasitic drug that is safe and easy to administer in carnivorous animals, especially in silver fox and raccoon dog.

Efficacy of ivermectin against endo - and ectoparasites in carnivorous animals

Species	Number of animals	Number of infections						Efficacy %	
		Endoparasites			Ectoparasites				
		Toxocara spp.	Ancylostoma spp.	Trichuris spp.	Sarcoptidae	Demodex spp.	Ctenocephalides spp.	Endoparasites	Ectoparasites
Silver-fox	161	136	-	-	32*	-	-	97,8**	97,0***
Raccoon-dog	35	3	-	-	29*	-	-	100	97,3***
Dog	13	6	3	2	4	5**	4	100	100
Cat	14	7	2	-	10	1**	3	100	100

*) Animal with clinical symptoms. **) Ivermectin used 3 times at 7-day intervals.
***) After the second ivermectin injection (9 days after the first one) all animals had been cured.

LABORATORY AND FIELD TESTING OF A SINGLE-DOSE VACCINE FOR PROTECTION OF MINK AGAINST DISTEMPER, VIRUS ENTERITIS, BOTULISM, AND *Pseudomonas aeruginosa*

T. M. Schwartz

American Scientific Laboratories, P.O. Box 3113, Omaha, NE 68103, U.S.A.

A new, one-injection vaccine (DISTOX-Plus, Schering Corporation, Kenilworth, NJ) for mink has been developed which is comprised of a lyophilized distemper virus and a diluent containing inactived mink virus enteritis, five inactivated serotypes of *Pseudomonas aeruginosa*, Clostridium botulism Type bacterin-toxoid, and an aluminum adjuvant. Laboratory tests for safety and efficacy were conducted according to USDA licensing procedures. Separate tests were performed to evaluated the stability of the lyophilized mink distemper component after rehydration with the diluent component. Field trials consisted of vaccinating approximately 1,000 mink kits which were divided among five separate ranches. Results of these laboratory tests and field trials are presented.

TOXOPLASMOSIS IN FUR-BEARING ANIMALS

Ulf D. Wenzel

Bezirksinstitut für Veterinärwesen Leipzig, Abteilung Pelztiergesundheitsdienst, Goldschmidtstr. 21, DDR 7010 Leipzig.

Toxoplasmosis is widely spread among domestic animals and productive livestock. In most cases it occurs as a latent infection without any clinical symptoms and animal loss and is only demonstrated by serological examination. There are only a few references to the occurrence of toxoplasmosis in fur-bearing animals in the literature. So far there has been a lack of systematic field investigations. Our serological survey indicates that toxoplasmosis is a rather frequent infection in fur-bearing animals. Serum samples of mink and nutria were examined for toxoplasmosis antibody by the Sabin Feldmann test. Although transplacental infection with toxoplasmosis is possible in fur-bearing animals, oral infection is predominant in natural surroundings. Clinical confirmation of toxoplasmosis in fur-bearing animals is hardly possible as our experience to date has shown that there are no characteristic symptoms of the disease. Likewise, there seem to be no specific pathomorphological changes. As according to Holmes et al. (1976) living toxoplasms persist for longer periods after infection, (e.g. in the nutria), those animals are a possible source of infection for man and his domestic animals. Since there is the possibility of smear infection due to contact with infected animals during slaughter, skinning, marketing and utilization, fur-bearing animal stock should be kept free of toxoplasms.

Poster

UTILISATION OF BIOCHEMICAL METHODS FOR DETECTION OF DISEASES IN FUR ANIMALS

Vyacheslav. A. Berestov

Laboratory of Fur Bearer Physiology, Biology Institute, Academy of Sciences of the USSR, Department of Karelia, Pushkinskaya 11, 185610 PETROZADOVSK.

Almost all diseases are accompanied by homeostatic disorders. This paper reports the biochemical and morphological composition of the blood of fur animals suffering from infectious, parasitic and non-infectious diseases. The following seric enzymes were determined ; lactate deshydrogenase, aspartate-amino-transferase, alanine-amino-transferase, aminase and alkaline phosphatase ; the values of these enzymes differed most from the confidence limits of the standard values established for most diseases. Non-specific humoral immune factors (the complement, lysozyme and betalysines) were also determined. The systematic determination of these enzymes in animals would contribute to the detection of latent disorders and, hence, to taking the right measures to prevent animal loss.

5 Fur and Skin

SEASONAL COAT CHANGES IN THE MINK IN RELATION TO THE CASTRATION IN THE MALE AND THE REPRODUCTIVE STATUS IN THE FEMALE

Daniel Allain* and Lise Martinet**

*Laboratoire des Pelages, Toisons et Fourrures, **Station de Physiologie animale - Institut National de la Recherche Agronomique, 78350 JOUY-EN-JOSAS.

Onset and duration of seasonal moults and changes in hair density were compared in intact males and in those castrated in November prior to annual testicular growth. In control males, spring moult began around April 20, when the testis was already half-regressed, and lasted for 5.6 $\pm$ 0.4 two-week periods. Autumn moult onset was observed by August 28 and the winter coat was completed in late November before testis recrudescence after a moult of 6.1 $\pm$ 0.2 two-week periods as compared to spring moult. Both the timing and duration of moult were identical in intact and castrated males. Castration altered neither the number of hairs per follicle bundle nor the percentage of change in hair density after moult. There was no indication that gonadal androgens control the moulting process in mink. The occurence of spring moult was compared in pregnant and unmated females. In pregnant mink, spring moult began by April 10 (three weeks before parturition) and lasted for 4.8 $\pm$ 0.5 two-week periods. The onset of moult was the same in unmated females, but it lasted longer (6.0 $\pm$ 0.0). The decrease in hair density was the same in both female groups. Finally, females seemed to display an earlier spring moult (April 10 vs April 20).

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KINETICS OF SEASONAL ACTIVITY OF THYROID, MOULTING, AND FUR FORMATION IN SILVER FOX FEMALES UNDER SELECTION FOR BEHAVIOUR TYPE

Yuriy Benemetsky and Ludmila A. Prasolova

Institute of Cytology and Genetics of the USSR Academy of Sciences, Siberian Department, Novosibirsk 630090, USSR.

No work has been done on the relationship between the functional state of thyroid and the processes of moulting and fur formation controlled by it in foxes selected for behaviour type. Adult females were kept in sheds under ambient temperature, natural illumination and usual diet. The pattern of the seasonal kinetics of thyroid activity in domesticated (tame) and nondomesticated (wild) foxes was the same, i.e. minimal thyroid activity in winter, maximal activity in summer. However, within one season there was a significant difference between the two groups. In winter, the thyroid activity in tame females was higher than in wild ones ($P<0.02$), and in autumn it was lower ($P<0.02$). These differences agree well with those in moulting and fur formation kinetics : in domesticated foxes moulting begins earlier (in January), while in autumn (October) the rate of fur growth is slower as compared to wild animals. In spring, the thyroid activity in tame females did not differ significantly from that in winter ; this correlated with the extended period of moulting in this group, which reached a peak at the end of March.

INCREASED SOLUBILITY OF COLLAGEN AND GLYCOSAMINOGLYCANS IN SKIN OF MINK SUFFERING FROM EHLERS-DANLOS' SYNDROME

Nelly Blumenkrantz

National Institute of Animal Science, Fur Bearing Animals, Trollesminde, 48 H, Roskildevej, DK-3400 Hillerød, Denmark.

In comparison to 7 unrelated, healthy controls, the solubility of skin acid glycosaminoglycans and collagen were increased in 10 mink suffering from Ehlers-Danlos Syndrome (EDS). Hexuronic acids, hydroxyproline, proline, hydroxylysine and lysine were determined on samples of dried and defatted skin. The skin samples, besides increased solubility, showed macroscopically detectable "curling" by which the disease was differentialy detected. This increased solubility of the two main macromolecular components of the skin has not yet been studied in other animals suffering from type I EDS. We consider that the inter-relation of these two main components could explain some of the aspects of the disease.

STUDIES ON THICKENED DERMAL STRUCTURES OF MINK

M. Harri - Katriina Jokivartio and M. Karjalainen

Department of Applied Zoology, University of Kuopio, POB 6, SF-70221 Kuopio 21, Finland.

The pelt of furbearing animals is graded mainly according to the quality of the hair coat. Recently more attention has been paid to the properties of the skin which forms a major part of the whole product. This study gives a detailed description of the these properties. Dried, raw mink pelts of dark male mink were selected using skin thickness as the main criterion. Thin and thick pelts from size-class I were derived from groups of pelts originally graded to Saga-and I-quality classes. There were no significant differences in the properties of hair coat between thick-and thin-skinned pelts. Neither were there differences in the surface structure of the hair. On the other hand, there were major structural differences in the skin besides thickness : the structure of the thick skin was more coarse and contained more fat. Removal of the fat left hollow cavities inside the skin. We can only hypothesize as to the reason for excessive skin thickness. One is physiological thickness associated with the increasing size of the animal. This is supported by detailed records of mink skins from one single farm. It was observed that the proportional weight of the pelt always remained constant, i.e. 12% of animal's weight, and that the weight of the pelt depended mainly on skin thickness. Thus it is biologically impossible to obtain a big thin-skinned animal. Cold climate as a possible reason for skin thickness is supported by the observation that mink skins sold in 1982 were on average thinner than those sold in 1981. On the other hand, against the climatic hypothesis is the fact that no geographical variations in thickness were observed. A third hypothesis concerning food quality, especially unsaturated fatty acid content, cannot be supported by chemical analysis : the melting point of the subcutaneous fat from thick-skinned animals was not different from that of thin-skinned ones. Further studies are in progress.

EXCESSIVE SKIN THICKNESS AS A QUALITY DEFECT IN MINK SKINS

M. Harri, M. Karjalainen and Katriina Jokivartio

Department of Applied Zoology, University of Kuopio, POB 6, SF-70221 Kuopio 21, Finland.

Pelts are generally graded into different quality categories according to the properties of the fur. The skin is a major part of the product. Recently more attention has been focused on the skin and it has been claimed that excessive skin thickness is increasing. In this study, we have evaluated the phenomenon in Finnish mink pelts. In 1981, skin thickness was measured on 3625 mink pelts graded according to size, quality and colour and in 1982 on 1080 pelts belonging to size classes 0 and 1, colour categories xx-dark, x-dark and dark, and quality categories SS, S and I. Skin thickness was measured to the nearest 0.01 mm. on the back of the pelt 12 cm from the base of the tail, and the pelts were weighed. In the 1981 sample, skin thickness increased with increasing pelt length ($p \leq 0.001$). More important than the mean values were the extent of thickness and the number of pelts exceeding a certain limit. If 0.60 mm is the absolute upper limit for skin thickness, then in 1981, 14.5 percent of the 0-size pelts exceeded this limit, while the corresponding value for size-class 3 pelts was 3.0 percent. Furthermore, significantly more thickskinned pelts were recorded for lower quality classes than higher ones. There was no systematic relationship between hair colour and skin thickness ; the thickness values for colour categories black to dark were the same, while the medium colour class contained more thickskinned pelts. Ten percent of the 0-size pelts exceeded the thickness limit of 0.72 mm. The corresponding ten percent limits for 1-, 2- and 3-size pelts were 0.57, 0.54 and 0.51 mm, respectively. In the 1982 sample, however, the ten percent limits for 0- and 1-size class pelts were 0.46 and 0.50 mm, respectively. It seemed obvious that milder weather in autumn 1982 was responsible for the thinner mink skins in this sample.

INDUCTION OF AUTUMN MOULT AND WINTER FUR GROWTH IN MINK BY ARTIFICIAL PHOTOPERIODICITY

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Institute of Cytology and Genetics of the Siberian Branch of the USSR Academy of Sciences, 630090 Novosibirsk, USSR.

The following light regimes contributing to the acceleration of fur maturation were studied : (1) continuous illumination from 20.6 till 20.7 and 8-hour daylight from 21.7 till 10.10 (group 1) ; (2) 8-hour daylight from 21.7 till 10.10 (group 2). The control animals were exposed to natural daily photoperiod. Laboratory analysis of fur and skin samples from Standard and Sapphire mink of experimental and control groups showed that both light regimes shortened the rest phase and accelerated coat maturation in treated animals by 1 month as compared to the controls. The experimental mink were pelted 10-15 October and the controls 10-30 November. An estimation of semi-manufactured and article product from pelt showed that the quality of fur experimental mink of both genotypes did not differ from the controls pelted one month later. The fur of group 1 animals was generally better than that of group 2. A method of accelerating mink fur maturation was elaborated on the basis of the first light regime and registered as an invention in 1979 by the National Committee for inventions. In 1980-1983 this method, subjected to wide industrial tests (more than 10000 mink) on the "Magistralny" breeding farm in the Altai region, showed great efficiency. The reduction of terms of mink growing by the method of photoperiodic acceleration permits the expenses of feeding and animal management to be reduced by 20% and therefore significantly increases economic efficiency of mink breeding.

6

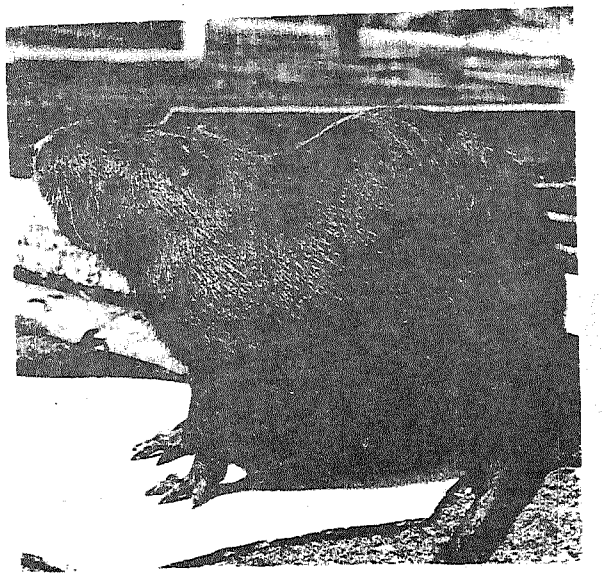
Husbandry
Economics
Sociology

YUGOSLAV EXPERIMENTS ON NUTRIA BREEDING

*A. Dudas and **Teofanovic

*Institute for Research Development and Investment, "Vojvodinainvest", P.O.B. 173, 21000 Novi Sad, Yugoslavia - **Veterinarin Institute, 21000 Novi Sad, Rumenacki put 6, Yugoslavia.

The organized breeding of coypu in Yugoslavia was initiated in 1977 at 38 breeding centers ; today, there are about 400 nutria-skin producers. Till 1981 the authors of this paper were coordinators of this activity, and since 1981 they have acted as expert consultants to a number of coypu breeders. In the present paper they describe experiments on : problems of accomodation and feeding of coypu ; diseases occuring from 1977 to the present and health regulations applied ; production results with special consideration of skin quality. The paper also contains collected statistical data on coypu reproduction and the production of nutria skins.



SITUATION AND DEVELOPMENT OF HUNGARIAN FUR PRODUCTION

Sándor Holdas, Zsolt Szendrő

Research Centre for Animal Breeding and Nutrition

H-2101, Gödöllo, Pf.57, Hungary

Fur production is rather recent in Hungary. There was only one research centre for mink and fox populations between the two world wars. In the fifties nutria production gained ground but was soon discontinued due to sale difficulties. During the next two decades the Gödöllo Research Center had only small populations of mink, nutria and chinchilla for demonstration purposes. A somewhat contradictory situation developed because the famous Hungarian fur trade exported significant amounts of finished goods but the necessary raw material had to be imported. Since 1975, several state farms, agricultural cooperatives and private breeders have imported breeding animals mainly from the Soviet Union, Norway and Poland. At present, three state farms and ten agricultural cooperatives have about 20 000 nutria and a further 50 000 belong to private breeders. Small-scale populations range between 10-100, while large-scale ones include 200-500 animals. Two agricultural cooperatives have silver and blue fox populations and two other farms have about 3000 chinchillas. Futher development can be realised in the breeding of herbivorous fur animals.

FURTHER IMPROVEMENT IN COOPERATION AND COMMUNICATION IN THE SCIENTIFIC AND PRODUCTION ASPECTS OF FUR ANIMAL PRODUCTION

Gunnar Jørgensen

National Institute of Animal Science, Fur Bearing Animals, Trollesminde, 48 H Roskildevej, DK 3400 Hilleroed, Denmark.

Previous international Scientific congresses on fur animal production the establishment of SCIENTIFUR, and the development of the scientific and production aspects of cooperation have shown us that we are on the right path regarding cooperation and communication. But editing work at SCIENTIFUR has clearly shown me that there is still a considerable language barrier as regards international communication. A lot of important basic reports are still written in "difficult" languages, and sometimes without an English summary. Many of these reports may not receive enough attention and thus not further improve the industry, at least not from an international point of view. Resources for research are so limited today that all sources of knowledge have to be utilized. One solution to the problem may be to start by translating "difficult" languages into a language - preferably English - which gives maximal utilization of the knowledge produced.
As a result of my own experience and that of many colleagues, I am pleased to recommend that this 3rd Congress discuss and stimulate the following activities in international cooperation : (1) complete translation into English of scientific and other important reports written in "difficult" languages (especially in Russian and other eastern languages, but also in French, German, Spanish, etc.) ; (2) Production of professional informative materials (articles, films, slides, transparents, etc.) of both a basic and scientific nature for local journals, public and professional school advisers and for courses in fur animal production. It is suggested that the establishment of the activities mentioned, together with the future production of SCIENTIFUR, should be based on economic support from the International Fur Trade Federation, of which all actual countries are members. The main economic background for the service should, like SCIENTIFUR, be based on subscriptions to the service.

The INTERNATIONAL FUR INFORMATION CENTRE should include the following activities : (1) establishment and management of an effective literature search in fur animal production ; (2) production and further improvement of SCIENTIFUR ; (3) translation into English of Scientific and other important reports dealing with fur animal production ; (4) edition of 2-3 printed pages of popularized International Scientific News for use in ordinary journals for fur breeders ; (5) professional production of all kinds of information materials for advising and teaching ; (6) stimulation of international cooperation in fur animal production. The services mentioned under 2, 3, 4, and 5 should be based on subscriptions.

FUR ANIMAL FARMING AND ANIMAL WELFARE

Hans-Christoph Löliger

Division of Hygiene and Diseases in the Institute for Poultry and Small Animals, Celle, Federal Research Centre for Agriculture, Dörnbergstr. 25/27, D-3100 Celle, Federal Republic Germany

The modern farming of fur bearing animals throughout the world has been discussed critically in regard to the demands of animal welfare regulations. The existence of fur farms has raised the following questions :

1) are men justified in keeping fur bearing animals under conditions of modern farming with encaging, allmash feeding and killing to harvest their precious fur ;

2) do conditions of modern fur-animal housing conform to the species-specific requirements of animal welfare :

3) what are the criteria for the suitable housing of farmed fur animals.

These questions have been discussed and answered by illustrations induding (1) the history of man : hunting of fur animals and history of the development of systematic fur animal farming to prevent the extinction of wild fur animals by hunting ; (2) conditions of housing, feeding, breeding and rearing of different fur animal species in farms and their biological requirements for conservation of the species, and (3) the health and fertility of lifelong encaged animal as objective criteria of the presence or lack of life conditions in the farm which correspond to species needs.

EXPERIMENTAL OPOSSUM FARMING IN NEW ZEALAND

Allan J. Pearson

Ministry of Agriculture and Fisheries, Ruakura Animal Research Station Private Bag, Hamilton, New Zealand.

Fur farming based on fitch *(Mustela putorius)* and opossum *(Trichosurus vulpecula)* is being developed as part of a programme to diversify New Zealand agriculture away from traditional pastoral production. However the potential of the brush-tailed opossum as a farmed fur bearer is still unclear. The opossum is well suited to intensive caging systems, is an efficient converter of plant nutrients and a wide variety of wild colour types occur. The principal disadvantage of the species is a low rate of natural reproduction (1-2 young per female in a breeding season). Fur quality characteristics and colour consistency will also need to be improved by selective breeding.

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The book has been reviewed for us by Doctor Niels Enggaard Hansen, the Agricultural University, Denmark.
Since it has been impossible for some years now to get hold of a Danish textbook/manual on mink production, it is an extremely good thing that this branch of stockbreeding is now covered with the appearance of a new book.
The book takes its readers through all important aspects of mink production, including the development of the production, organization of the industry, establishment and operation of mink farms, reproduction, genetics, types of mink, breeding methods and systems, breeding animal committees, the care of mink, feeding, feed production, feed centres and feed control, diseases and hygiene, anatomy and physiology of mink, pelting, processing and storage of skins, sorting and sale of skins, and advertising and marketing.

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SCIENTIFUR is a non profit service organ for the fur amimal production. SCIENTIFUR is therefore not able to finance translation, printing and marketing MINKPRODUCTION by itself.

The basic costs of the book has therefore to be raised througt preordering followed by pre- or prompt payment. The production period is calculated to be 6 months, and the production will not be started before the financial background is ensured through preorders. The book is planned ready for delivery August 1st. 1985.

The production will not be started before 2000 orders are in house. The price is calculated on basis of 3000 copies sold.

Scientifur
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Denmark

The book is extremely attracti
and readable. It is naturally primarily addressed to fur breeders, and new breeders, in particular, will find that it give
them a great deal of useful information. However, it also provides a valuable textbook and manual for teaching purposes.

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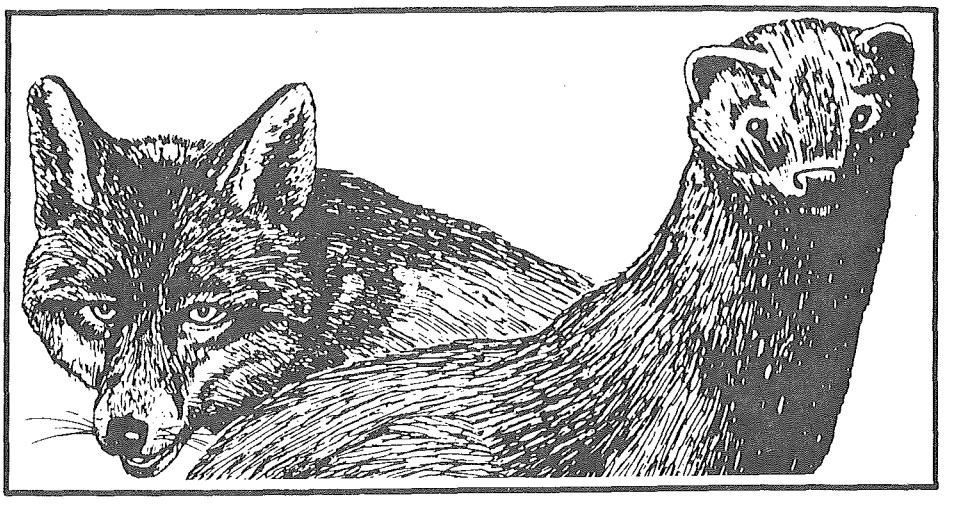

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Editor: H. Hattenhauer, Dr. Sc.

In GERM.

TOXASCARIDOSIS IN POLAR FOX.

Petrozavodsk

12 January 1985

Dear Dr. Jørgensen,

Please, find enclosed our new book "Toxascaridosis in polar fox".

The book gives data on the biology of pathogene, epizoology, pathogenesis (Parasite-host interrelations), diagnostics and treatment of the disease in farm-bred polar fox.

I think that the book is of interest for specialists in fur breeding.

With best wishes

Yours sincerely

Prof. V.Berestov

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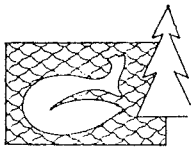

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112 pp, 24 tables, 36 figs., 236 references.
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Dear Dr. Jørgensen,

Petrozavodsk

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I think that you will find the book interesting.

КАРЕЛЬСКИЙ ФИЛИАЛ АН СССР
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Sincerely yours

Prof. V. Berestov

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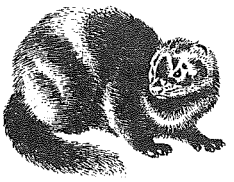

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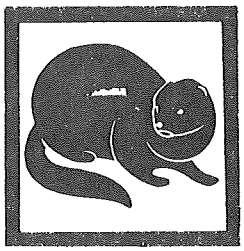

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