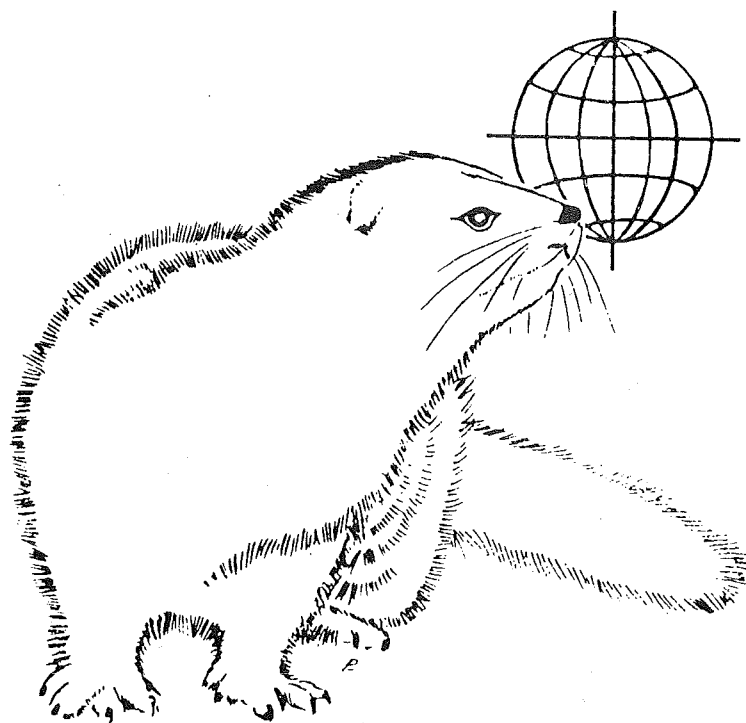


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Effects of ambient temperature on the 1080-LD₅₀ of raccoons.

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Rabinowitz, A.R. & Potgieter, L.N.D. (Journal of Wildlife Diseases: 20(2): 146-148, 1984). Code: 9-O

9. COMMUNICATION

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MINK & FOX ADVANCES. 71
 Natl. Board of Fur Farm Organizations, USA.
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VITAMINS IN THE NUTRITION OF FUR BEARING ANIMALS. 72
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 Code 6-14-M-F-O.

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Notes

SCIENTIFUR, VOL. 12, NO. 1, 1988

Dear Readers.

Happy New Year. At the moment we are very far from being happy, because of the fact that we cannot imagine a solution for the continuation of SCIENTIFUR after 1988. We do really hope that this issue of Volume 12 are not goint to be number one of the last volume.

Why, this pessimistic reflection? Because our institute is going to move at the end of this year, and that the fact is that it will be very costly to establish SCIENTIFURs production independent of the office facilities at our new institute.

And one more thing. In the past years only few crowns have been paid as salaries for production and running of the SCIENTIFUR business. We feel that it cannot be correct if such a service cannot bear its really costs.

Our budget tell us that SCIENTIFUR will not have a chance for this without a number of subscribers of at least 700 or by direct support to fulfilling of the budget.

From the following table it appears how the distribution of subscribers to

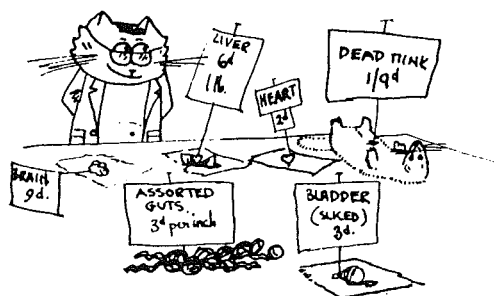
SCIENTIFUR is in relation to the skin export from the various countries, and how many it should be for reaching the budget to ensuring the future of SCIENTIFUR.

You may not only read the table. The breeders organizations in the various countries must decide how far they think that SCIENTIFUR has such a value for the fur industry that it should continue by obtaining of the necessary number of subscribers or by directly supporting in relation to the list given in the table.

It is not very fascinating for us to write about our problems in such a direct way, but if we do not find a solution, the subscription price for SCIENTIFUR will go up to Dkr. 750 per volume from January 1989.

Due to our experiences from our last increasing of the subscription price we know that it probably will cause a lowering of the number of subscribers considerably, - and by this do the continuation impossible.

This was the future. At present we have sent out the invoice for Volume 12 the



Subscribers to SCIENTIFUR in relation to the world production
of mink and foxes 1986/87.

	Million skins *			% of total	Subscribers + total price			
	Mink	Foxes	Total		actual		Necessary **	
					No	%	No.	Dkr.
Denmark	9.1	0.2	9.3	23.8	72	19.2	166	71400
Finland	4.0	3.1	7.1	18.2	57	15.2	127	54600
Norway	0.5	0.6	1.1	2.8	48	12.8	20	8400
Sweden	2.1	0.1	2.2	5.6	44	11.7	39	16800
Iceland	0.1	0.1	0.2	0.5	5	1.3	4	1500
Scandinavia total	15.8	4.1	19.9	51.0	226	60.0	356	153000
USA	4.5	0.1	4.6	11.8	36	9.6	83	35400
USSR (exp.)	4.0	0.2	4.2	10.8	1	0.02	76	32400
Canada	1.5	1.0	2.5	6.4	31	8.3	45	19200
China (exp.)	2.0	-	2.0	5.1	1	0.02	36	15300
Holland	1.5	0.2	1.7	4.4	19	5.1	31	13200
Japan	0.7	0.1	0.8	2.1	6	1.6	15	6300
DDR	0.5	-	0.5	1.3	2	0.1	9	3900
England	0.3	-	0.3	0.8	8	2.1	6	2400
Ireland	0.1	-	0.1	0.3	2	0.1	2	900
France	0.5	-	0.5	1.3	7	1.9	9	3900
Fed.Rep.Germ.	0.4	-	0.4	1.0	9	2.4	7	3000
Poland (exp.)	0.1	0.5	0.6	1.5	2	0.1	11	4500
Belgium	0.2	-	0.2	0.5	1	0.02	4	1500
Argentina	0.1	-	0.1	0.3	2	0.1	2	900
Italy	0.4	-	0.4	1.0	4	1.1	7	3000
Spain	0.1	-	0.1	0.3	8	2.1	2	900
Others	0.1	-	0.1	0.3	10	2.7	2	900
Total	32.8	6.2	39.0	100	375	100	700	300000

*) Approx. values.

***) Calculated in relation to the percent of world production and the necessary number of subscribers, namely 700.

1988 volume - and shall ask you, kindly, to give it your attention immediately.

We are sorry to inform you that the new book "Beauties of Fur Animals and their colour genetics" have been further delayed, and will not be ready for delivery until ultimo April primo May 1988.

We regret very much this delay. The price is unchanged, Dkr. 260,- + postage for the order received before that time. But we intend to contact an international commission agent for sale of the book, and this will, probably, make the book more costly.

Have a good summer.

Your editor.

Gunnar Jørgensen

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Original Report

Morphological and Chemical Studies on the Bending Guard Hairs of Mink (*Mustela vison*) Ranched in Qinghai Plateau, China

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Summary

The fur quality of the mink ranched on Qinghai plateau in China is seriously affected by the bending-tip of the guard hairs.

In these studies, the morphological structure of bending guard hairs were observed using an electron microscope, and the amino acid composition of the hairs was analyzed by an amino acid autoanalyzer.

Results obtained indicated significant morphological differences and amino acid composition between bending guard hairs and normal ones. It was suggested that the action of ultraviolet rays is the main cause of the bending-tip in the guard hairs of the mink ranched on Qinghai plateau.

Introduction

Mink breeding has been carried out in Qinghai province in China for more than 20 years. However, the industry is hampered by the presence of bending guard hairs in the mink skins produced in this area. Therefore, the future success of mink breeding in the province depends on research efforts to clarify the cause of the bending guard hairs and to find adequate prevention methods.

In this paper, some morphological characteristics and the chemical composition of the bending guard hairs of mink produced in Qinghai plateau were identified and discussed.

Results

1. Morphological structure of bending guard hairs.

In extreme cases the bending hairs appeared on the abdomen of the mink, though the bending hairs appeared mainly on the back. The bending characteristics varied among individual guard hairs. In some cases the bending angle was only 10-30 degrees, but in extreme cases, the bending angle was as large as 30-60 degrees. Also, the hairs sometimes developed into a spiral formation. In all such cases the hairs were transformed in 1/3 locations from the tip of the hair, independent of the degree of transformation of the hair.

1-1. Results of observations of bending guard hairs using a scanning electron microscope

The arrangement of the scales in the bending parts was observed by a scanning electron microscope, and the results were

shown in figs. 1, 2, 3. Further, the distance between scales was shown in Table 1.

Table 1 shows that the distance between

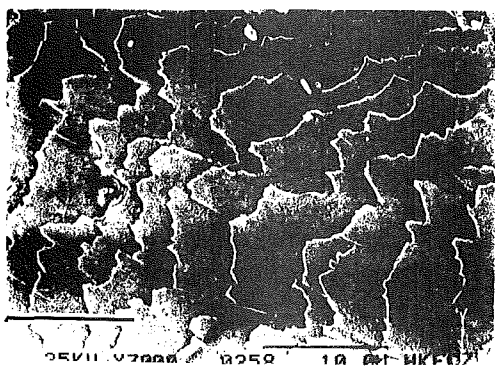


Fig 1. Scanning electron micrograph of normal guard hair. Bar=5um



Fig. 2. Scanning electron micrograph of scales of bending guard hair. Bar=5um

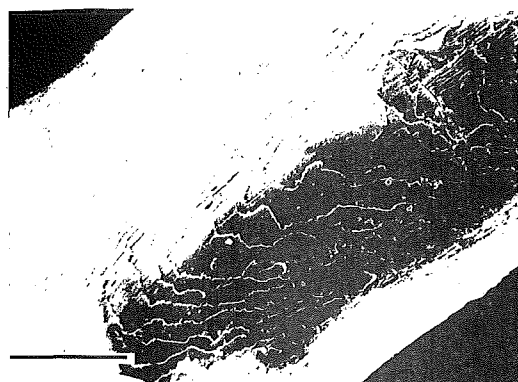


Fig. 3. Scanning electron micrograph of scales of bending guard hair. Bar=5um

scales in normal hairs was longer than in bending hairs. The angle of the scale to the hair shaft showed 90 degrees in the normal parts (Fig. 1), while it showed 120 degrees in the bending parts (Fig. 2, 3).

1-2. Results of observations of bending guard hairs using a transmission electron microscope.

The observational results of normal guard hairs and bending guard hairs by a transmission electron microscope were shown in Figs. 4, 5, 6, 7.

In a transverse section of mink guard hairs examined, 18-30 scale layers were seen (Fig. 6). The normal guard hairs revealed a smooth shape (Fig. 5). On the other hand, the scale cells of the bending guard hairs were transformed into a wave-like shape (Fig. 4). While in the cortex and medulla there were no differences between normal and bending guard hairs (Figs. 6, 7).

II. Appearance time of bending guard hair

The appearance rate of the bending guard hairs in the minkskins produced in Quinghai plateau was examined in 80 minks and the results were shown in Table 2.

Table 2 shows that the rate of the bending guard hairs increased with the growth of minks. Bending guard hairs did not appear until the minks were 2months old. Also, the appearance rate of the bending guard hairs was higher in winter coats than in summer ones. But even in winter coats, the appearance rate of the bending guard hairs in early October was not significant, but it increased with the increase in hair growth in November and December. Furthermore, the angle of bending increased with the increase in the appearance rate of the bending guard hairs.

III. Analysis of the cause of bending guard hairs

Mink experience a change in climatic conditions when they move from the plains to the plateau. The characteristics of the climatic conditions in Quinghai plateau are as follows.

Though temperature variations throughout the year are small, they are large within one day (30°C) and wind velocity is strong

Table 1. Morphological characteristics of scales in bending parts

	Distance between scales (um)	Angle of scale margin to hair shaft	Number of scales/1 mm
Normal hair	4 - 15	90°	150
Bending hair	2 - 4	120°	500

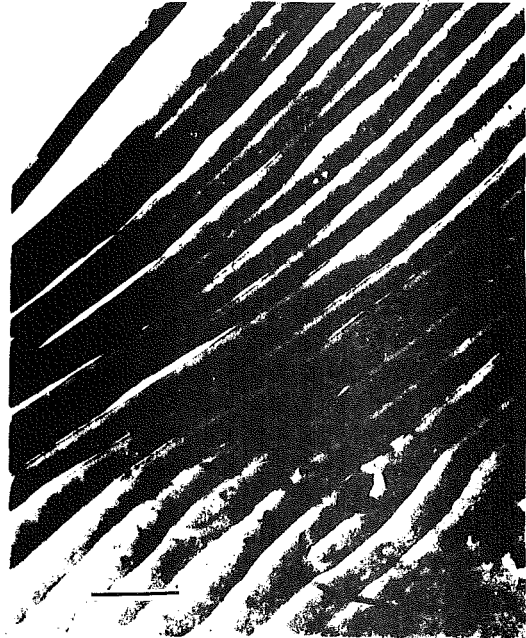


Fig. 4. Transmission electron micrograph of scale layers of bending guard hair. Bar=1um

Fig. 5. Transmission electron micrograph of scale layers of normal guard hair. Bar=1um

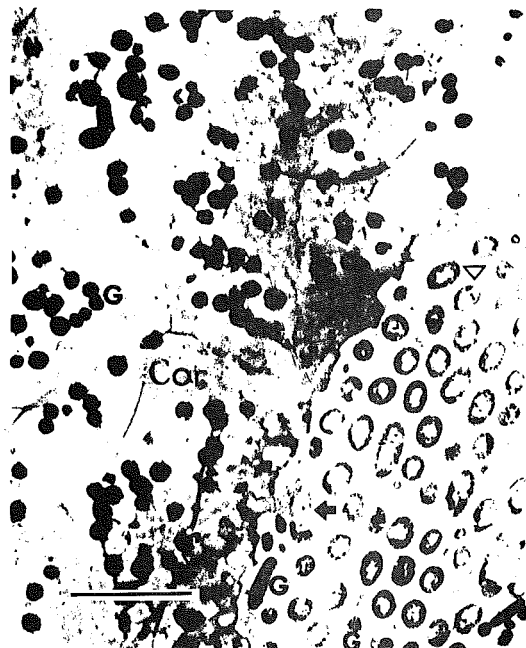


Fig. 6. Transmission electron micrograph of normal guard hair. ←:Scales; G:Melanine granules. Bar=1um

Fig. 7. Transmission electron micrograph of normal guard hair Cor:Cortex; G:Melanine granules;←:mèdulla;▽:Air spaces. Bar=1um

Table 2. Appearant rate of bending guard hair

	1. October		1. November		1. December	
	Number	%	Number	%	Number	%
Normal hair	53	66.7	25	31.3	12	15.0
Bending hair						
small	22	25.0	27	33.8	34	42.5
middle	5	6.3	27	33.8	30	37.5
large	-	-	1	1.3	4	5.0
Total	80	100	80	100	80	100

(maximum velocity of wind: 3-5m/second). Air is thin and oxygen density and relative humidity are low. Duration of sunshine throughout the year is 2,250-3,600 hours. The strength of the direct rays of the sun is 1.4-1.7 cal./cm². min. and the intensity of ultraviolet rays is high.

The amino acid composition of the bending guard hairs in the mink produced in Quinghai plateau were compared with that of normal guard hairs in mink raised in the plains in order to examine the influence of ultraviolet rays on keratines. Amino acid analyses were carried out according to established column chromatographic procedures using a Hitachi automatic amino acid analyzer.

The results of the amino acid analyses are given in Table 3.

As shown in Table 3, the amino acid composition of the bending guard hairs of the mink produced in Quinghai plateau indicated low contents of cystine and tyrosine.

There is some controversy on the reasons for the development of bending guard hairs in mink. *He Xing-Jun (1980 and Jia Wen-hua (1983)* reported that mink bred on Quinghai plateau and kept in sheds out of the sunshine showed a lower appearance rate of bending guard hairs.

In the present experiments, the amino acid composition of the bending guard hairs showed that cystine and tyrosine in the bending guard hairs was oxidized by ultraviolet rays. Therefore it was concluded that better fur quality might be achieved by isolating the mink bred in Quinghai plateau from ultraviolet rays.

Table 3. Amino acid composition of normal hair and bending hair (%)

	Normal hair	Bending hair
Alanine	2.86	3.73
Arginine	7.92	8.19
Asparatic acid	4.89	5.93
Cystine	15.62	9.78
Glutamic acid	14.98	15.90
Glycine	4.41	5.10
Histidine	1.13	1.24
Isoleusine	2.45	2.50
Leusine	6.24	6.50
Lysine	3.29	3.59
Methionine	1.13	1.17
Phenylalanine	2.61	2.91
Proline	7.47	7.41
Serine	10.12	10.11
Threonine	5.70	6.50
Tyrosine	4.09	3.48
Valine	5.06	5.98

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Jia Wen-hua (1983): Fur Animal Farming, No. 2, 24-26.

*Original Report***Seasonal rearrangements in the isoenzymatic profile of lactate dehydrogenase in the blood serum of cage-bred minks and polar foxes**

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Abstract

The division of isoenzymes of lactate dehydrogenase (EC I.I.I. 27) in the blood serum of minks and polar foxes by agar gel electrophoresis revealed seasonal variations in the ratio of electrophoretic fractions of the enzyme. It has been shown that in winter the rearrangements of the isoenzymatic spectrum of LDH is expressed in the increased relative content of LDH-I with a simultaneous decrease in the portion of LDH-5 in the total lactate dehydrogenase activity. The aerobic pathways of glycolysis were concluded to play an important role in maintaining the internal temperature homeostasis of fur-bearing animals

Introduction

Fur-bearing animals of the predator order are characterized by the animal cyclic recurrence of some biological functions. Thus, the animal periodicity of the basal metabolism is reflected in seasonal rearrangements in heat production and gas exchange in minks, sables, ermines, polar foxes, silver foxes and raccoon dogs (*Segal', 1975; Danilov, Tumanov, 1976; Korhonen et al., 1982; and others*). The total activity of serum enzymes in minks and polar foxes varies in different seasons (*Berestov, Kozhevnikova, 1981*).

Our earlier investigations have shown that the total activity of lactate dehydrogenase (LDH) in the blood serum of minks and polar foxes increases with decreased environmental temperatures and reaches its maximum values in February (*Berestov, Kozhevnikova, 1981*). However, the direction of glycolysis, its participation in aerobic and anaerobic pathways in the adaption to low environmental temperatures is still unclear. In this connection the aim of this investigation is to study isoenzymatic LDH profiles of blood serum and to determine the ratio between cathodic and anodic forms of the enzyme with a change of the seasons.

Materials and methods

Studies have been made on farm-bred adult minks and polar foxes. Blood serum obtained from the animals in February, April, July and November was used to investigate the isoenzymatic LDH profile.

Multiple molecular lactate dehydrogenase forms in blood serum were revealed by agar gel electrophoresis (*Wime, 1959*) modified by *E.G. Gorozhanskaja and V.S. Shapot (1973)* on a home device "PEF-3". The electrophoresis was performed in the veronal-medinal buffer,

PH = 8,6, ionic strength 0,05, tension 3-4 V/cm and strength of the current 50 ma/cm² for two hours. The quantitative ratio of LDH isoenzymes was estimated by scanning electrophoregrams (after their histochemical staining) on a microdensitometer "Chromoscan 200-201".

Results and discussion

All the five LDH molecular forms are distinctly observed in the enzymograms of serum LDH: from rapid anodic (LDH-1) to slow cathodic (LDH-5) (Fig. 1, 2).

In minks, the isoenzymatic LDH spectrum

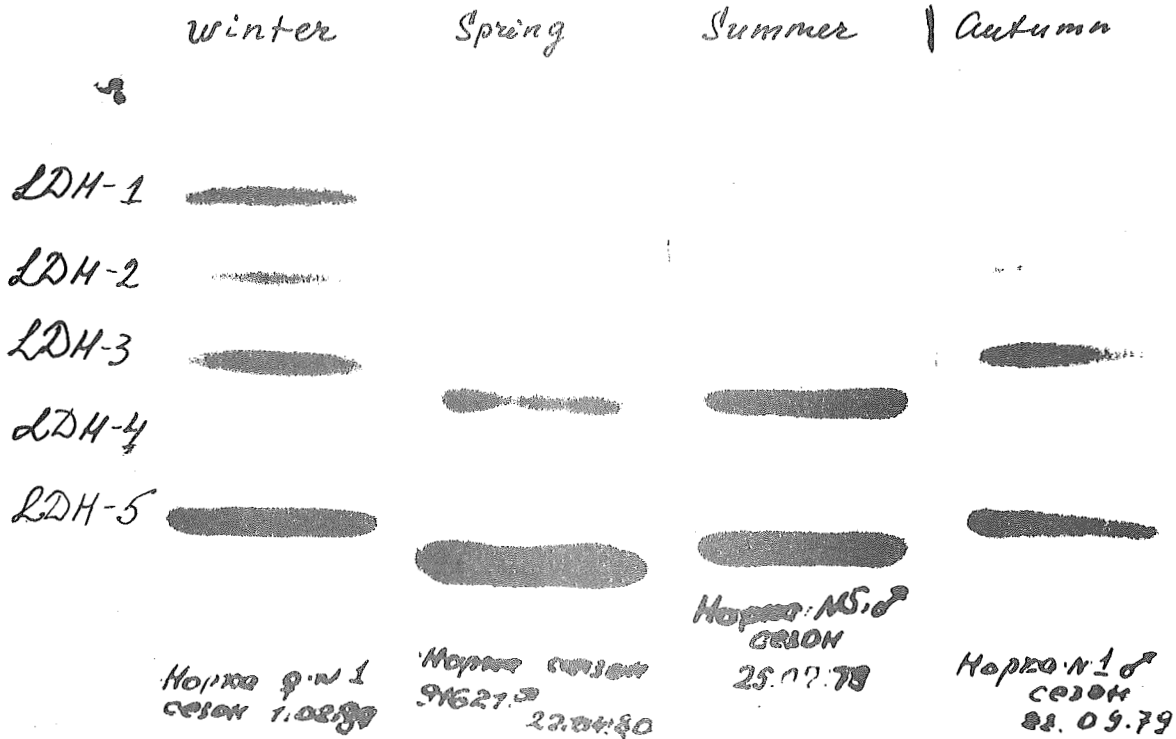


Fig. 1. Enzymograms of blood serum LDH of minks (in agar-gel plates) depending on the season. Fractions from LDH-1 to LDH-5 are read from top to bottom.

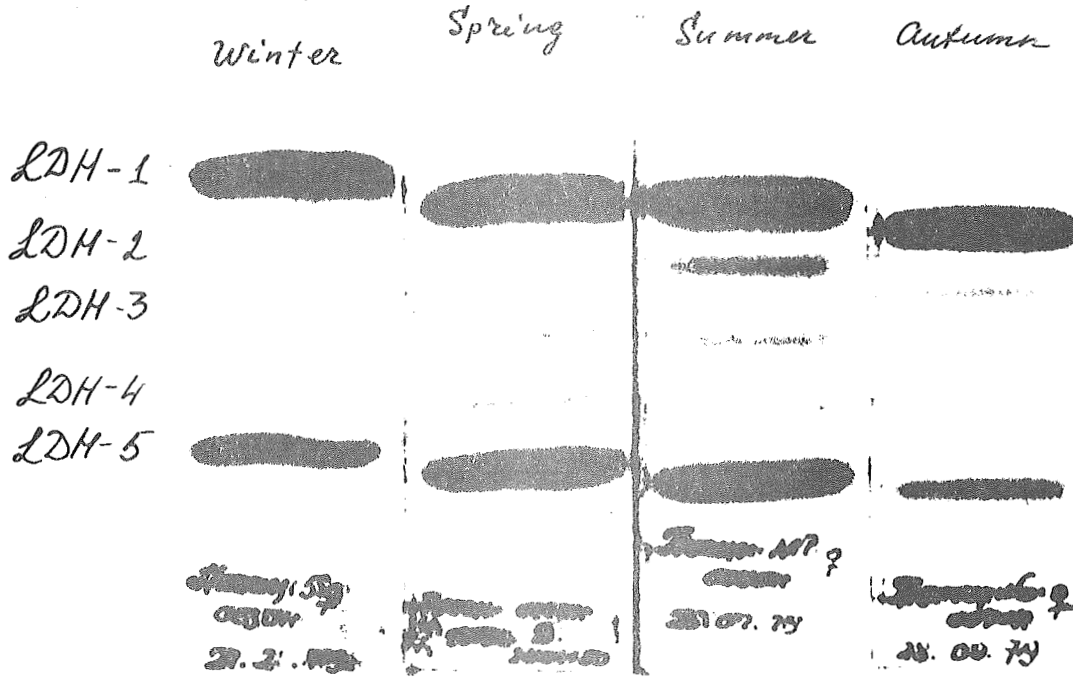


Fig. 2. Enzymograms of blood serum LDH of polar foxes depending on the season.

was dominated by the fifth fraction whose content varied from 28,9 to 37,1% throughout the year (Table 1). The content of the anodic isoenzyme LDH-I was 1,3-1,9 times lower than that of LDH-5. During the year the portion of LDH-I changed and it definitely increased in February accounting for one fourth of the total LDH activity. The relative content of hybrid isoenzymes LDH-4 was stable and fairly low (5,5 - 8,5%). The summer - autumn period was characterized by low LDH-2 activity, whereas in winter it increased. At the same time the portion of LDH-3 was the highest in the spring - summer period and it decreased for one third with the first autumn cold days.

In the isoenzymatic LDH spectrum in the blood serum of polar foxes the anodic fraction LDH-I was most active, its seasonal content varied from 38 to 62% (Table). In this case its content significantly and definitely increased in autumn ($p < 0.001$), and its highest values were registered in winter comprising more than 50% of the total LDH activity. The portion of the cathodic fraction LDH-6 in the blood serum of polar foxes was much less than that of LDH-I. The spring-summer period was characterized by the highest content of LDH-5, whereas in autumn and especially in winter its portion was twice as low. The relative content of LDH-3 and LDH-4 was the lowest in winter. The comparison of the isoenzymatic LDH

Table 1. Relative content of LDH isoenzymes in the blood serum of minks and polar foxes depending on the season, (%).

Seasons	n	LDH fractions (M±m)					Coeff. LDH 5/LDH I
		1	2	3	4	5	
Minks							
Winter	8	25.3 ± 1.1 *)	13.8 ± 0.6	19.6 ± 1.3 *)	8.1 ± 0.9	33.2 ± 1.0	1.31 *)
Spring	5	17.2 ± 0.6 *)	12.1 ± 1.6	28.7 ± 3.2 *)	8.5 ± 0.9	33.6 ± 5.5	1.96 *)
Summer	8	18.3 ± 2.4 *)	11.0 ± 1.1 *)	35.9 ± 1.7 *)	5.5 ± 1.6	28.9 ± 3.5	1.57 *)
Autumn	8	19.0 ± 1.7 *)	11.1 ± 0.6	21.2 ± 1.5	8.0 ± 1.2	37.1 ± 1.7	1.95 *)
Polar foxes							
Winter	6	62,6 ± 2.3 *)	7,2 ± 1,7	7,3 ± 1,2	3,2 ± 0,4 *)	19,8 ± 2,8 *)	0,31 *)
Spring	13	38,8 ± 2,3 *)	8,5 ± 0,7 *)	9,1 ± 0,8	7,9 ± 1,1 *)	35,5 ± 1,7 *)	0,91 *)
Summer	8	38,2 ± 1,8 *)	15,0 ± 1,3	11,4 ± 1,7 *)	6,5 ± 0,9	28,9 ± 1,4	0,75 *)
Autumn	8	46,2 ± 3,5 *)	10,0 ± 1,5	14,8 ± 2,5	5,9 ± 1,3	23,2 ± 2,3	0,50 *)

* Significantly different from winter: $p < 0.01$.

spectrum for the blood serum of minks and polar foxes reveals some similarities and differences. Both in mink and in polar foxes the serum LDH is divided into five electrophoretic fractions. During all the seasons the isoenzymatic LDH profile of polar foxes was dominated by LDH-I whereas in minks LDH-5 prevailed. In the order of decreasing activity in minks the electrophoretic fractions were

distributed as follows: LDH-5 > LDH-I > LDH-3 > LDH-4; in polar foxes: LDH-I > LDH-5 > LDH-2 > LDH-3 > LDH-4. The species specificity of LDH isoenzymatic distribution in the blood serum and organs of fur-bearing animals have been discussed in our previous works (Kozhevnikova et al., 1983) and it seems to be connected with ecological specialization of the species seasonal rearrangements in the isoen-

zymatic LDH profile of the serum in minks and polar foxes is expressed in the increased relative content of the anodic LDH-I fraction in winter with simultaneous decrease of the portion of the cathodic LDH-5 fraction. The later results in decrease of the coefficient of the activity ratio LDH-5/LDH-4 to its minimum values in this period of the year that indicates a shift of the glycolytic processes towards aerobiosis.

It is well known that the physiological sense of the existence of LDH isoenzymes m and H is in subtle regulation of the alternative metabolic pathways. LDH-5 catalyzes the final stages of anaerobic transformation of carbohydrates (reduction of pyruvate to lactate), whereas LDH-I mostly catalyses aerobic oxidation of accumulated lactate to pyruvate (Lehninger, 1972).

On the basis of the above properties of LDH isoenzymes to catalyze the alternative glycolytic pathways one may conclude that in winter a shift of lactate dehydrogenase reaction towards the formation of pyruvate is observed in minks and polar foxes. In this case both the relative portion of LDH-I and the anodic fraction total increases. In minks, relative content of LDH-I + LDH-2 grows from 29.4 to 39.15% from July to February, i.e. 1.3 times. In polar foxes, this increase is much higher from 38.4 to 69.7% i.e. almost 2 times. At the same time cathodic fraction total (LDH-4 + LDH-5) accounts for 41.2 and 23% in minks and polar foxes, respectively, that is one third lower than in summer.

A shift of the isoenzymatic LDH spectrum of mink and polar fox blood serum towards the preferential content of the enzyme H-subunits in winter together with the increased total LDH activity (Berestov; Kozhevnikova, 1981) may be regarded as the specific adaptation of the energy exchange to low environmental temperature. The intensive decomposition of glucose through the aerobic pathway, as most intensive in terms of energy production, shows that in winter carbohydrates have come to have a significant value in furbearing animals. The latter seems to be connected with the decreased use of protein and fats at this time of the year, which function as heat isolation. The rearrangement of the carbohydrate exchange in fur-bearing animals in winter is similar to that observed in animals which adapt to low environmental temperatures. Thus, long staying of rats in cold conditions results in the decomposition of glucose through the Embden meyerhof sequence with the aerobic pathway of pyruvate conversion being activated (Isaakjan, 1972).

In the spring-summer period the role of the aerobic pathway of carbohydrate conversion falls in fur-bearing animals, and the process of catabolism is generally decreased. This is evidenced by a fall of the total lactate dehydrogenase activity and by the decreased relative portion of LDH-1 in minks and polar foxes in spring and by an increase in the relative content of LDH-5 that is especially distinct in polar foxes.

Thus, seasonal rearrangements of the isoenzymatic LDH profile in the blood serum of minks and polar foxes evidence for a subtle regulation of biochemical functions of the direct participation of the systems, responsible for the energy supply, in the process of adaptation.

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*Original Report***Seasonal changes in activity and behavioural patterns of farm-raised foxes (*Alopex Lagopus*)**

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Summary

Behavioural patterns and locomotor activity of blue foxes (*Alopex lagopus*) were studied under normal farm conditions. Activity of the animals consisted of a system of short bursts of activity altering with rest periods. The animals were diurnal rather than nocturnal, and moved most in the morning (0600–0900 hours). The animals were most active at breeding time. Towards autumn the activity of the animals significantly ($p < 0.05$) decreased. Circadian locomotor activity was confined to the time of feeding. The most frequently occurred behavioural patterns under farm conditions were locomotion, self-grooming, sleeping, lying awake, standing, eating, drinking, defecation and urination. No marked aggressive behaviour was observed. The overall use of urination has most importance as a scent-marking method. The results support the conclusion that activity and behavioural patterns of farmed blue foxes differ from that of wild ones in a looser relation with environmental conditions.

Introduction

The blue fox (*Alopex lagopus*), a colour mutation of the Arctic fox, is widely housed for fur production all over Scandinavia. This species is well-adapted to severe subarctic and arctic conditions and has many features typical

of the other canid species. One important factor which regulates behaviour and activity of the blue fox is seasonal changes of its energy economy (Korhonen *et al.*, 1983; 1985; Korhonen, 1988); the blue fox exhibits a marked change in food consumption, locomotor activity and body weight year-round. During summer it is active, eating well but also has its lowest body weight whereas the opposite is true for the winter period (Korhonen, 1988).

Although behavioural patterns and activity of foxes have been studied a lot under natural conditions (*c.f.* Tembrock, 1957; Ables, 1969; Österholm, 1966; Fox and Cohen, 1977; Whitten *et al.*, 1980; Jones and Theberge, 1982; Malcolm, 1985), few data are available especially concerning the activity of foxes on farms. On the other hand, lots of papers are available which deals olfactory communication (Kleiman, 1966; 1967; Barash, 1974; Jorgenson *et al.*, 1978; Blizard and Perry, 1979), general behaviour (Fox and Cohen, 1977; Braastad, 1986a,b; Hoffmeyer, 1987), domestication (Belyaev, 1978), nest behaviour (Sonderup, 1986; Harri *et al.*, 1987) and food-caching behaviour (Jeselnik and Brisbin, 1980) under captive conditions.

The aim of the present study was to evaluate seasonal changes in behavioural patterns and activity of farmed blue foxes under normal cage conditions.

Materials and Methods

General procedures

The experiments were undertaken at the research fur farm of Kuopio University, in eastern Finland. All experimental animals were grown-up males which were born under farm conditions. The animals were housed alone in standard wire-mesh cages measuring 105 cm wide x 120 cm long x 60 cm high. They were fed once a day. Ready-mixed fox feed and water were available by conventional procedures. Feed portions were based on the feeding recommendations of the Finnish Fur Breeders Association (Berg, 1986). The diet was mainly composed of slaughter-house offals, fish and cereals, and it originated from the central feed kitchen of Koillis-Savon Rehu Ltd. For a further description of the diet see Korhonen (1987).

Data collection

Behavioural patterns and activity of the foxes were measured by direct visual observations. An observation period generally started at 0900 a.m. and lasted for 24 continuous hours. Observations were performed by two people at

once. The animals were not disturbed and, in general, they were not aware of the observers.

Statistics

The data were expressed as the mean \pm SD. The data were statistically processed by a Sharp Scientific calculator EL-51035 and by a VAX 11/780 computer using the SPSS (Statistical Package for Social Sciences) program.

Results

General observations

The main data are presented in Tables 1-2 and in Figs. 1-2. Activity pattern of the animals consisted of a system of shorter or longer bursts of activity alternating with rest periods. Seasonal changes in circadian activity and behavioural patterns were found. On the other hand, individual differences were rather small.

Almost all animals on the entire farm could be activated by external disturbances (noisy farm work, the crash of a shadehouse etc.). The time when the farmer came onto the farm was also observed by the animals, and they often became active. The noise of the feeding machine also exerted the same in-

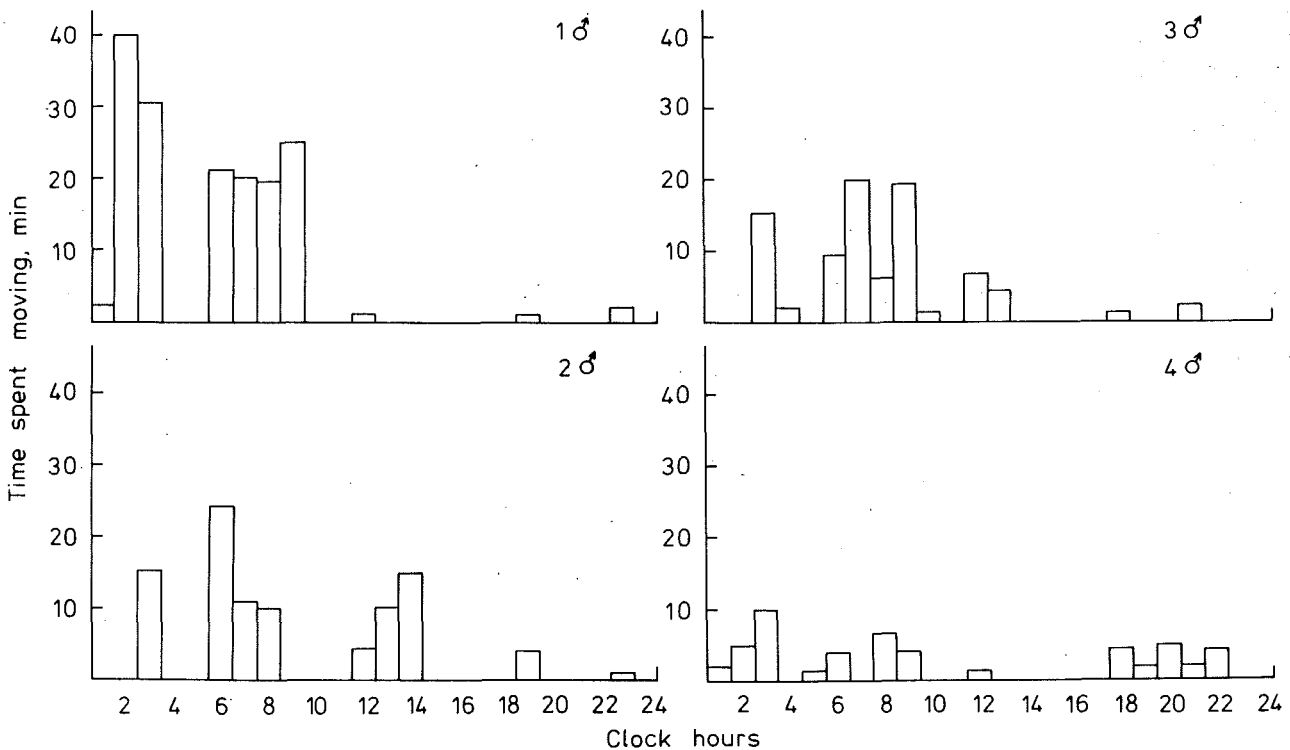


Fig. 1. Distribution of circadian locomotor activity in adult blue foxes between May 5th and 6th.

Tabel 2. Locomotor activity of adult blue foxes (N=5) in relation to worktime and light hours. Based on the data presented in Tabel 1.

MONTH	DAY LENGTH (h)	LOCOMOTOR ACTIVITY DURING		
		WORKTIME (%)	LIGHT HOURS (%)	REST (%)
JANUARY	6.5	60.0	60.0	40.0
FEBRUARY	5.0	33.2	35.2	64.8
MARCH	9.0	38.6	42.4	57.6
APRIL	11.0	84.1	90.0	10.0
MAY	14.0	29.9	35.5	64.5
JUNE	15.0	44.4	51.2	48.8
JULY	18.5	41.7	43.0	57.0
AUGUST	17.5	39.0	33.3	66.7
SEPTEMBER	15.0	78.5	79.0	21.0
OCTOBER	12.0	70.1	89.2	10.9
NOVEMBER	11.0	45.7	51.0	49.0
DECEMBER	9.0	62.3	64.0	36.0

which were active less than one hour (21 min) but also animals whose locomotor activity period could last 7-8 hours (562 min) per day.

Locomotor activity of foxes did not depend on sunrise or sunset. Animals moved sporadically, and each one had its own activity pattern. However, activity of the animals had some connection with the farmer's workschedule (Table 2). It was observed that farmer's daily activities synchronized, to some extent, the activity pattern of the animals. The animals became especially active in the morning when the farmer came onto the farm.

Sleeping was the most common behavioural pattern. No marked seasonal changes were found in sleeping behaviour but it lasted from 10 to 14 hours per day year-round. Furthermore, no marked seasonal changes were observed in lying awake or sitting activities. Generally the animals sat about 2 hours per day and lay awake about 5 hours per day. Defecation and urination took place 5-10 minutes per day altogether. Between May and June the animals spent most of their active time for self-grooming. This occurred just at the time of highest hair loss. For eating the animals spent 7-14 minutes per day. Eating behaviour was concentrated at the times of feed supply. The animals generally ate all the feed given at once. Furthermore, the animals seemed to know from the farmer's different activities, noises and behaviour, when feeding time was coming. Thus, prior to feeding, they became restless and active. They often peeped

out, carefully listening and walking around the cage. The animals drank more during summer than during winter. Typically, they licked a small quantity of water all at once. Some snow-eating behaviour was also observed during winter.

Discussion

It has been observed that wild foxes are typically nocturnal having some passive periods at midnight (Ables, 1969). Over 50% of their daily locomotor activity seems to occur between 1700 and 0900 hours although some afternoon activities are also available (Tembrock, 1957). Österholm (1966) found similar activities in red foxes kept in large wire-mesh cages (measuring 10 m long x 10 m wide x 2.5 m high); locomotor activity of the animals occurred mainly between sunset and sunrise.

Aschoff (1962) mentioned that nocturnal animals typically have two activity peaks which occurred in the evening and in the early morning whereas the midnight is the time of acant motility. Since wild foxes move so much during daylight and to a lesser extent at midnight, one cannot consider them truly nocturnal animals (Aschoff, 1962).

The present study showed that farmed blue foxes are most active in the morning (between 0600-0900 hours). Some short activity peaks also occurred at midnight, in the afternoon and in the morning. Over half of the locomotor activity generally occurred during the daylight.

High activity peaks in the morning disagrees with the results of Österholm (1966) who concluded that captive foxes are most active in the evening but agree with his observations Österholm, 1966) done in wild animals.

One probable cause for the animals activity differences observed between various studies is the small number of experimental animals (varying from 3 to 5). It is well known that each animal has his own activity rhythm which it generally follows years around (Korhonen et al., 1985; Korhonen, 1988). In many species, furthermore, it has been observed that activity patterns vary between individuals often a lot (Korhonen et al., 1985; Gerell, 1970). Thus, it is obvious that differences between various studies exist.

In the present study, the animals were fed in the morning (about 0830 o'clock). This led to increased locomotor activity of the animals before and at feeding time. It has been observed also in minks (Klochkov, 1966; Gerell, 1970), polecats (Korhonen et al., 1985) and raccoon dogs (Korhonen, 1988) that locomotor activity of farm-raised animals are confined to the time of feeding. Thus, on farms, times just before and at feeding serve as set points for the circadian clocks. Furthermore, locomotor activity of captive animals seems to be more acyclic and diurnal than that of wild animals (Gerell, 1970). Thus, the circadian activity rhythm of farmed animals is in a looser relation to environmental conditions. Nocturnal patterns in nature are evidently adaptations to the availability of prey (c.f. Österholm, 1966; Korhonen et al., 1985).

There exist marked seasonal changes in locomotor activity of foxes. Tembrock (1957) mentioned that foxes are most active at breeding time but some time before whelping they become inactive. Thereafter, they again move a lot but by mid-June their locomotor activity decreases. The next activity peak is observed during autumn. Österholm (1966) presents similar results for captive foxes. The high activity peak found at breeding time in the present study coincides with those previous works. However, there exist no peaks after whelping and towards autumn the activity of our farmed foxes significantly decreased. In nature, of course, foxes have to be very active during autumn to get food and enough subcutaneous body fat for winter. Under farm conditions, on the other hand, food is freely available year-round. Thus, farmed foxes do not need to move in search of food. Decreased activity during autumn has been observed

besides in foxes but also in farmed polecats (Korhonen et al., 1985) and raccoon dogs (Korhonen, 1988). Thus movement itself is not necessary for the animals but, of course, in nature they have to move to get food.

When the behavioural patterns of farmed blue foxes are compared with those observed in wild foxes, it is evident that most of the characteristic features are the same. For instance, self-grooming, vocal communications and many other general features are typically seen both in wild and captive animals. Feeding behaviour, on the other hand, differs because animals on farms are fed regularly. Generally they eat the given daily portion at once and thereafter are rather inactive. In nature, on the other hand, the animals might have to search for food for longer periods of time (c.f. Ables, 1969). When the animals are in an inactive state, both wild and captive animals display similar patterns (c.f. Tembrock, 1957; Österholm, 1966; Fox and Cohen, 1977).

Scent-marking has significant importance in the sociological life of foxes. Wild Arctic foxes seem to differ from grey and red foxes in their overall use of urination while fecation has less importance as a marking method (Kleiman, 1966). This conclusion also holds true for farmed blue (Arctic) foxes; the animals generally do not have any defined dung piles but they defecate all over the cage. Urination, on the other hand, seems to play a more important role in communication; the animals urinate at certain cage sites every now and then.

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Original Report

Activity and behaviour of farmed raccoon dogs

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Abstract

Activity pattern of farm-raised raccoon dogs (*Nyctereutes procyonoides* Gray 1834) consisted of a system of shorter or longer bursts of activity alternating with rest periods. Individual and seasonal differences in circadian activity and behavioural patterns were found. Behavioural differences between adults and juveniles were also evident in some cases. Each individual has fairly regular activity rhythms which could persist for long periods of time. Feeding the animals at a fixed time resulted in an increased activity, often to a significant degree. The total active time of the animals was greater during summer than during winter. When the winter nest was available, the animals spent their daylight time inside the nest. Locomotor activity of the animals without a winter nest was more evenly distributed throughout the 24 h as compared with when the nest was available. Animals defecated and urinated during summer significantly more frequently than during winter. All the animals housed in the same cage tended to have one dung pile which was utilized commonly. Typically, raccoon dogs deposited a small quantity of urine at once, often at particular, definite sites. Eating behaviour was concentrated at feeding times. Aspects of aggressive behaviour was not very common between the animals. The results support the conclusion that activity and behavioural patterns of farmed animals differ from that of wild ones in a looser relation with environmental conditions.

Introduction

The raccoon dog (*Nyctereutes procyonoides* Gray 1834) is a medium-sized carnivore (family Canidae) native to eastern Siberia, Japan, China and northern Indochina (Heptner *et al.*, 1974; Stains, 1975). However, the raccoon dog has shown an effective colonizing ability and has markedly expanded its original range during the last 50 years (Corbet, 1978; Safonov, 1980).

The first farming trials with this species were performed in the USSR in the late 1920's (Schmidt, 1931; 1937; Heptner *et al.*, 1974), but were discontinued by 1945 because it was not profitable (Kornejev, 1954). At present, Finland is the leading country in commercial fur production of raccoon dogs and produces over 70.000 skins yearly (Tarhaajan kalenteri, 1986). The first farming trials were done in Finland no earlier than 1971 (Mäkelä and Kiiskinen, 1978).

Since the raccoon dog has been adopted as a farm produced fur animal quite recently, available data on its farm-life characteristics, including activity and behavioural patterns, are still scarce (*c.f.* Seitz, 1955; Kleiman, 1967; Yamamoto and Ikeda, 1982; Brzozowski and Kaleta, 1985). However, some studies of its social behaviour (Novikov, 1956; Masui, 1980; Ikeda, 1982), habitat utilization patterns (Ikeda *et al.*, 1979; Väisänen, 1982) and behavioural activity (Popov, 1956; Geller, 1959; Heptner *et al.*, 1974; Muller-Usig, 1975; Ikeda, 1982) in the wild are available. These works support conclusion that the raccoon dog is a solitary canid which displays frequent scent-marking

throughout its habitat. In addition, this species is mainly nocturnal, and exhibits activities like superficial hibernation (winter sleep) and excessive autumn fattening which are not characteristic of other members of the family Canidae.

The present study was carried out in an attempt to completely clarify the activity and behavioural patterns of the raccoon dog under commercial fur farm conditions. One purpose of this work was to access differences between whelps and adults on the one hand, and differences between summer and winter on the other hand. This paper also evaluates possible differences between animals having different sized cages with and without nests. Finally this study attempts to collect data on the adaptation of the raccoon dog to captive conditions. Thus, comparisons between data from captive and wild conditions were done.

Materials and methods

Subjects

The experiments were carried out at the research fur farm of Kuopio University during 1982-1987. Adult and juvenileraccoon dogs were used. First observations were started when the whelps were about two months old. Several activity and behavioural pattern experiments were done at intervals during their growth and adult stages.

All animals were farmborn and farmbred. They were housed in wire-mesh cages of three different sizes: (1) 105 x 120 x 60 cm (width x length x height), (2) 105 x 60 x 60 cm, and (3) 105 cm x 240 cm x 60 cm. Animals were caged alone, in pairs or in groups of four animals. In general, no nest was available to them. However, activity patterns of some animals were observed also when the animals were using a winter nest. A wooden nest consisting of two separate nest boxes were used. The inner box was made of 1.7 cm thick board and the outer of 2 cm thick plywood. This nest type is often used for whelping raccoon dogs on farms. For a further description of the nest see *Korhonen and Harri (1985)*. The animals were inspected daily and they remained healthy throughout the experiments.

The animals were fed once a day. Ready-mixed farm feed and water/snow were available by conventional procedures. Feed portions were based on the feeding recommendations of the Finnish Fur Breeders' Association (*Berg, 1986*). The feed was mainly composed of slaughterhouse offals, fish and cereals, and it originated

from the local central feed kitchen. For a complete description of the diet see *Korhonen and Harri (1986)*.

Procedures

Altogether, data were collected over a 6 year period and include recordings of 40 whelps and 16 adults. Activity and behavioural patterns of the animals were measured in two ways: (1) by means of a Miniscript Z Activity chart recorder. Depression of a treadle by the active animal resulted in a mark on the recording paper run at a speed of 1 cm/h. The treadle was placed in the middle of the cage. This part of the cage was narrowed by about 20 cm in order to ensure that the active animal always stepped on the treadle (*Harri, 1982; Korhonen et al., 1985*). Activity chart measurements were recorded altogether for about three years. (2) by direct observations. At least 4600 hours were used for observations of the animals. An observation generally started 0900 a.m. and lasted for 24 continuous hours. Direct observations were often performed by two people at once. The animals were not disturbed and, in general, they were not aware of the observer.

Data treatment

Since no significant sex differences were observed, the values of both sexes are pooled unless otherwise mentioned. Generally the data are expressed as the mean \pm SD. The data were statistically processed by a Sharp Scientific calculator EL-51035 and by a VAX 11/780 computer using the SPSS (Statistical Package for Social Sciences) program.

Results

General

The main features of daily activity and behavioural patterns of raccoon dogs are deducible from Figs. 1-3 and Tables 1-3. Activity pattern of the animals consisted of a system of shorter or longer bursts of activity alternating with rest periods. Individual and seasonal differences in circadian activity and behavioural patterns were found. Behavioural differences between adults and juveniles were also evident in some cases. When more than one (generally two) animal was housed in the same cage, they tended to be active and resting at the same time. Moreover, animals in groups of three or four animal per cage often showed similar patterns. For instance, they readily slept together in a pile.

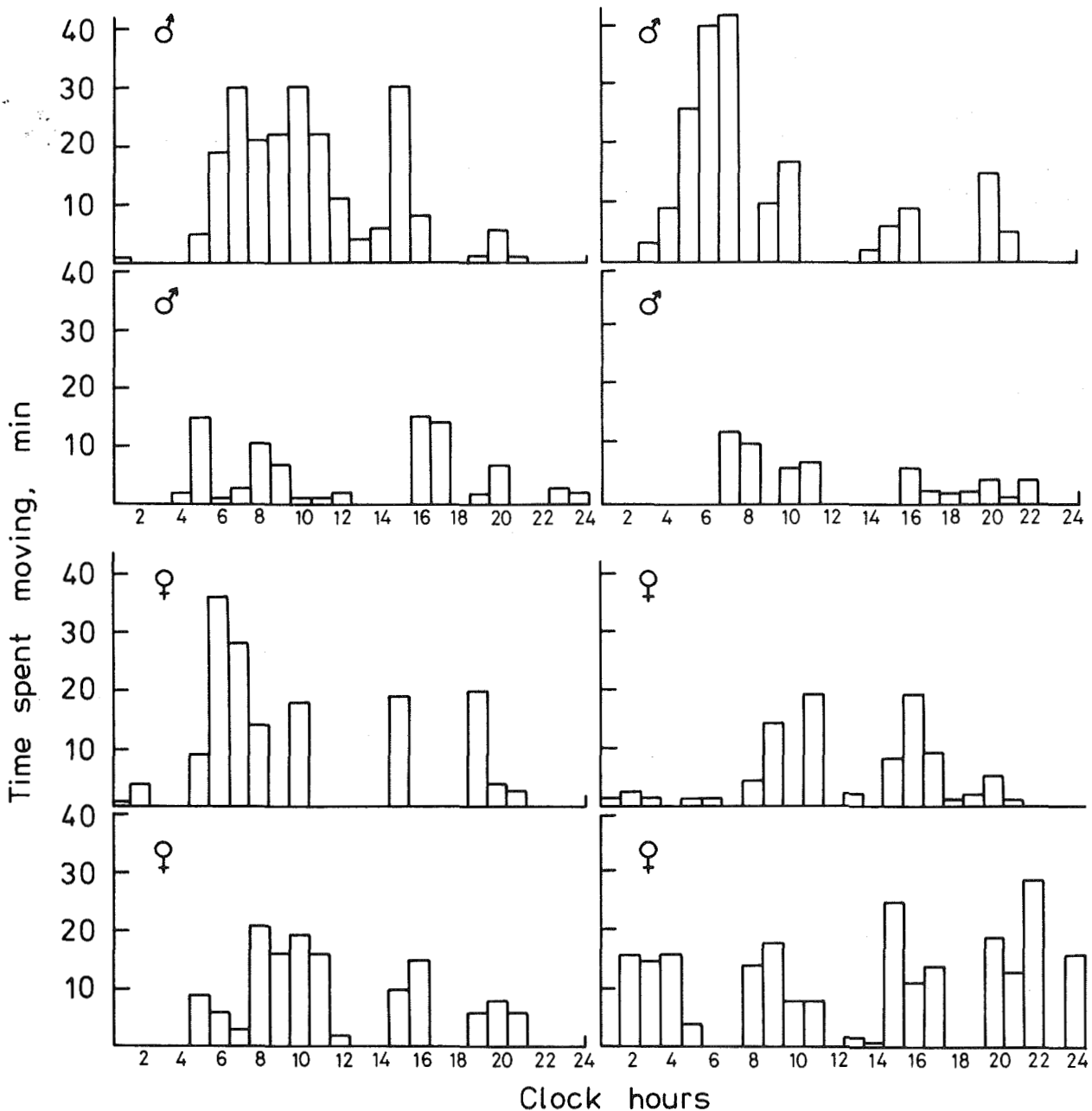


Fig. 1. Distribution of circadian locomotor activity in juvenile raccoon dog males and females. Based on observation data gathered between 13th and 14th November in 1986. Note the differences between individuals which are typical for them year around.

Almost all animals on the entire farm could be activated by external disturbances (Noisy farm work, The crash of a shadehouse etc.). The time when the farmer came onto farm was also observed by the animals, and they often became active. The noise of the feeding machine also exerted the same influence. In general, however, the animals were rather calm and spent their time without taking any extra notice of normal, daily farm activities.

Circadian and seasonal activity rhythms

Individuals were encountered with different types of circadian activity patterns, i.e., there were very active individuals with distinct intensification of activity during the evening and night time, and others whose circadian activity was more evenly distributed throughout the 24 hours. The records of the mechanical chart recorder demonstrate that each individual had fairly regular activity rhythms which could persist for long periods of time.

Feeding of the animals at a fixed time resulted in increased activity, often to a significant degree.

The total active time of the animals was greater during summer than during winter. Furthermore, whelps exhibited more activity than the adults in general. A representative

comparison of locomotor activity between whelps and adults is given in Fig. 2. For adults and whelps daily activity in minutes was 280 and 325, respectively.

Seasonal changes in individual activity patterns were also observed. For instance, the circadian activity pattern of one male raccoon

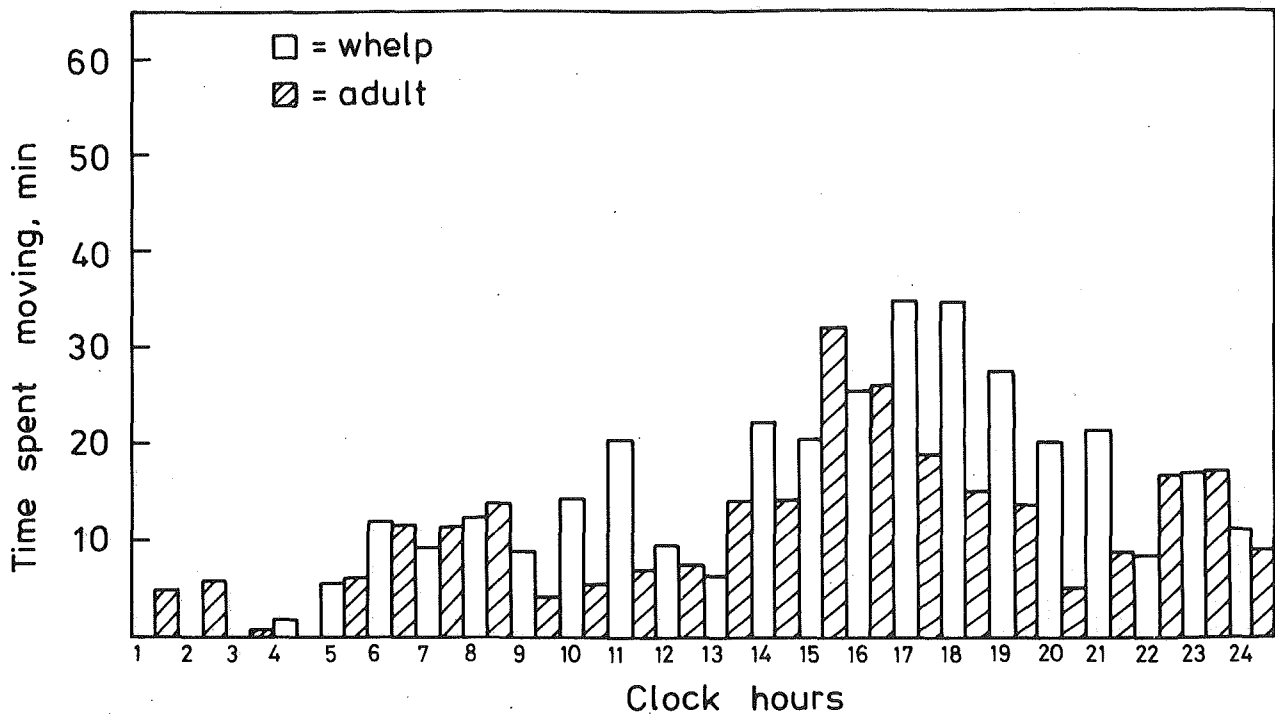


Fig. 2. Distribution of circadian locomotor activity in juvenile and adult raccoon dogs (N=4). Data based on continuous activity chart recordings between 15th and 30th July in 1985.

dog recorded in July was rather evenly distributed throughout the 24 hour period with alterations of shorter or longer activity and rest periods. However, in November the activity pattern was different; no marked nocturnal activity was observed. Locomotor activity was totally concentrated during the daytime with almost continuous moving. Furthermore, the beginning and ending of the activity period was closely connected with sunrise and sunset, respectively. On the other hand, it was observed that older animals (older than 1-2 years) have especially regular activity patterns, and it was difficult to make them change their patterns. This was noticed, for instance, when rest shelves were offered them. Generally, older raccoon dogs did not care about shelves whereas younger ones more eagerly slept on shelves.

During summer, the whelps exhibited very active locomotion throughout the 24 hour period. Observation studies revealed that whelps within the same cage often were active together. They were still rather active throughout the day into September

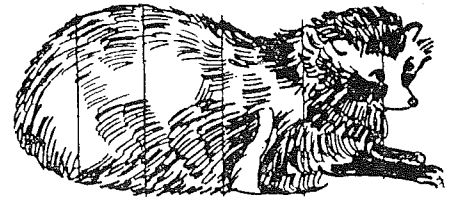
Total time spent moving varied markedly between the individuals. There were animals which were active less than one hour in 24 hours (48 min) but also animals whose locomotor activity period lasted 7-9 hours. During winter the animals were rather inactive. A tendency toward decreased activity during late autumn was also typical for both whelps and adults (Tables 1 and 2).

Activity patterns with and without a nest

Circadian activity rhythms of raccoon dogs with and without the availability of a winter

Tabel 1. Average monthly activities of juvenile raccoon dogs from weaning until pelting time. Data are given as minutes in 24 hours.

VARIABLE MEASURED	JUL	AUG	SEP	OCT	NOV	DEC
Locomotor activity	298	198	200	173	152	149
Sleeping	540	515	538	427	480	376
Lying awake	205	233	136	327	361	356
Sitting	121	212	294	369	369	319
Standing	162	173	190	88	29	194
Self-grooming	43	40	24	11	11	10
Eating	38	35	27	22	20	16
Drinking	20	19	21	13	8	10
Defecation	7	7	5	5	5	5
Urination	6	7	5	6	5	5



Tabel 2. Average monthly activities of adult raccoon dogs year round (N=8-13). Data are given as min. in 24 hours.

VARIABLE MEASURED	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Locomotor activity	220	207	345	198	195	245	260	201	183	111	118	126
Sleeping	754	671	769	827	605	677	634	591	737	807	746	856
Lying awake	228	265	130	158	229	105	149	193	127	63	142	78
Sitting	103	158	124	161	179	179	195	319	304	337	275	289
Standing	103	98	32	48	180	171	146	86	17	77	110	56
Self-grooming	13	18	17	14	24	22	21	20	21	15	13	13
Eating	7	10	10	15	11	19	17	16	24	17	19	17
Drinking	2	3	3	9	7	12	8	3	17	13	7	5
Defecation	5	5	5	5	5	5	5	5	5	5	5	5
Urination	5	5	5	5	5	5	5	5	5	5	5	5

nest is illustrated in Fig. 3. When the nest was available, the animals spent their days inside the nest. At about 0400 o'clock p.m. the animals came out of the nest and started to move to and fro on the cage floor remaining active past midnight. At about 1-2 o'clock a.m., they disappeared into the nest and remained there until the next evening. This fixed pattern was observed throughout the entire observation period.

When the nest door was closed and the animals were forced to spend their time outside the nest, their circadian activity rhythm changed (Fig. 3). Fixed activity was now more regularly distributed throughout the 24 hours than when the nest was available. Particularly during the morning (0600-0800) when the farmer appeared, the animals became active. Some locomotion during the day was

also evident. However, the total active time during a 24 hour period with and without a nest was of the same order of magnitude.

Some experiments with the nest for whelps were also done. Animals chosen included whelps which were used to spending some of daily time in a nest but also those who did not. However, it was observed that if whelps were very shy, they stayed inside the nest during the entire workday. In some cases it was observed that such animals became more shier during the growing period, and were even afraid to come out.

Inactive state

The inactive state includes behaviours like sleeping, lying awake, sitting and standing. Sleeping was the most common behavioural pattern in both adults and whelps. The

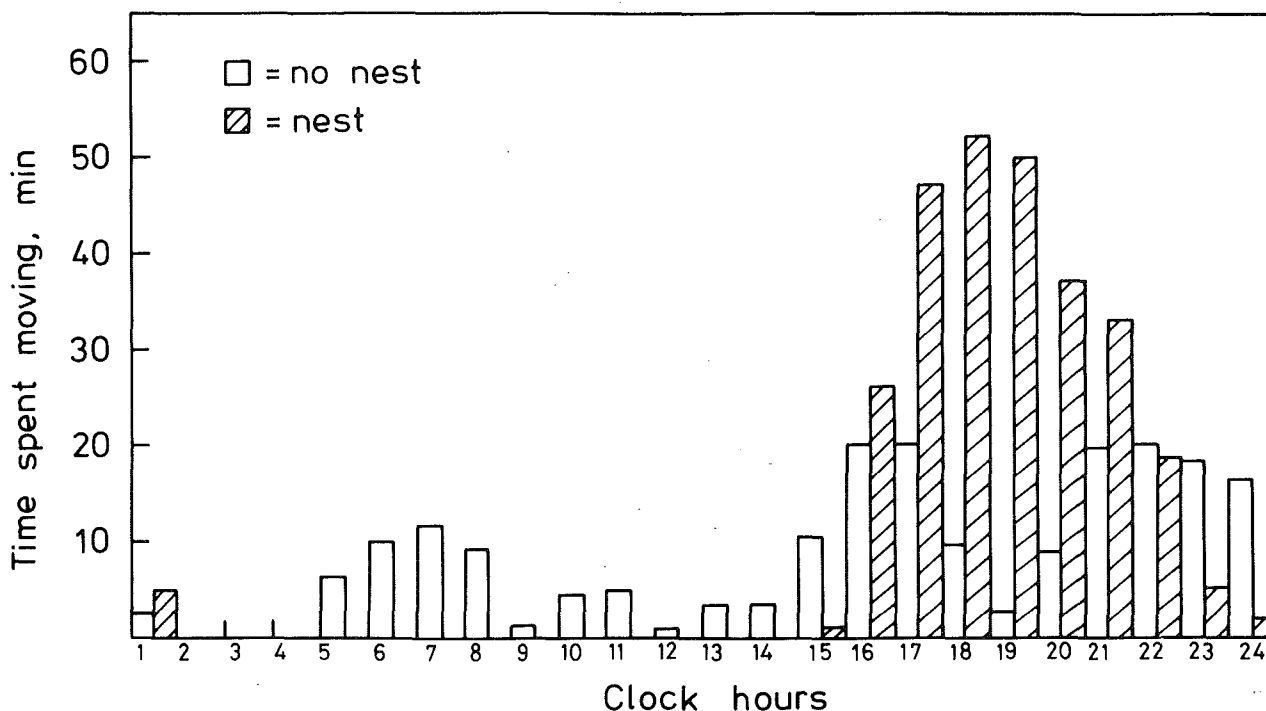


Fig. 3. Distribution of circadian locomotor activity in adult raccoon dogs between February 4 and March 10. Data based on continuous activity chart recordings.

maximum the animals could sleep was over 13 hours, and even the minimum time spent in sleeping was as high as five hours. Total time spent sleeping varied from 66 to 425 minutes in 24 hours.

Total time spent sitting was about two hours during summer but increased significantly ($p < 0.001$) during late autumn. In August-October the animals might sit over 6 hours per 24 hours. Time spent for standing was rather low, from 30 to 180 minutes per day.

When comparing adults and whelps, one can see that adults spent significantly ($p < 0.05$) more time sleeping than whelps. On the other hand, sitting and standing time was about the same for both whelps and adults.

Defecation and urination

Raccoon dogs often deposited their faeces at definite sites, e.g. on the feeding tray, rest-shelf or some other site from where the faeces could not easily fall down through the cage floor. Afterwards, they often ate their faeces.

It was observed that especially in large cages animals tended to deposit their faeces at a definite site (Fig.4). This was the case even when four animals were kept in the same cage; they all used a common dung pile. The sizes of the dung piles in large and small cages are given in Table 3. The size of the dung pile

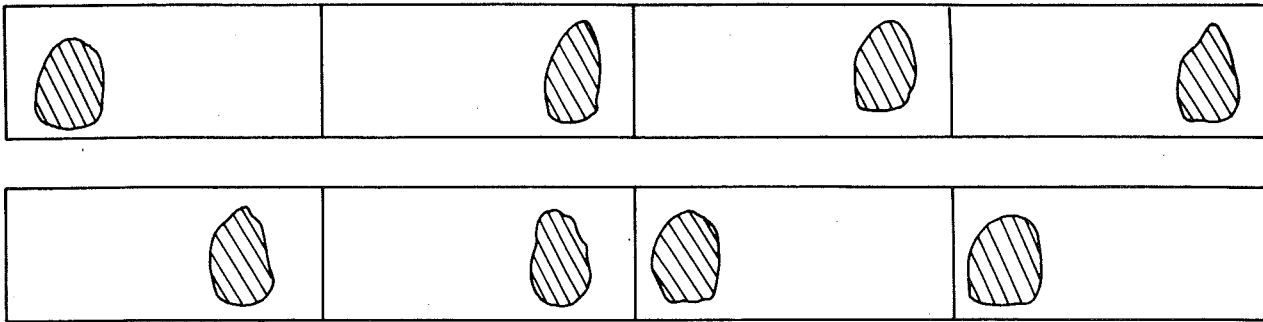
increases, during the course of the rearing period, of course, but the location of the pile was the same all the time.

When sleeping plates were provided for the animals, most of them defecated on the plates regularly. When a nest was provided, some of the animals defecated inside the nest—although there were also those who never did so.

Table 3. The sizes of the dung piles in large and small cages.

VARIABLE MEASURED	LARGE CAGE	SMALL CAGE
AUG 31		
length	51.4 ± 7.1	49.2 ± 6.1
width	40.7 ± 6.3	35.4 ± 6.0
OCT 10		
length	70.0 ± 8.9	65.4 ± 6.5
width	44.3 ± 6.7	37.1 ± 6.1
NOV 11		
length	88.6 ± 8.0	81.6 ± 6.3
width	47.1 ± 6.4	38.8 ± 6.0

Large cages



Normal cages

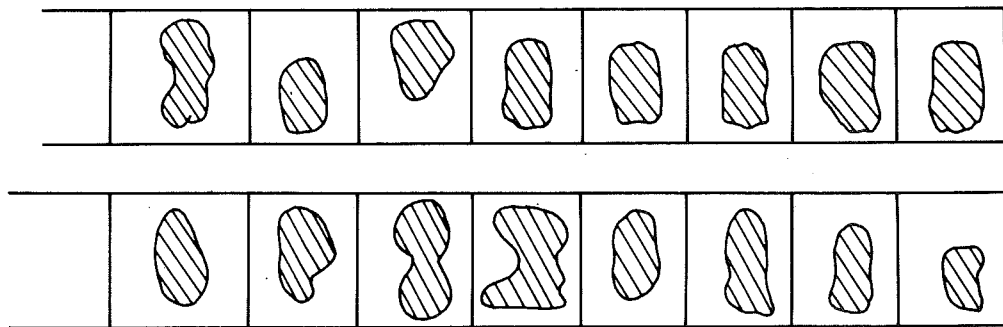


Fig. 4. Location of dung piles under cages. Number of animals per cage in large and small cages was 4 and 2, respectively

When caged in pairs, anal sniffing was evident when the other was defecating. Sniffing of dung piles (inside the cage) was also a common behaviour of the animals.

Animals were observed to urinate on feeding trays, sleeping plates and rest-shelves. Typically raccoon dogs deposited a small quantity of urine at once, often at a particular, definite place. The animals urinated from the squat-raise position. An arch or arch-raise posture was typical for defecation behaviour. Occasionally the defecation posture was prolonged following deposition of the faeces. Total time spent in 24 hours for urination and defecation was only 5-10 minutes (Table 1,2).

Eating and drinking

Eating behaviour was concentrated at the times of feed supply. The animals generally ate all the feed given at once. The animals seemed to know from the farmer's different activities, noises and behaviour, when feeding time was coming. Thus, prior to feeding, they became "restless" and active. They often peeped out, carefully listening and walking around the

cage. Eating itself lasted only 7-24 minutes. When more than one animal was in the same cage, the animals ate the feed ravenously. Competition for feed between partners was typical.

The animals drank significantly ($p < 0.05$) more frequently during summer than during winter (Table 1,2). Typically, the animals licked a small quantity of water all at once, but the water licking behavior itself occurred in some cases surprisingly often, varying 7-18 times per day during summer. During winter, the animals were able to drink only when water was supplied them because it quickly froze. Some snow-eating behaviour was also observed during winter

Other behaviours

Self-grooming behaviour tended to occur more frequently during summer than winter. When self-grooming, the animals generally scratched, pawed or licked their coat. During winter, shaking of their coat was common. Shaking was often aimed at cleaning snow from their coat. Face washing was not a common pattern.

Tabel 4. Locomotor activity of adult raccoon dogs in relation to worktime and light hours. Based on the data presented in Tabel 2.

MONTH	DAY LENGTH (h)	LOCOMOTOR ACTIVITY DURING		
		WORKTIME (%)	LIGHT HOURS (%)	REST (%)
JAN	6.5	4.4	4.4	95.6
FEB	5.0	9.7	11.2	88.8
MAR	9.0	21.5	27.2	72.8
APR	11.0	98.0	99.8	0.2
MAY	14.0	63.0	73.9	26.1
JUN	15.0	62.3	66.9	33.1
JUL	18.5	66.4	70.7	29.3
AUG	17.5	70.4	74.5	25.5
SEP	15.0	34.2	34.7	65.3
OCT	12.0	70.1	89.2	10.9
NOV	11.0	52.5	52.5	47.5
DEC	9.0	60.3	60.3	39.7

Whelps played together more commonly than adults. Aspects of aggressive behaviour was not very common between the animals. Stereotypic movement was observed sometimes, when the animals moved to and fro along the side of the cage. This lasted a maximum of 15-25 minutes per episode.

Discussion

Since the raccoon dog has some characteristic features which are not typical for other members of the family Canidae, these should be taken into consideration when evaluating the activity and behavioural patterns of this species. Originally, the raccoon dog is adapted to a north temperate climate in eastern Asia, but now its range extend into northern part of Finnish Lapland. The raccoon dog is a sedentary animal, and has a smaller range size than that many other omnivorous animals (Ikeda, 1982). The food habitat of this species is characterized by alternate use of the main food in both season and habitat (Ikeda et al., 1979). Since the raccoon dog is not a predator but a food collector (Viro and Mikkola, 1981), it uses a large proportion of its active time in the wild state for foraging behaviour (Ikeda, 1982). Furthermore, the raccoon dog does not establish a continuous area enclosed with definite boundaries and, therefore, there is a high degree of range overlap between different individuals. Moreover, unlike the other canid

species, the raccoon dog is able to survive winter periods by superficially hibernating (wintersleep) in a den (Heptner et al., 1974). This winter lethargy is supported by high amounts of subcutaneous body fat gathered during late summer and autumn periods, and are reflected in changes in behaviour and activity (Ikeda, 1982).

Only few data on the circadian activity of the raccoon dog are available. Ikeda (1982) studied the activity patterns of wild raccoon dogs in Japan by radiotelemetry. The beginning of the activity period varied between animals, but it took place within a few hours around sunset. Although raccoon dogs were mainly nocturnal, changing of the site or moving activity was sometimes observed even in daytime. Most daylight activity observed was slight movement or grooming. Heptner et al., (1974) also mentioned that wild raccoon dogs are active mainly during the dark hours of the day, but could be occasionally seen moving in daylight also. According to Brzozoswki and Kaleta (1985). Farmed raccoon dogs were mainly nocturnal during summer. The distribution of their activity was divided into two main periods: (1) the lack of activity from 1 a.m. to 8 a.m. (usually sleeping) and (2) the active period with a peak between 6 and 11 p.m. (usually sitting or slow moving). However, they only studied three animals for only 72 hours each. Thus, as they also mentioned, the validity of generalizing from such a study is,

to a some extent, questionable.

In the present study, the daily activity pattern of raccoon dogs was different from that observed in the wild state. The animals under farm conditions were not typically nocturnal but their activity rather was distributed throughout the entire 24 hour period with alterations of rest and active periods. According to *Ikeda (1982)* wild raccoon dogs were 68-80% nocturnal whereas our farmed raccoon dogs moved by night only 10-20% of the total 24 h activity. Corresponding differences in activity pattern between farmed and wild animals have also been observed e.g. in the American mink (*Klochkov, 1965; 1966; Gerell, 1969; 1974*) and the polecat (*Bäumler, 1973; Korhonen et al., 1985*). It seems apparent that in captivity circadian activity profiles differ from those of wild animals in a looser relation to environmental conditions. Nocturnal patterns in nature are evidently adaptations to the availability of prey and are also aimed at avoiding possible enemies. Under farm conditions, however, times just before and at feeding often serve as set points for the circadian clocks. Thus it is tempting to conclude that moving itself is not a need of the animals but, of course, in nature they have to move a lot to get food.

In nature, moving constitutes of about half of all behavioural activities during a 24 hour period (*Ikeda, 1982*). This proportion in the raccoon dog is longer than found in many other carnivores. Due to the fact that wild raccoon dogs have to spend most of their daily time foraging, this is not a surprise. Such extended moving periods seem to be necessary for searching and treatment of its small food items (*Viro and Mikkola, 1984*). However, under farm constitutes only 3-4 hours of all daily activities. This is of course, due to the fact that the animals don't have to search for food on farms.

It is also interesting to note that starting and ending of locomotor activity of farmed animals has nothing to do with the time of sunrise or sunset. Animals move every now and then, and each one has its own activity pattern. However, activity of farmed animals has some connection with the farmer's workschedule (Table 4). The fact is that farmers daily activities synchronize the activity pattern of the animals. Especially during summer (Apr-Sep) most of the total activity occurred during worktime. However, it is surprising that during winter the animals were rather inactive just at worktime but moved the rest of the day. As can be seen from Table 4 the relationship

between daylength (light hours) and activity is not clear and partly non-conclusive. However, it seems obvious that right at breeding time (March-April) the activity of the animals is mainly concentrated during daylight hours. This, of course, is reasonable due to the fact that light is a very important stimulus for breeding activities.

It was observed that the use of a nest seemed to decrease activity occurred during worktime. In some cases the animals do not even come out at feeding time. It is obvious that a nest reduces visual disturbances of the animals. On the other hand, especially during breeding time it is not good if animals are inside the dark nest during all light hours because heat may be delayed. In nature, however, raccoon dogs spend most of their winter time wintering in a den (*Heptner et al., 1974*). Winter, particularly in northern latitudes, is a critical period of the year for survival of this cold, non-acclimatized species. Thus this species prepares for wintering by gathering large stores of subcutaneous fat. This preparation increases locomotor activity of wild raccoon dogs during autumn (*Heptner et al., 1974*). Such a conclusion, however, cannot be drawn from the present study. Farmers' observations also support the conclusion that farmed raccoon dogs, as a result of a great amount of late summer and autumn feeding, rather reduce their locomotor activity; they just sit on the cage wire which causes wearing of the buttock fur (*Haverinen, 1986*). A significant increase in sitting behaviour from August onwards was observed in the present study also.

Olfactory communication has a socioecological importance in wild canid species. As *Kleiman (1966)* points out, some canid species tend to use one marking method to the exclusion of others. Generally, the predominant mode of marking is urination but dung piles (also called latrines) also have their own importance. It has been observed that wild raccoon dogs utilize their latrines as an information site which brings about mutual tolerance between individuals (*Ikeda, 1982; 1984*). As the present study showed, raccoon dogs often very eagerly urinated onto latrines also. Thus, latrines seem to have an important function in the social life of captive as well as wild raccoon dogs (*Yamamoto and Hidaka, 1982*). This was further observed when the dung pile inside a raccoon dog's cage was experimentally transferred to another place and the original site was cleaned. After this, defecation took place at the new site which

then became the new latrine. In the present study, we also found that raccoon dogs use latrines under farm conditions. Very important also is the fact that all four animals in the same cage used the same latrine. Ikeda (1982) estimated that several wild raccoon dogs could use the same latrine. He also mentioned that numbers and distributions of latrines may change seasonally in nature. All these observations suggest the conclusion that latrines are very important in the social life of both wild and farmed raccoon dogs. Latrines are mainly information sites which means less avoidance and more cohesion among individuals.

According to Brzozowski and Kaleta (1985), various behaviours were rather scanty for farmed raccoon dogs during summer. They pointed out that except for play jumps there were no observable displays. To some extent this conclusion can be drawn from the present study also. However, it should be noted differences between adults and whelps. Whelps were generally more active than adults and showed various forms of play and game behaviour. Behaviour of adults, on the other hand, is really rather scanty and they have few main activities which they repeat cyclically for days and years. Furthermore, it should be noted that most animals on farms are whelps, and are living there only 8-9 months before pelting. Only a few animals are able to live on farms more than 1-2 years whose the scanty behaviour mainly concerns

Acknowledgements

The author greatly appreciate the valuable assistance of Ms Riita Tirkkonen, Ms Arja Röppänen, Ms Tarja Kananen, Ms Heini Kurki, Mr Mikko Ikäheimo and Mr Jari Raihia. The language of the manuscript was kindly checked by Dr Daniel Williams. Financial support for this investigation was provided by the Finnish Reserach Council for Natural Sciences, the Alfred Kordelin Foundation, the Finnish Cultural Foundation and the Oskar Öflund Foundation.

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Is it possible to speed up the development of the winter coat?*Valtonen, M., Blomstedt, L., Polonen, I.*

Melatonin implantation, carried out at the beginning of July in mink and foxes in Finland, induced early peltmaturity. For 91 treated adult Scan Brown and Scan Black mink female, date of pelting was 15 Oct. and 20-27 Oct. resp. vs. 27 Nov. and 3 Dec. for 95 untreated controls. There were only minor differences between the groups in pelt length and quality. For young Scan Black treated male and female (40 per group), date of pelting was 28 Oct. vs. 3 Dec. for 40 controls, but pelt quality was better in the latter than in the former. 20 Blue Frost and 49 Golden Island foxes, given melatonin implants, were pelted from 13 Nov. to 2 Dec. and on 1 Nov. resp. vs. 2 Dec. and 11 Nov. for untreated controls. Pelt quality was significantly better in controls than in treated foxes, but there were no significant differences between the groups in pelt length.

Finsk Pålstidskrift: 21(4):223-226, 1987
2 figs.
In SWED.

*CAB - abstract***Biological effects of epidermal growth factor and 2, 3, 7, 8 - tetrachlorodibenzo-p-dioxin on development parameters of neonatal mink¹***Aulerich, R.J.; Bursian, S.J. & Napolitano, A.C.*

Newborn mink (*Mustela vison*) kits were administered 0.1 mg 2, 3, 7, 8 - tetrachlorodibenzo-p-dioxin (TCDD)/kg body weight, 1 mg TCDD/kg body weight, 10 mg epidermal growth factor (EGF)/kg body weight, or 50 mg EGF/kg body weight by intraperitoneal (i.p.) injection (10 ml/kg body weight) for 12 consecutive days to compare the effects of TCDD and EGF on body weight gains, time of eyelid opening, tooth eruption, and pelage development. A 1:9 acetone-corn oil mixture and 0.85 NaCl served as vehicle controls for the TCDD and EGF groups, respectively. Mortality exceeded 50% at the higher doses of both TCDD and EGF, while at the lower doses, TCDD and EGF resulted in significant reduction of body weight gains. Additionally, EGF

caused a significant decrease in the time of eyelid opening and retarded growth and development of the fur of the treated kits. TCDD had no discernible effects on the time of eyelid opening or hair growth. The time of tooth eruption was not significantly affected by either compound.

Arch. Environ. Contam. Toxicol. 17, 27-31 (1988)
2 tables, 1 fig., 18 references.

*Authors abstract***Production control***Sauna-Aho, R.*

Data obtained in 1986 on 71000 breeding mink, 31000 foxes and 400 raccoon dogs in Finland were analysed. Monthly mortality was 0.3% for fox males, 0.5% for fox females and 0.6% for fox cubs, and 0.4, 0.8 and 0.6% for mink males, females and kits resp. Daily feed consumption per animal averaged 186 g for mink, 485 g for blue foxes, 388 g for silver foxes and 403 g for raccoon dogs, and the amount of feed consumed per pelt produced at 9 farms averaged 56.2 and 127 kg for mink and blue foxes resp. The number of young produced per mated female averaged 4.11 for mink and 6.28 for blue foxes.

Finsk Pålstidskrift: 21(4): 218-221, 1987
5 tables
In SWED.

*CAB - abstract***Research into the spatio-temporal system of the free ranging stone martens (*Martes foina* ERXLEBEN, 1777).***Skirnisson, K.*

This work attempts to give insights into the life habits of free ranging stone martens (*Martes foina*), in particular into their spatio-temporal system.

Seven adult and 3 juvenile animals (5 females, 5 males) living in different habitats (two different villages and an uninhabited mixed forest/field area) were fitted out with radio transmitters. Both implants and collars

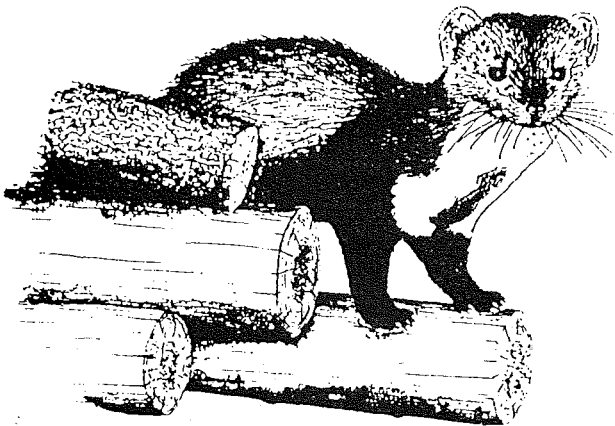
BEITRÄGE ZUR WILDBIOLOGIE · HEFT 6



Wissenschaftliche Schriftenreihe,
herausgegeben vom
Landesjagdverband Schleswig-Holstein

Untersuchungen
ZUM RAUM-ZEIT-SYSTEM
FREILEBENDER STEINMARDER
(*Martes foina* ERXLEBEN, 1777)

KARL SKIRNISSON



M + K Hansa Verlag
Hamburg

were used. The total transmission time of the transmitters amounted to 1.246 days, a period during which the animals were continuously tracked for 388 complete nights.

The following results were obtained:

1. The food habits of the martens tracked in the forest/field area and in the two villages showed remarkable differences which are primarily to be attributed to varying availability of food.

The omnivorous martens proved to be generalists as well as opportunists as regards their feeding habits, usually taking the easiest available food. A total of about 100 different prey items serving as food were identified. They varied in importance, however, for the most part depending on the season.

2. The stone martens occupied relatively stable home ranges with constant borders for long period of time; generally over the year. In the same habitat males were found to live in larger home ranges than females, a female occupying only about 60% of a male home range.

Home ranges in the villages were smaller than those in the mixed forest/field area. In the course of the year the home range size of an adult reproducing female living in a village varied from 63 to 111 hectares while an adult female living in the mixed forest field area occupied an area of 131 to 225 hectares. By shifting from the forest/field area into a village an adult male reduced his home range from 292 to 20 hectares.

3. Two cases of home range shifts were observed. In both cases the initial area was gradually left within 4 to 5 days and an adjacent area occupied.

4. Spacing patterns and social organisation was characterised by the complete overlapping of the ranges of a female and a male (fig. 13). In all likelihood the home ranges of males and females were of exclusive use the year round; males being territorial against males, females against females (intersexual territoriality). Marking behaviour through anal drag was observed, exclusively in late spring and summer.

Males and females used the same hiding places in the daytime only in two periods: during rutting in late spring and summer and in January and February. In these cases the male was visited by the female. Females were able to expel males from their hiding places.

5. On the whole, males covered at night about twice the distance covered by females, and at nearly twice the speed.

6. The martens used total area of their home ranges. The distribution of trails within the home ranges were quite regular. Concentrations were found near those dens used in the daytime, at places with a high food supply, and by males at certain border areas.

7. The stone martens tracked, used different habitats such as mixed forest/field, hedgerows-/field, village/field and village areas. Polymorphic habitat types offering cover were preferred to open areas.

8. As hiding places in the daytime, the stone martens frequented buildings (lofts and barns) in villages, while in the forest/field area either natural hiding places (root systems, trees, bushes, dens in hedgewalls) or those created by man (piles of wood or schrubwood, drain pipes, root walls) were used.

the first hour after sunrise in May, June and July. In the rearing period, the female and the 3 young stone martens became active during the day.

In months with a period of darkness of more than 9 hours (August to April) 1 to 4 breaks during nocturnal activity were observed.

11. The smaller size of home ranges and less activity of village animals in comparison to martens living in the forest/field area were especially related to a more abundant and constant food supply in villages. In autumn and winter it was also related to a different loss of energy due to the exposure to cold air at the different resting sites used in villages and in field areas.

Beiträge zur Wildbiologie, Heft 6, pp. 200
17 tabels, 48 fig., 26 photos, 112 references
In GERM Su. ENGL

Authors summary

Experiences with implantation of transmitters in beech marten living in the wild

Skirnisson, K. & Feddersen, D.

In this paper a report is given about experiences with implants and collars used in a free range study on beech marten (*Martes foina*) in northern Germany. Altogether, we implanted surgically an implant weighing 22.6 to 30.2 g into the intraperitoneal cavity of a total of nine beech martens. The weight of the implant amounted to between 1.4 and 2.8 % of the body weight. Five beech martens were fitted out with a collar.

Each operation was performed in a laboratory. Normally, the animals were released within 2 to 8 hours after narcosis. One animal died after the operation when the sutures tore loose.

All implants used worked without malfunction but none of the collars transmitted the stated time as declared by the manufactures. In three out of five cases the collars failed completely after a short transmitting time. On average, an implant provided much more data in this project than a collar. A reduced activity was observed in the first two nights after the operation for implantation. After that, the behaviour of the beech marten could be characterized as normal. A female with an implant in the intraperitoneal cavity gave birth

to three kits, which were brought up until their dispersion.

Z. Jagdwiss. 30 (1984), 228-235
1 tabel, 17 references
In GERM, Su. GERM, ENGL, FREN

Authors summary

Fur farming in Kashmir A report prepared for the Government of India

Cochrane, R.L., FAO Consultant

The fur trade is one of the major sources of employment and income in the town of Srinagar. There are 30.000 to 60.000 individuals in the Kashmir area who are dependent on the fur trade for source of income, not to mention the income for the town of Srinagar, state of Kashmir and country of India derive from industries that support the fur trade, such as supplies of raw materials and services dealing with shipping, selling and advertisement. In addition the availability of traditional Kashmiri furs adds to the tourism appeal of Kashmir, and Srinagar in particular. This trade is a very old and traditional vocation of the area and dates back over 200 years or more. As one furrier put it, it is the world's second oldest profession which dates back to the time that Adam and Eve began clothing themselves after being driven from the Garden of Eden. Not only is fur trading an old and traditional profession, it is also one of the most highly developed skills in Kashmir in terms of difficulty and intricacy of the skill and degree of sophistication (Gunther lang, West German fur exporter - personal communication).

The major species of mammal used in the fur trade of Kashmir in the past were the wild cats, such as the snow leopard (*Panthera uncia*), cheetah (*Acinonyx jubatus*), tiger (*Panthera tigris*), leopard (*Panthera pardus*), clouded leopard (*Neofelis nebulosa*), golden cat (*Felis temmincki*), caracal (*Felis caracal*), leopard cat (*Felis marmorata*), rusty spotted cat (*Felis rubiginosa*), marbled cat (*Felis marmorata*), fishing cat (*Felis viverrina*), Lynx (*Felix lynx*), Palla's cat (*Felis manul*), jungle-cat (*Felis chaus*), and desert cat (*Felix libyia*); the martens, both stone marten (*Martes foina*) and Himalayan yellowthroated marten (*Martes flavigula*); the otters, common otter (*Lutra lutra*), smooth otter (*Lutra perspicillata*) and

clawless otter (*Aonyx cinerea*); three sub-species of the red fox, hill fox (*Vulpes vulpes montana*), desert fox (*Vulpes vulpes griffithi*) and whitefooted desert fox (*Vulpes vulpes pusilla*); the Indian fox (*Vulpes bengalensis*), the wolf (*Canis lupus*); the jackal (*Canis aureus*); and the civet cats, large Indian civet (*Viverra zibetha*), small Indian civet (*Viverricula indica*), common palm civet (*Paradoxurus hermaphroditus*) and the Himalayan palm civet (*Paguma larvata*). With the increase in human and domestic animal populations intensifying the competition with wildlife for habitat and the unmanaged harvesting of fur animals depleting the populations of these species, many wild species have become extremely rare and, in fact, one mammal (the cheetah) has completely disappeared from India. All of the cats that were major items in the Kashmir fur trade, except the jungle cat and the desert cat are now listed as endangered species. In addition the common otter and wolf are also listed as endangered species.

In 1972 The Indian government attempted to stop the decimation of wildlife by instituting the Wild Life (Protection) Act. This act set up the government organisation for preserving wildlife, controlling harvesting of wildlife and managing the exporting of wild fauna and flora, or the parts thereof. The State Government of Jammu and Kashmir followed the Indian Central Government's lead and put into place the Jammu and Kashmir Wild Life (Protection) Act of 1978, which was patterned after, and is almost identical to the Indian Government Wild Life Act of 1972. The Indian Central Government signed the accord of the Convention on international Trade in Endangered Species and this went into effect on 18 October 1976. In 1979 the Indian Central Government placed a total ban on the export of wild animal furs. Wide spread objections to this total ban on the export of fur articles was raised by the fur dealers of Kashmir, since they claimed to have large inventories of wild furs stock piled and needed time to dispose of these inventories. For this reason the fur dealers were requested to supply the Central Government with a list of their inventories and a moratorium was declared on the ban on export of jackal, jungle cat, desert cat, civet cat, hill fox, red fox (desert fox) and common (Indian) fox from 1981 through 1984. During this moratorium records were kept on the types and numbers of fur articles exported. By 1984, it became apparent from these records that the number of pelts

exported exceeded the inventory that the fur dealers had in stock in 1979. Because of this, a complete ban on the export of wild furs was again put in place in 1985.

A three and half month study was made into the feasibility of establishing a fur farm in Kashmir. This study was made because the banning of the export of wild fur put an end to the means of livelihood for 30,000 to 60,000 people. Thirty two days were spent in Srinagar and another ten days were spent in Ladakh to look into the situation. Over fifty fur dealers were visited and consulted. In addition to this 49 individuals were consulted concerning the fur business and/or allied matters during the 97 day stay in India. The study concludes, without a doubt, that extreme hardship does in fact exist in the fur trading community of Srinagar. A number of methods for relieving this hardship were considered. It was concluded that the three most promising solutions to the economic depression experienced in the fur community are:

1. to begin the intensive rearing of Persian and broadtail lambs in Kashmir, Ladakh and Rajasthan.
2. to begin a farm to raise hill foxes and ferrets (Tibetan polecats) in captivity, and
3. to manage the wild populations of fur animals so that a closely supervised harvesting programme could be carried out.

The farming of foxes and ferrets in captivity was outlined as to methods and equipment. A farm was designed and cost estimates were made. The most difficult problem to solve in establishing a fur farm is the procurement of meat for carnivore diets. A scheme for resolving this problem was presented. The farm is definitely a viable project from the economic stand point, except for the extremely high estimate on capital expenditures to build the physical plant of the farm. These estimates are probably exaggerated. More study needs to go into reducing the cost for building the physical plant. It is believed that the physical plant can be built for one half to one quarter of the estimated cost. *It is urgent that this problem be resolved immediately and that a farm be set up within a year and a half.* Preferably the farm should be run by the private sector.

Establishment of the Wildlife Institute of India UNDP/FAO Project IND/82/003, pp. 96. 9 tables, 16 fig., 4 references.

Thymus involution in mink fetuses (*Mustela vison*)

Goscicka, D., Glinska, B.

30 mink fetuses were examined. We have divided them into 5 compartments and we have found that the thymus begins its involution during the prenatal life by the division of the gland and its adipose degeneration.

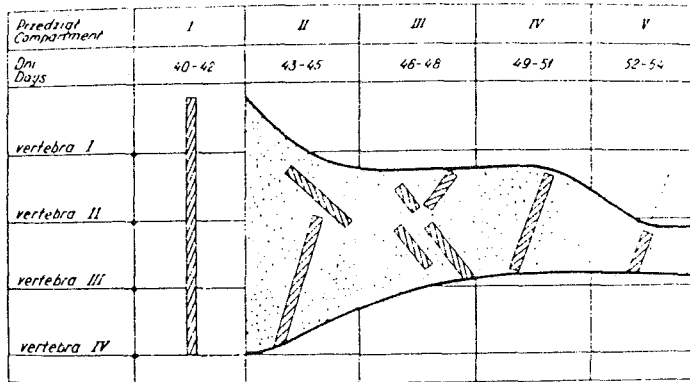


Fig. 7. The involution of the thymus in the mink fetuses between 40 and 54 days of the prenatal life: comp. I — the thymus (oblong) in one part, comp. II — the thymus bipartite, comp. III — the thymus tetrapartite, comp. IV — the thymus rudimentary (in one lobe), comp. V — fatty degeneration of the thymus

Polskie Archiwum Weterynaryjne: 25(4): 117-119, 1986.

7 fig., 8 references.

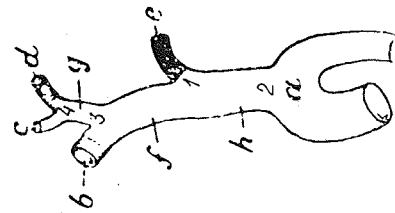
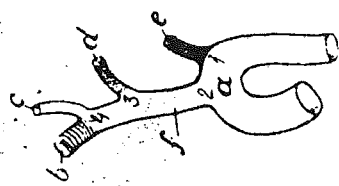
In *POLH Su. ENGL, RUSS, POLH.*

Authors summary

Brachiocephalic trunc in mink (*Mustela vison*)

Goscicka, D., Glinska, B.

Resorting to anatomical and radiological methods we have examined the configuration and the sclerotomy of the brachiocephalic artery in one hundred adult minks. We have found two variations of the artery: type -M- and type -P-. Both types project on the vertebral segment enclosed between the 4 and 1 thoracic vertebra.



Polskie Archiwum Weterynaryjne: 25(4): 101-109, 1986.

3 tabels, 4 fig., 13 references.

In *POLH Su. ENGL, RUSS, POLH.*

Authors summary

A study of the duodenal glands of the mink

Takehana, K., Abe, M.

The site, distribution, cell formation and glycoproteins of the duodenal glands of the mink by means of light- and electron-microscopic methods were observed.

The results are summarized as follows.

1. The duodenal glands were located from the pyloric region to about 0.5 cm in a caudal direction and were in constant distribution.

2. The acinous cells of the duodenal glands of the mink consisted of mucous cells. The acinous cells contained neutral and acidic glycoproteins.

3. By Po-lectin-DAB reactions, neutral glycoproteins contained α -D-glucose, α -D-mannose, α -fucose, N-acetyl- α -D-galactosamine, N-acetyl-D-glucosamine, galactose and D-galactose, and acidic ones contained sialic acid.

Journal of the College of Dairying, Natural Science (Japan). (Oct. 1985). V. 11(1) p. 179-186.

2 tabels, 14 fig., 26 references.

In *JAPN Su. ENGL.*

Authors summary

Ultrastructure and stereology of leukocytes and platelets of normal foxes and a fox with a Chediak-Higashi-like syndrome

Fageland, J.A.; Hagemoser, W.A. & Ireland W.P.

Peripheral blood leukocytes and platelets from five normal foxes (*Vulpes vulpes*) and a fox

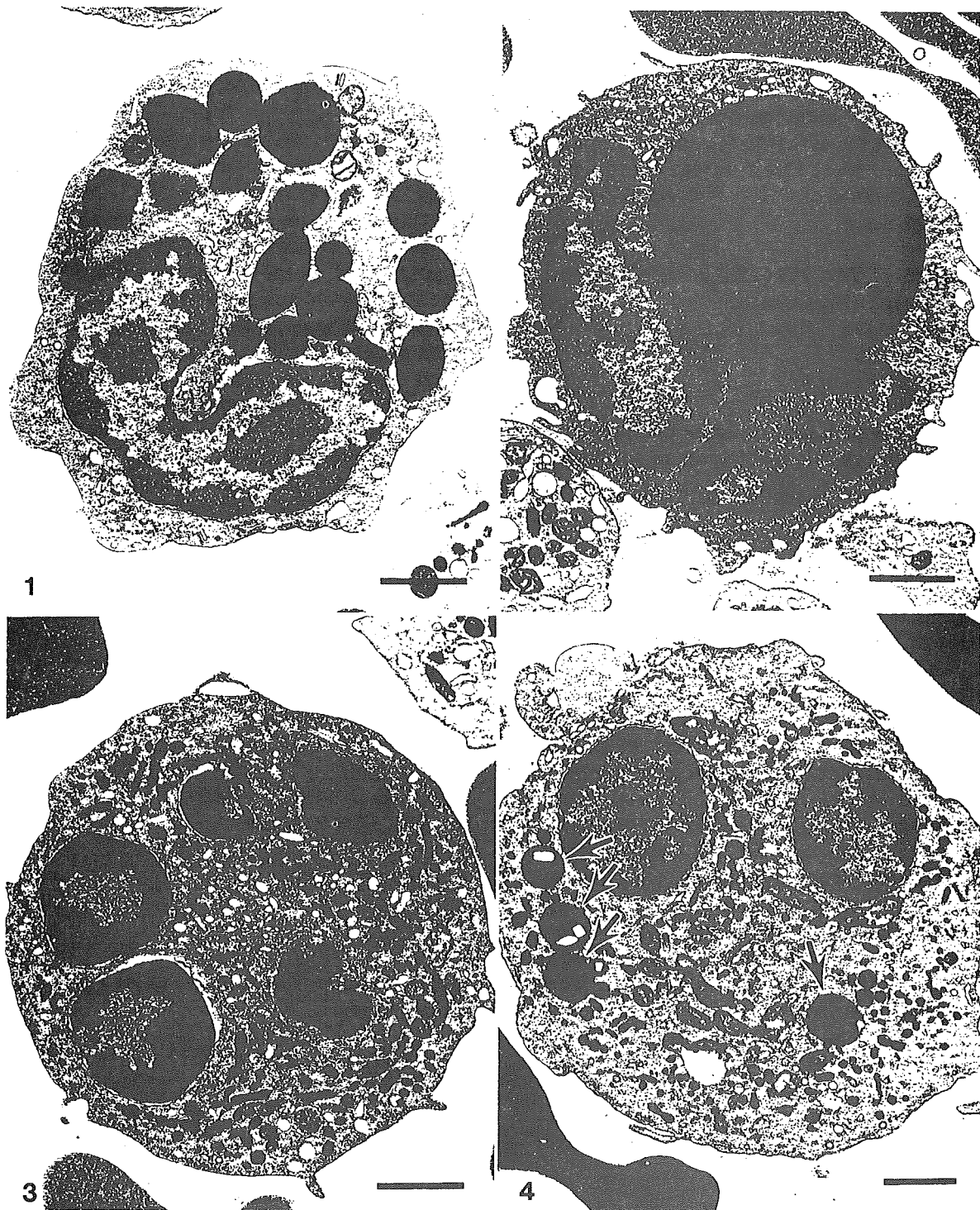


Fig. 1. Eosinophil, normal fox. Bar = 1 μ m.
 Fig. 2. Eosinophil containing a single abnormal granule, affected fox. Bar = 1 μ m.
 Fig. 3. Neutrophil, normal fox. Bar = 1 μ m.
 Fig. 4. Neutrophil from affected fox. Enlarged granules (arrows). Bar = 1 μ m.

with phenotypical characteristics of Chediak-Higashi syndrome (CHS) were examined by electron microscopy. Lymphocytes, monocytes, neutrophils, eosinophils, and platelets from the affected fox contained giant membranebound

granules that resembled lysosomes. In eosinophils and neutrophils from the affected fox and a normal fox, relative cell volume occupied by granules and number of granules per unit area were calculated. Relative cell volume occupied

by granules was the same in both foxes, but there were significantly fewer granules per unit area in the affected fox. This result is consistent with the idea that the giant granules arose from fusion of pre-existing, normal-sized granules, as occurs in CHS. In platelets from the affected fox, no osmiophilic granules were seen. Our findings agree with those from studies of CHS-affected blood cells in other species.

Vet. Pathol. 24:164-169 (1987)

1 tabel, 10 fig., 29 references

Authors abstract

Changeability of haemogramme components in hybrids of the skunk and ferrets in postnatal period.

Szymeczko, R. & Bieguszewski, H.

The objective of the experiments was to study variations in the haemogramme components in hybrids of the skunk and ferrets of various age. The number of red blood cells, erythroblasts and reticulocyte content, erythrogramme, the mean erythrocyte diameter, HB and haematocrite value, osmotic resistance and the red blood cells sedimentation rate were determined in 182 skunk and ferrets. The following red blood cells indices were calculated: MCV, MCH and MCHC. Physiological blood anaemia was ascertained, which was manifested by a characteristic quantity and quality "break down" in the red blood cells picture. Postnatal anaemia was accompanied by intensive erythroblastic system activity. This anemia characterized by an increased amount of erythroblasts and reticulocytes in peripheral blood and by the lowest with the narrowest osmotic resistance scope. The rate of the red blood cells sedimentation was the highest in the skunk and ferrets in the first two months of postnatal life.

Medycyna Weterynaryjna (Poland). (1986). v. 42(7) p. 436-439.

2 tabels, 1. fig., 39 references

In POLH Su ENGL, RUSS

Authors summary

Mercury levels in Ontario mink and otter relative to food levels and environmental acidification

Wren, C. D., Stokes, P. M. and Fisher, K. L.

Tissue mercury levels were determined in 94 mink and 84 otter collected from five study areas in Ontario during the 1983-1984 and 1984-1985 trapping seasons. The level of Hg in tissues of both mink and otter followed the order of liver, kidney > muscle > brain. There was no observed relationship between age, sex, or selenium content and tissue Hg levels in mink or otter within a study area. Tissue Hg levels in mink and otter were significantly different among locations. For example, the mean Hg concentrations in mink liver from the English River, Turkey Lakes, Muskoka, Sudbury, and Cambridge areas were 2.55, 2.36, 2.17, 0.56 and 0.14 g/g, respectively. Mercury levels in fish and crayfish from the study areas followed a similar pattern. Mink and otters are, therefore, sensitive bioindicators of environmental Hg levels. The results contradict the general hypothesis of elevated Hg levels in biota from acid-stressed ecosystems, and suggest that environmental variables other than pH play a major role in governing biotic metal levels.

Can. J. Zool. 64: 2854-2859.

4 tabels, 37 references.

Authors summary

Dental problems in rabbits, guinea pigs and chinchillas

I. Westerhof and J. T. Lumeij

Results of diagnosis, treatment and follow up of 14 rabbits, 11 guinea pigs and 2 chinchillas with dental problems are discussed.

Seven rabbits had mandibular prognatism and 11 out of 14 had cheek teeth problems. In 6 rabbits dental problems were complicated by abscesses. In general the prognosis for rabbits with dental problems is good after treatment. Regular trimming of affected teeth with the right equipment however is necessary. Seven guinea pigs had cheek teeth problems and 3 guinea pigs had incisor problems. Mandibular prognatism was not seen in this species. In one animal showing signs of pruritus, anorexia

was caused by accumulation of hair in the gingival sulci. In most guinea pigs with cheek teeth problems treatment came too late. They probably died of ketosis.

Chinchillas showed loss of appetite and wetting around the mouth caused by cheek teeth problems. They recovered after treatment and needed regular trimming of their teeth. If rabbits are presented with a diminished appetite or salivation examination of the oral cavity after sedating the animals is indicated using a good light source and specialized equipment.

To improve the prognosis in guinea pigs with diminished appetite or anorexia due to cheek teeth problems it is suggested that initial emergency treatment should consist of force feeding and treatment with corticosteroids and vitamin C before the animals are sedated for oral inspection.

Tijdschrift voor Diergeneeskunde: 112(Supl. 1): 68-108, 1987.
3 tables, 5 references.
In ENGL.

Authors summary

IgG status of mink of different coat colours with Aleutian disease

*T. I. Kochlashvili, A. V. Taranin,
I. I. Fomicheva and O. K. Baranov*

A quantitative and qualitative analysis of IgG composition in minks of three different colours (topaz, sapphire and standard) from 2 populations infected with viral plasmacytosis was performed. It was established that serum IgG quantity is directly proportional to the degree of pathomorphological changes. There is a shift of relative subpopulation concentrations of both heavy and light IgG chains, which is indicative of a selective proliferation of certain combinations of alpha-lymphocyte clones. No electrophoretically homogenous IgG

was found in serum of diseased minks, its presence would have indicated to the monoclonal nature of hypergammaglobulinemia under Aleutian disease. No significant differences in the quantitative and qualitative characteristics between diseased minks of three colours under study were found.

Sel'skokhozyaistvennaya Biologiya: (No.) 3:58-64, 1987
2 tables, 3 fig., 24 references
In RUSS Su ENGL

Authors summary

Meat yield and quality in nutrias

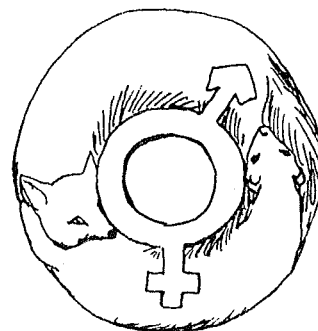
*Niedzwiadek, S.; Kowalski, J.; Palimaka-Rapacz,
G. & Piatek, B.*

A research was conducted on 240 nutrias of Greenland variety, divided into 4 groups (I-IV) according to body weight before slaughter that ranged, respectively, 3.00-3.99, 4.00-4.99, 5.00-5.99 and 6.00-6.99 kg. Post-slaughter examination indicated that carcasses and eatable part weights were increased at higher body weight before slaughter. Dressing percentage ranged from 52.2 to 55.7%. The contents of meat, bones and fat in nutria carcasses ranged, respectively, 63.2-70.0, 10.3-12.0 and 7.2-13.5%. A high quality of nutria meat was proved by chemical analyses. During a taste panel evaluation, it was scored at the level of veal (9.9 points). The results indicate that besides valuable fur, nutrias can be a source of sizeable quantities of highly nutritive and tasty meat.

Rocz. Nauk. Zoot. T. 13, z. 1 (1986) 319-334
8 tables, 14 references
In POLH, Su. ENGL

Authors summary

Genetics



The Polish Pastel fox - a brown silver fox mutation

Einarsson, E. J., Nes, N.

Insemination of 3 Polish Pastel silver fox female (imported into Norway in 1984) with semen from a Colicott male resulted in 10 cubs from 2 of the female, of which 7 survived. At birth, all the cubs had a slightly paler coat colour than normal silver foxes, and in Oct. their coat colour had a hint of brown. It was concluded that the genes for Pastel and Colicott are not identical, and that the crossbred cubs were carriers for the silver fox, Pastel and Colicott genes. Further crossbreeding experiments involving the crossbred cubs will be carried out soon.

Norsk Pelsdyrblad: 61(4): 6-7, 1987
6 photos, 2 references.
In NORG.

CAB - abstract

The study of mink Hydrocephalus

Hong Long

Mink hydrocephalus is a hereditary disease. Based on the results of investigation and its symptom description, the number and properties of the determinant genes of this disease have been ascertained. The rate of diseased minks by this disease found in the mink farms so far been investigated has also been figured out (1.2%). Finally, based on the genetic

information and knowledge, the ways and means of eliminating this determinant disease have also been discussed.

Journal of Shanghai Agricultural College (China).; 1985; v. 3(2) p. 123-126.;
2 tabels, 2 references.
In CHIN, Su. CHIN, ENGL.

Authors summary

Peptidases A, B, C, D and S in the American mink: polymorphism and chromosome localization

Mullakandov, M.R.; Gradov, A.A.; Zaki jan, S.M.;
Rubtsov, N.B. & Serov, O.L.

An electrophoretic analysis of peptidases was carried out in a population of American mink. Based on substrate and tissue specificities, as well as subunit composition, homologies were established between mink peptidases A, B, C, D and S and human peptidases. Polymorphism for peptidases B and D was demonstrated for minks of three coat colour types. Breeding data indicated that the peptidase variations are under the control of allele pairs at distinct autosomal loci designated as PEPB and PEPD respectively. Using a panel of American mink-Chinese hamster hybrid clones, the gene for PEPB was assigned to mink chromosome 9.

Theor Appl Genet (1986) 73:272-277
4 tabels, 4 fig., 41 references

Authors summary

Reproduction

Diurnal variations of plasma melatonin concentrations in pregnant or pseudopregnant mink (*Mustela vison*) maintained under different photoperiods

Ravault, J.P.; Martinet, L.; Bonnefond, C.; Claustrat, B. & Brun, J.

Removal of the superior cervical ganglia suppresses the inhibitory role of short days in prolactin and luteal activity in pregnant or pseudopregnant mink. Alternatively, timed injections of melatonin replicate the inhibitory role of short days in females maintained under long days. To understand if the diurnal variation of melatonin secretion is part of the mechanism by which the mink measure day length, diurnal variations in plasma melatonin concentrations have been measured in intact

and ganglionectomized females maintained under long or short days after mating. Melatonin was measured by radioimmunoassay according to Brun et al. (*Adv. Biosci.* 53:41-45). In intact females, plasma concentrations ranged from nondetectable levels to 40 pg/ml during the day, increased shortly after the onset of the dark phase, and reached peak values during the middle of the night. The duration of the elevated levels was roughly proportional to the length of the night. No diurnal variations could be detected in ganglionectomized females; melatonin levels never exceeded the days values observed in intact females.

Journal of Pineal Research 3:365-373 (1986)
2 tables, 3 fig., 21 references

Authors summary

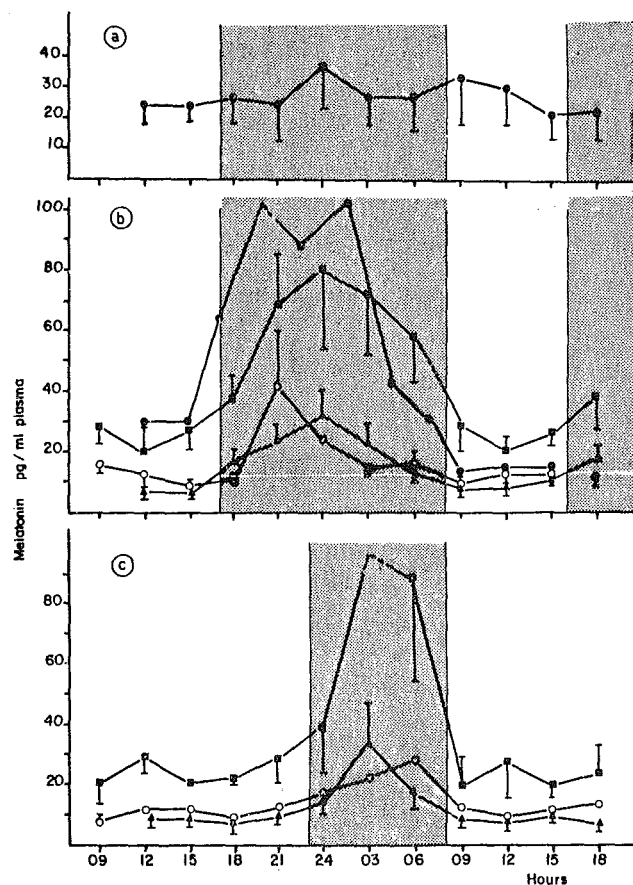


Fig. 2. Diurnal variations in plasma melatonin concentrations (mean \pm SEM) in ganglionectomized (a) or intact (b,c) mink maintained under short (b) or long (c) days at four different periods after mating (1 (O), 21-22 March; 2 (Δ), 3-4 April; 3 (\blacksquare), 17-18 April; 4 (\bullet), 14-15 May). The shaded areas are the dark periods.

The effect of polygamy of male mink on the fertility of females*Drysl, O.*

Data were obtained on 610 females mated in 1983 and 728 mated in 1984. In the 2 yr, litter size per housed female averaged 3.93 and 2.89 resp., the largest litters (averaging 4.24 and 3.3 in the 2 yr) being sired by males mating with 2 females in the 1st yr and with 3 females in the 2nd yr. When only whelping females were considered, litter size averaged 4.76 and 4.0 in the 2 yr., the largest litters (5.83 and 4.61) being sired by males mating with 2 females in the 1st yr and with 1 female in the 2nd. In the 1st yr, for 231 females mated with males mating with more than or equal to 5 females and 379 females mated with males mating with 1-4 females, the percentage whelping was 71.6 and 72.4. It was concluded that neither the degree of polygamy nor the mating ability of males had a significant effect on the fertility of females whelping rate or litter size.

*Chovatel: 25(5):114-115, 1986**3 tabs**In CZEC**CAB - abstract***Insemination of foxes in 1986-87***Forsberg, M.*

In 1986 in Sweden, 2400 fox females representing 15% of the total population of breeding females, were inseminated. Of the inseminated females, 88% were blue foxes, and of these, 87.5% were inseminated with silver fox or red fox semen. The overall CR was 69%, and ranged from 50 to 90% at different farms. Litter size averaged 7.8 and 3.1 resp. per blue fox and silver fox female inseminated with semen from their own species and 5.2 per female inseminated with semen from a different species. Litter size at birth averaged 8.9, 4.3 and 6.5 resp. for females in the 3 groups.

*Våra pälsdjur: 58(3):100, 1987**In SWED**CAB - abstract***Breeding statistics (Chinchilla)***Anonymous*

The performance of 3512 breeding chinchillas in Denmark were recorded in 1986. The percentage of infertile females was 15.91, and that of females mated more than once was 22.02. The number of young born and weaned per mated female averaged 2.78 and 2.14 resp., and litter size when the offspring were aged 6 months was 2.08. total kit mortality was 25.07%

*Våra Pälsdjur: 58(4):162, 1987**3 tabs**In SWED**CAB - abstract***Serum testosterone levels in male mink prior to, during and after the breeding season and their fertility***Christiansen, I.J.; Mitchell, T.C. & Koefoed-Johnsen, H.H.*

Serum from 28 mink housed at the same farm was analyzed for testosterone content prior to, during and after the breeding season 1985 to investigate, whether there is a connection between the testosterone level, the time for maximum content of testosterone and the fertility. The serum levels of testosterone are shown in Tables 1 and 2 and in Fig. 1A and B. The breeding results are tabulated in Tables 3 and 4. No relation was found between the breeding results and the testosterone levels (Tables 5, 6, 7 and 8). Furthermore there was no connection between the level of serum testosterone just prior to the breeding season and the fertility of the male mink expressed by the breeding result.

*Årsberetning. Kongelige Veterinær- og landbohøjskole. Institut for Sterilitetsforskning (Denmark) (1986). (No. 29) p. 20-31**9 tabs, 2 fig., 5 references**In DANH Su ENGLH, DANH**Authors summary*

Hormone profiles and fertility in pastel- and standard male mink

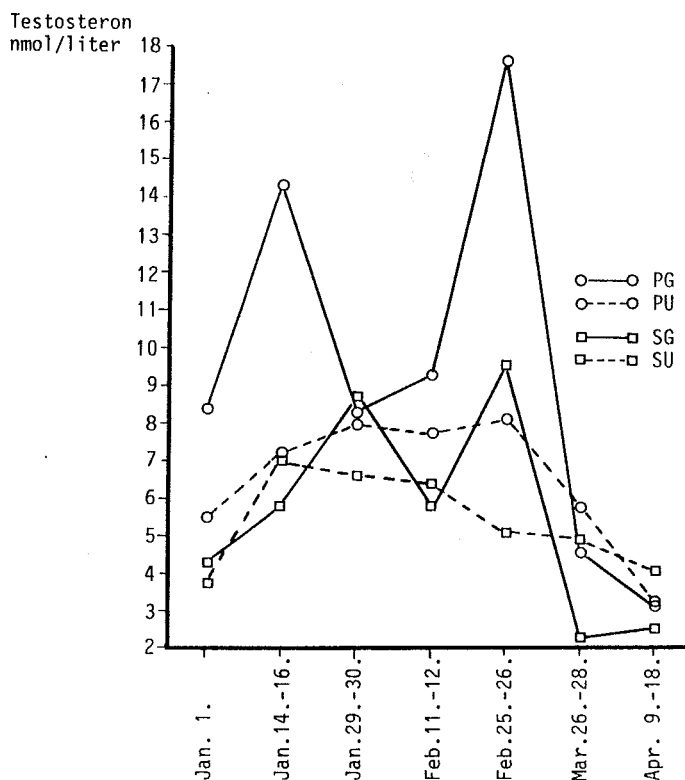
Mitchell, T.C.; Clausen, T., Christiansen, I.J. & Koefoed-Johansen, H.H.

Serum testosterone levels in 1- and 2-year old male mink of the types pastel and standard were determined prior to, during and after the breeding season 1985.

The breeding results are tabulated in Tables 1-4. The serum levels of testosterone

are shown in Table 5 and figure 1. The highest level of testosterone was found in serum from pastel mink, but there was in neither type of mink found any relation between the breeding results and the testosterone levels.

*Årsberetning. Kongelige Veterinær- og Landbohøjskole. Institut for Sterilitetsforskning (Denmark) (1986). (No 29) p. 12-19
5 tabels, 1 fig., 5 references
In DANH Su ENGL*



Figur 1. Grafisk fremstilling af serumtestosteronindholdet hos unge og gamle hanmink af typerne pastel og standard. (Diagram of serum testosterone levels in young and old male mink of the types pastel and standard).

Authors summary

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FEEDING MACHINES FROM MC-MACHINE FACTORY DENMARK



SPECIFICATIONS:

TYPE	ENGINE	TANK CAP. (litres)	TURNING RAD. mm	HEIGHT mm	WIDTH mm	LENGTH mm	OWN WEIGHT kg
450 STD	10 HP Honda	450	1400	1300	850	1750	350
450 B	12 HP Kohler	450	1400	1350	850	2000	450
450 D	18 HP 2 cyl. Diesel B	450	1400	1350	850	2250	500
600 B	18 HP Kohler	600	1400	1380	850	2100	450
600 D	2 cyl. Diesel	600	1400	1380	850	2250	500
920 D	24 HP 3 cyl. Diesel	920	5000	1500	870	2750	750

Different extra equipment - feed tank stainless steel - acid proof feed hose.

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Original report



Body water space and body water turnover in mink females

Brandt, A. National Institute of Animal Science, Roskildevej 48H, DK-3400 Hillerød, Denmark.

Abstract

The applicability of the isotope tracer dilution technique applying tritium labelled water for the determination of the total body water space, total body water turnover rate and estimating the total body fat and the fat-free wet body weight in mink females of different states of hydration was investigated.

The results demonstrated that the technique gave values comparable to those of other larger mammalian species and that it was manageable as an invitro method in mink. Thus female mink with nursing sickness symptoms were extremely dehydrated and the amount of estimated fat was negligible, both states being in agreement with the patho-physiological state of nursing sickness and the necropsy.

Introduction

The use of isotope tracer dilution technique is a recognized *in vivo* method for the determination of the different body components (Ried 1967).

The method is also applicable for the determination of the total body water space (TBWS) and the total body water turnover (rate) (TBWR) in larger animals (>100g), where the coefficient of variation is less than 5%. The water content of the adult animal is in general constant and a fixed proportion of the fat free body weight - the animal is in water balance.

Pregnant or growing animals are in general in a positive water balance as a result of the high metabolism.

A number of unnormal physiological and pathological conditions result in a negative water balance.

Water loss exceeding 15-20% of the total water volume will be fatal.

When considering the water balance in mink females, the point of interest is during the lactation period under which the development of nursing sickness is common among high yielding females. The disease is characterized by anorexia, somnolensia, dehydration, and cachexia (Brandt, 1983-84; Brandt & Henriksen, 1987).

In the present report, the applicability of the isotope tracer dilution technique applying tritium labelled water (TOH) for the determination of the total body water space, total body water turnover rate and estimating the total body fat and the fat-free wet body weight (FFWW) in mink females was evaluated.

The results were compared to those of larger mammalian species and mink females of different states of hydration and with nursing sickness symptoms.

Materials and methods

May the 18th eight pastel mink females with different physiological characteristics were selected for the investigation and submitted to different treatments as shown in tabel 1.

One hour after the intra peritoneal injection of isotonic saline solution the females were weighed. The animals were then anaesthetized (2.5 ml Althesin/kg l.w., i.p.), and 2 ml isotonic saline solution added 100 μ ci TOH was injected intra peritoneally.

The state of total labelling (equilibrium) was presumed to have taken place within a few minutes after the injection.

Blood samples of 1 ml were taken by v. jugularis puncture 1/2, 6, 24, 48 and 72 hours after the injection of the isotope and submitted to the following treatment:

Two hundred myl blood and 200 myl trichloroacetic acid (1.2 mol/l) were pipetted into a 2.5 ml test tube. The test tube was corked, shaken vigorously for 1 min. using vortex mixer and centrifuged (6000 x G in 10 min.).

The supernatant (200 myl) was transferred to a 10 ml scintillation vial containing 10 ml Aqua Luma prior to vigorous mixing in shaker and counted in a LKB cooling scintillation counter with external standard.

The results were the means of complete double determinations of each sample.

The animals were euthanized by an overdose of Mebumal-Na.

The total body water space was calculated using the formula:

$$TBWS = (SD \times VD / SE) - VD.$$

Where SD = the specific concentration of the dose, VD = volume of the dose, SE = the equilibrium specific concentration of isotope water.

The total body water turnover rate was calculated using the formula:

$$TBWR = (1n(S1/S2))/(t2-t1)$$

Where S1 and S2 = the initial and final specific TOH concentration, t2-t1 = the time laps from the initial and terminal sample taken and 1n = the natural logarithm.

As the proportions between water, protein and minerals are constant in the mature animal, Pace and Ratburn has suggested 0.732 as an average inter specific value for the proportion between TBW and fat-free wet body weight (FFWW):

$$FFWW = TBW / 0.732$$

Therefore the amount of total body fat (TBF) could be calculated:

$$TBF = BW - FFWW$$

Results

The results are shown in Tabel 1. As a sequel of the animals performance it was not possible to take all samples, and as a consequence female no 5 and 6 were euthanized due to severe nursing sickness. The autopsy revealed severe emaciation, lack of body fat and dehydration.

Tabel 1. TBWS, TBWR and TBF of mink females determined by TOH-dilution method.

Female no.	1	2	3	4	5	6	7	8
Number of kits	0	0	6	6	6	6	6	6
Weight (g)	871	933	791	724	531	584	946	642
Nursing sickness symptoms	-	-	-	-	+	+	-	-
Emaciation	-	-	+	+	+	+	-	-
Weaned			+	+	+	+	-	-
Treated with 40 ml isotonic saline i.p.	-	+	-	+	-	+	-	+
TBWS (ml)	556	653	518	549	398	402	614	456
% of body weight	64	70	66	75	75	69	65	71

TBWR 6 h.*	.020	.034	.021	.040	.010	.023	.018	.036
24 h.	.024	.030	.028	.043	-	-	.017	.035
48 h.	.020	-	.030	.046	-	-	.018	-

TBF	111	40	83	0	0	34	107	19
% of body weight	13	5	10	0	0	6	11	3

* Determined 6, 24 and 48 hours after equilibrium.

Discussion

Due to the nature of the pilot investigation the number of observations were not relevant for statistical analysis the following discussion was based on simple comparison between the animals.

Applying the dilution principle using TOH labeled water for the determination of TBWS is based on the assumption, that TOH will dilute in the same manner as water (HOH) in the body water compartments.

In general the method result in higher TBWS values compared to measuring TBWS by desiccation.

The error is due to evaporation from the skin, the mucous membranes, expiration and the incorporation of TOH in non-aqueous substances (*Holleman & Dietrich, 1975*).

The total water space can be divided into the extra and intra cellular compartments. The size of these compartments is not constant, but dependent on the prevailing osmotic pressure.

The effect of injecting isotonic saline solution was an expansion of the extra cellular compartment with a concomitant raise in the TBWS. The dynamic is reflected in the results when comparing the pairs in each treatment group.

The injection of the isotonic saline solution also causes an enhanced water turnover measured as TBWR.

As mentioned the TBF can be estimated on the assumption that the TBW:FFWW of mature female mink is constant.

This estimation can only be correct if the variation (the value) of FFWW is known for normal Pastel mink females and assuming that the animal is in a neutral water balance. The latter should in general be the case if the animal drinks ad libitum without being exposed to environmental circumstances that may alter the water balance. As previous investigations on TBWS, TBWR, FFWW and TBF in mink were lacking, it was not possible to compare the values to e.g. direct methods. The magnitude of the values were comparable to those estimated in other larger mammals (*Ried, 1967*).

As could be anticipated the mink females with nursing sickness symptoms were extremely dehydrated - about 20% lower depending on the fat-free dry weight. In general a water loss exceeding 15-20% of the total water volume is considered fatal. Also the amount of estimated fat was negligible, both states being in agreement with the patho-physiological state of nursing sickness and the necropsy.

The reason for the lactating females not showing a larger TBWR than the non-lactating can be explained by the relative low milk yield was a sequel of the manipulations and the terminal stage of the lactation.

In conclusion the investigation demonstrated the applicability of the isotope tracer dilution technique applying tritium labelled water for the determination of the total body fat and the fat-free wet body weight in mink females of different states of hydration.

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The effect of soybean meal, extracted soybean meal and extracted low-molecular substances on growth, health and fur quality of weaning pastel minks

Brandt, a.; Jørgensen, G.; Mortensen, K. & Sørensen H.

Pastel male mink kits were randomly assigned to 3 dietary treatments: Conventional feed supplemented 12% soybean meal, 10.8% soybean meal extracted for low molecular weight substances and 1.2% extracted for high molecular weight substances.

The chemical composition of the soybean meal extracted for the low molecular substances were similar to commercial products such as Danpro-A, Protao and Soycomill.

Thrypsin and chymothrypsin isolated from the pancreas of mink and rat were used in investigating the soybean meal isolated proteinase inhibitors.

There were found a low and presumably insignificant thrypsin and chymothrypsin inhibitory effect of the soybean meal on the rat and mink enzymes.

There were found no effects of the dietary treatments on the activities of pancrease thrypsin, chymothrypsin, elastase, alpha amylase and proteinase.

The growth rate, feed conversion was significantly higher and the fur quality was better in mink fed extracted soybean meal compared with soybean meal.

The general health of the mink was optimal as evaluated from clinical and various clinical-chemical investigations in all dietary treatment lots.

*Statens Husdyrbrugsforsøg, Copenhagen, Denmark, Meddelelse No. 606
5 tabels, 2 references
In DANH*

Authors summary

Effects of dietary supplement of methionine and lysine on blood parameters and fur quality in mink fed with low-protein diets

Työppönen, J.; Berg, H. & Valtonen, M.

Four groups of mink were fed from weaning to pelting with feed of two different protein

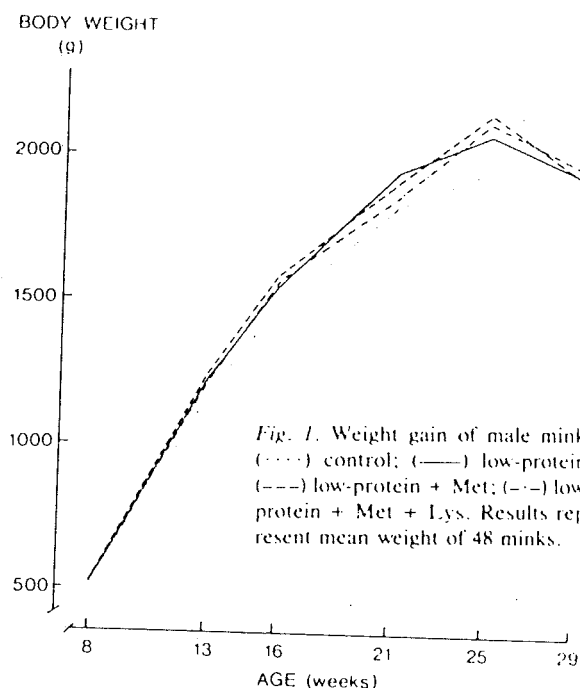


Fig. 1. Weight gain of male mink: (· · · ·) control; (—) low-protein; (---) low-protein + Met; (- - -) low-protein + Met + Lys. Results represent mean weight of 48 minks.

levels. The metabolizable energy (ME) from protein amounted to 40/36% in the control group and 25/20% in the three low-protein groups during the early and late growth period, respectively. One of the low-protein groups received an unsupplemented diet, the second diet was supplemented with methionine, and the third with methionine and lysine. The levels of methionine and lysine added in the low-protein feeds were equivalent to the control diet. In all low-protein groups the decreased protein intake was observed as increased nitrogen retention in young animals and as elevated plasma levels of alanine and branched chain amino acids (BCAA) valine, leucine and isoleucine. The clinical blood parameters either remained unchanged or some improvement was observed in the low-protein groups compared to the control group. The low-protein diets were sufficient for growth and gave larger pelts than the control diet, but the quality of the pelts was significantly reduced as compared to the control group given a normal protein diet. The dietary supplementation of methionine and lysine yielded no improvement in the fur quality as compared to the unsupplemented low-protein feed.

*Acta. Agric. Scand. 37:487-494, 1987
7 tabels, 1 fig., 25 references*

Authors summary

Nutritional aspects of sexual dimorphism in the american mink *Mustela vison* (Schreber)

Gregory, J.

Nutritional aspects of size-related sex differences in the diets of free-living mink were investigated in laboratory-based feeding trials with adult farm bred mink maintained on 'natural' diets. As preliminary studies had shown the carcass utility was virtually complete, the rations presented comprised the minced whole carcasses of wild rabbit *Oryctolagus cuniculus*, eel *Anquilla anquilla*, laboratory rats and mice, and domestic fowl. Determinations of gross composition revealed significant differences between these diets; the smaller prey types, including rodents, bird and fish, were found to have a higher ratio of Apparent Digestible Energy to Nitrogen than larger items such as rabbits, although comparisons with data presented by other workers demonstrated that the variations between species within these prey groups are as great as, or greater than, those between the diets themselves. From the results of the feeding trials, it was also apparent that such diets do not differ significantly, either in digestibility or biological value and attempts to classify particularly prey items in terms of their nutritional value are, therefore, of limited application in analyses of the feeding ecology of a generalist predator.

Nutrient intake was related to diet composition and varied widely between trials, although the mass-specific requirements of females were higher than those of males. Comparisons of gut morphology indicated that, in females, hypertrophy of the alimentary tract may develop in response to increased energy demands. A similar adaptation was evident in both males and females from wild populations, suggesting that the natural diets of free-living mink are generally of a lower quality than the rations fed to commercially raised animals.

Feeding trials were also carried out on growing kits from 56 to 105 days *post partum*. Sex differences in nutrient metabolism were not significant but the growth rates of males were higher than those of females. In both sexes the growth rates of kits fed on 'natural' diets were lower than those of animals raised on commercial rations. This effect was most pronounced in males, a finding which supports the hypothesis that the degree of sexual dimorphism in this species is

dependent on the extent to which the growth potential of males is constrained by dietary regime during the early phases of development.

Thesis submitted for the degree of Doctor of Philosophy of The University of Durham. pp 191

80 tables, 18 fig., 271 references

Authors abstract

Experimental administration of electrolytes in minks (*Mustela vison*)

Martino, P.E. & Stanchi, N.O.

Diarrhea and lactation-syndrome are two of the most important problems in mink ranches, causing severe losses. In this work, experimentally administration of electrolytes in the water was done in pregnant females and their kits, later on, to prevent these entities and to measure animal increased weight. Results were statistically processed.

REV.ARG.PROD.ANIM.VOL 6 NO 11-12: 727-730 (1986)

2 tables, 10 references

In SPAN, Su SPAN, ENGL

Authors summary

Studies on using protein concentrate F₁ in feeding polar foxes slaughtered for skin production

Zon, A.; Jablonski, K. & Sieron, Z.

Studies were conducted on 176 foxes divided into 4 feeding groups. Group 0 was fed without F₁ concentrate. In the diets for groups I, II and III, respectively 20, 40 or 60 percent of protein of fresh meat-fish feedstuffs were replaced by F₁ concentrate. Body weight before slaughter was equal in groups 0, I and II, and was 5900 g in males and 5550 g in females. In group III body weight was lower by, respectively, 200 and 150 g.

The results of licence evaluation were similar in both males and females (26.4-28.0 points). About 80% of skins was qualified as grades II and III. Replacing up to 40% of

protein of fish-meat feedstuffs by the protein of F₁ concentrate made it possible to obtain high quality skins and to save up to 30 kg/fox of scarce feedstuffs of fish and meat origin.

Rocz. Nauk. Zoot. T. 13, z. 1 (1986) 229-238
3 tabels, 18 references
In POLH, Su ENGL, GERM, RUSS

Authors summary

Studies on using silages in feeding of nutrias

Niedzwiadek, S.; Kowalski, J.; Babik, D. & Kubanek, D.

An experiment was conducted on 256 young nutrias of Greenland variety, divided into 4 groups of 64 animals each, fed rations containing: group I - grass silage, group II - silage from maize and beet tops, III - ensiled steamed potatoes, group IV (control) - no silage. Silage intake was from 30 g. at the beginning to 180 g in the last month of rearing.

Initial 35 day weight was 642-665 g in males and 621-642 g in females. At 8 months of age body weight of males in the groups was similar, i.e. 4620-4780 g, that of females 4230-4370 g. Feed intake of males and females in the control group during rearing was, respectively (kg): concentrate 25.2 and 23.8, roots 14.8 and 14.8, steamed potatoes 12.4 and 12.4. Concentrate intake by nutrias of the experimental groups was lower and ranged from 21.1 to 21.4 kg.

The results indicated that using silages in feeding of nutrias leads to good gains and high body weights, and to the reduction of concentrate intake from weaning till slaughter by, respectively, more than 3 kg and about 2.5 kg per a male and female.

Rocz. Nauk. Zoot. T. 13, z. 1 (1986) 157-166
6 tabels, 16 references
In POLH, Su. ENGL, GERM, RUSS

Authors summary

Fur value of the skins of nutrias fed diets containing silages

Niedzwiadek, S. & Palimaka-Rapacz, G.

120 skins of nutrias of Greenland variety, 30 in each feeding group were evaluated. The

skins were obtained from nutrias fed diets containing: group I - grass silage, II - maize and beet top silage, III - ensiled steamed potatoes, and IV (control) - no silage.

Hair compactness of the skins in all groups was similar: SGM 34.51-34.81 mm. Mean thickness of down hair was similar in the groups: 11.0-11.3 my. Mean thickness of cover hair was 98.6-99.6 my. Higher density of down hair count was also similar in all groups (99-102).

Quality panel evaluation of the rough and dressed skins proved their high fur value. The results indicated that feeding silages to nutrias allow to obtain skins with hair of high quality.

Rocz. Nauk. Zoot. T. 13, z. 1 (1986) 283-295
7 tabels, 1 fig., 12 references
In POLH, Su. ENGL, GERM, RUSS

Authors summary

Acute toxicity of 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin to mink

Hochstein, J.R.; Aulerich, R.J. & Bursian, S.J.

The effects of 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (TCDD) on adult male mink were assessed. TCDD was administered as a single oral dose (0, 2.5, 5.0, and 7.5 mg/kg body weight) and the mink observed for 28 days. There was a dose-dependent decrease in feed consumption with corresponding body weight loss. Gross necropsy revealed mottling and discoloration of the liver, spleen, and kidneys. In mink exposed to higher doses of TCDD, brain, kidneys, heart, and thyroid and adrenal glands were enlarged when expressed as a percent of body weight. Hematologic and thyroid hormone measurements in surviving animals revealed no alterations resulting from TCDD exposure. A 28-day LD₅₀ value of 4.2 mg/kg body weight was calculated. These results indicate that mink are among the most sensitive species to TCDD and that they can serve as a valuable model to study the impact of environmental dioxins on carnivorous mammalian species.

Arch. Environ. Contam. Toxicol. 17, 33-37
(1988)
3 tabels, 22 references

Authors abstract

Chronic toxicity of dietary fluorine to mink

Aulerich, R. J., Napolitano, A. C., Bursian, S. J., Olson, B. A., Hochstein, J. R.

Seventytwo 3-mo-old pastel mink were fed diets that contained 0, 33, 60, 108, 194 or 350 ppm supplemental fluorine (F) as NaF, for 382 d to assess its effects on growth, fur quality,

reproduction and survivability. The basal diet contained 35 ppm F as fed. No significant differences were observed in body weight gains or fur quality between the controls and any of the F-treated groups ($P>.05$). Some males fed 350 ppm supplemental F for a 4-mo period prior to pelting had weakened frontal, parietal and femoral bones that fractured during the pelting process. The F treatments had no

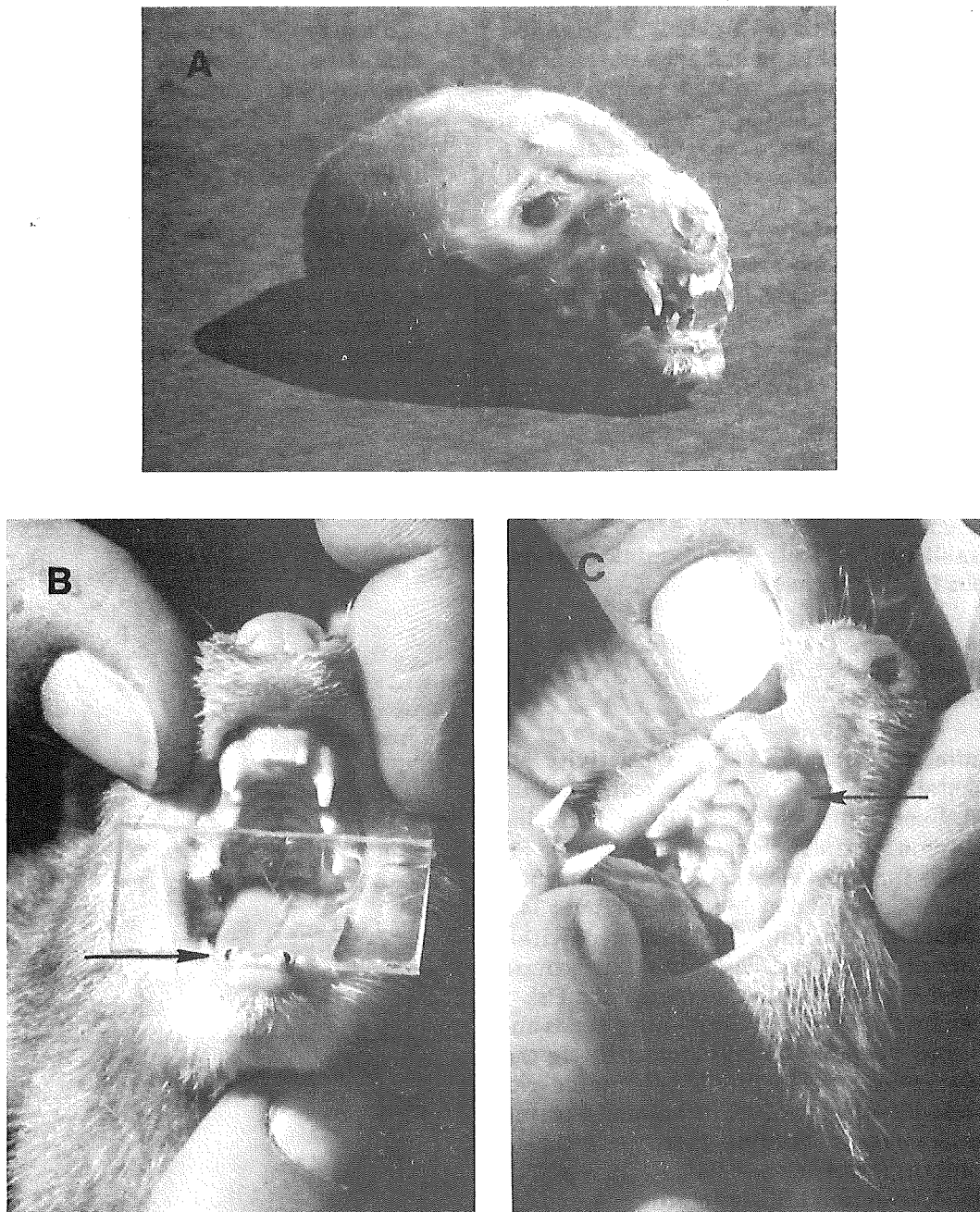


Figure 2. Dental lesions in mink kits associated with in utero, lactational and dietary exposure to supplemental fluorine. A) Mottled canines of kit exposed to 350 ppm fluorine. B) Slight mottling of upper canines and broken lower canines of kit exposed to 350 ppm fluorine. C) Exostotic lesions in the area of the canine alveoli in kit exposed to 194 ppm fluorine.

measurable effects on breeding, gestation, whelping or lactation, although only 14% of the kits whelped by females fed 350 ppm F survived to 3 wk of age. The survivability of the adult mink was adversely affected only at 350 ppm supplemental F. At the termination of the study, no differences were observed in hematologic parameters or serum calcium concentrations between the controls and treated mink ($P > .05$), but serum alkaline phosphatase activities were increased ($P < .05$) by the two highest dietary F levels. Serum F levels were elevated ($P < .01$) only in mink fed 194 and 350 ppm F, and urinary and femoral F concentrations in the treated animals were generally greater ($P < .05$; $P < .01$) than control values and were closely related with dietary F levels. Femoral ash contents of the 194 and 350 ppm F- treated mink were less than the control values ($P < .05$). Clinical signs of toxicosis included skeletal and dental lesions, general unthriftiness and hyperexcitability.

Anim Sci. 1987, 65: 1759-1767.
5 tabels, 2 fig., 17 references.

Authors abstract

Availability of vitamin B-1 in mink kept on various feeding regimens

Tumanov, V. N., Petrova, G. G., Izotova, S. P., Trebukhina, R. V., Berestov, V. A. and Ostrovskii, Yu. M.

Thiamin diphosphate (TDP) and activity of transketolase (EC 2.2.1.1) were estimated in blood, liver, kidney and brain of mink during the autumn mass slaughter. The mink were fed in groups for 3 to 4 weeks. Group 1 (control) was given a normal diet containing fish at 34% of animal protein and supplemented with thiamin at 1 mg/head daily; the 2nd group received the normal diet but with the fish replaced with horse flesh and boiled feeds and additional thiamin at 1 mg/head daily. In the diet for group 3 the amount of thiaminase-rich fish was increased to 50% of animal protein. After 3 weeks of feeding there were significant decreases in the concentration of TDP in blood, liver and kidney in groups 1 and 2; Those decreases were more pronounced, and also occurred in the brain, in group 3. In all groups there was no change in transketolase activity, apart from a slight fall in that of blood.

Doklady VASKhNIL: (No. 3): 37-38, 1987.
2 fig., 6 references
In RUSS.

CAB - abstract

Thiamine Deficiency Encephalopathy in Foxes and Mink

H. M. Okada, Y. Chihaya and K. Matsukawa

Thiamine deficiency resulted in the death of 500 out of 850 female foxes and 1000 cubs aged 3-14 days, also "several hundred" out of 1170 mink and 2500 young mink, on a fox farm in Japan between April and July 1983. Their diet consisted of 60% raw fish, 12% grain, 7% abattoir offal, 6% boiled pig blood, 6% chicken offal, 6% pig or bovine liver, 3% vegetables and a vitamin supplement. Thiamine content of the diet was 0.9 mg/kg dry matter. There was no evidence of thiaminase activity in the fish. The survivors responded to thiamine injections

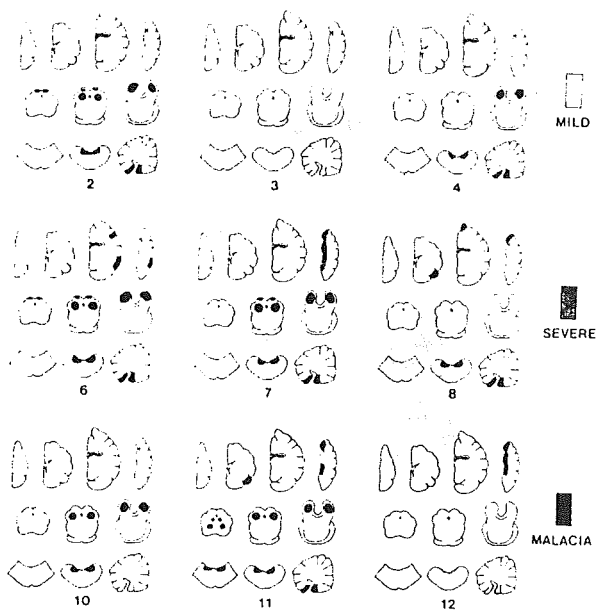


Fig. 2. Distribution and severity of brain lesions in 12 fox dams. Black = malacia. dark stipple = severe early ischemic lesion, light stipple = mild early ischemic lesion.

Veterinary Pathology: 24(2): 180-182, 1987.
5 fig., 10 references

CAB - abstract

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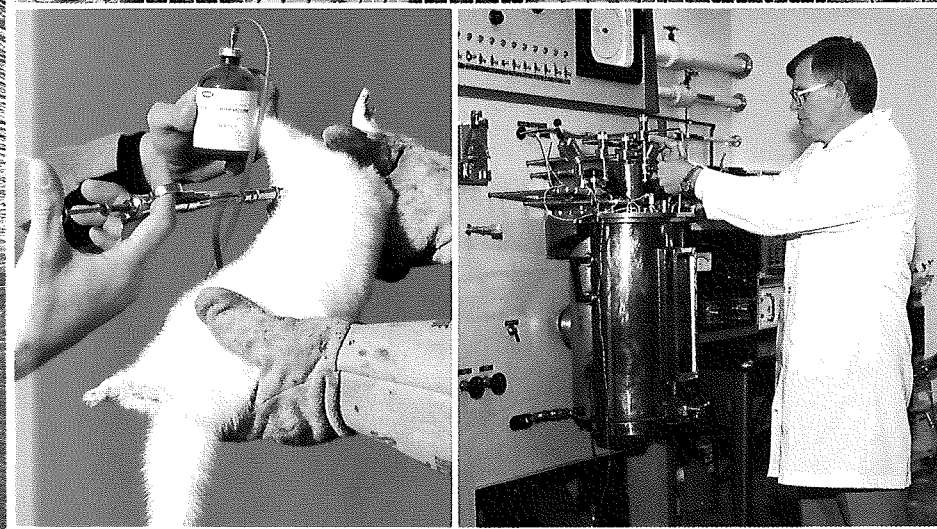
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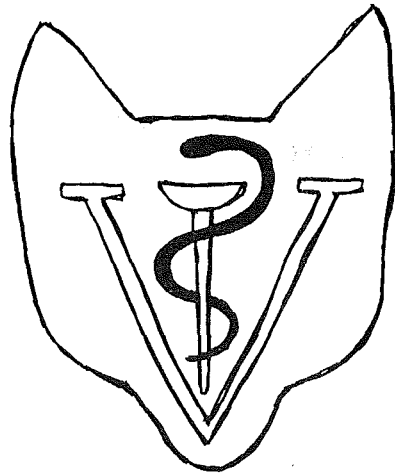


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Original Report

Influence of mink triple vaccine challenge on AD-test in an A-farm, where Aleutian disease has never been recorded.

Munck, C., Hansen, M. Danish Fur Breeders Laboratory, 60 Langagervej, DK 2600, Glostrup

An American producer of minkvaccines and AD antigen advises that mink should not be tested for Aleutian disease immediately following vaccination because of the risk of false positive reaction in the CEP test (Counter immune electrophoresis).

In the autumn 1987 the laboratory experienced one case of positive reaction in five male mink aged 3 years following revaccination. Few days after vaccination the whole stock of animals were tested for Aleutian disease by means of the CEP-test. The only reactors in the A-farm consisting of 1500 breeders were the five revaccinated males. These five animals were retested twice after 7 and 21 days, all of them proved negative at both tests. Eventually the animals were killed and autopsy and histologic examination was performed. No signs of lesions or plasmacytosis were seen.

Material and Methods

To investigate whether it was possible to provoke false blood reactions by vaccine challenge an experiment was performed in a Danish A-farm in November 1987. No AD reactors have ever been registered in this farm during 9 years. 166 kits aged 6-7-month participated in the experiment, none of them had been vaccinated earlier. The kits were participated in the experiment, none of them had been vaccinated earlier. The kits were tested for Aleutian disease on day 0,3,7 and 30

by CEP-test and lineelectrophoresis. In each block consisting of six mink five were vaccinated with vaccine containing antigen against Distemper, MEV and Botulism (Dix-Tox ser. 70255-74132). The recommended dose 1 cc was applied in the thigh. Furthermore one mink in each block received an injection of 1 cc of Prednisole Vet. DAK (5 mg intramuscularly). One kit in each block served as control.

Results

A total of 514 blood samples were analyzed by CEP-test and Lineelectrophoresis. No positive or inconclusive were found. On pelting post mortems were performed on 55 animals chosen at random and histologic examination were performed on liver and kidney. In no case plasmacells could be demonstrated. One liver showed few foci with cystologic changes probably due to inflammation

Conclusion

In the above experiment it has not been possible to provoke changes in blood or organs of AD free kits which might be misinterpreted as AD reactions in a period of 3 to 30 days by means of vaccine challenge. Injection of prednisolone, having an effect on the immune system, did not influence the result.

Comparisons of feline panleukopenia virus, canine parvovirus, raccoon parvovirus, and mink enteritis virus and their pathogenicity for mink and ferrets

Colin R. Parrish, PhD; Charles W. Leathers, DVM, PhD; Renee Pearson, DVM, MS; John R. Gorham, DVM, PhD

Parvovirus from mink (mink enteritis virus (MEV)), cats (feline panleukopenia virus (FPV)), raccoons (raccoon parvovirus (RPV)), and dogs (canine parvovirus (CPV)) were compared. Restriction enzyme analysis of the viral replicative-form DNA revealed no consistent differences between FPV and RPV isolates, but CPV and MEV isolates could be distinguished readily from other virus types.

Feline panleukopenia virus, RPV, and MEV, but not CPV, replicated to high titers in mink. However, on the first passage, disease and microscopic lesions were observed only in mink inoculated with MEV. Feline panleukopenia virus and RPV isolates replicated in ferrets, but disease or microscopic lesions were not observed. Feline panleukopenia virus and RPV isolates could be passaged repeatedly in mink and ferrets. Virulence of FPV and RPV isolates was low compared with that of MEV, and only a single mink inoculated with FPV or with RPV developed clinical disease on the sixth passage of virus.

Am J Vet Res, Vol 48, No 10, October 1987, 1429-1435

1 tabel, 6 fig., 39 references

Authors summary

Detection of mink enteritis virus in mink feces, using enzyme-linked immunosorbent assay, hemagglutination, and electron microscopy

Shen, D.T.; Ward, A.C.S. & Gorham, J.R.

Twenty-five mink were inoculated with mink enteritis virus (MEV). Fecal specimens were collected daily and were simultaneously evaluated for MEV antigen by use of a direct enzyme-linked immunosorbent assay (ELISA), hemagglutination (HA), and electron microscopy. Results of the evaluations indicated that MEV was shed in the feces on postinoculation days 5 and 6. The virus was not detectable by ELISA or HA after postinoculation day 6,

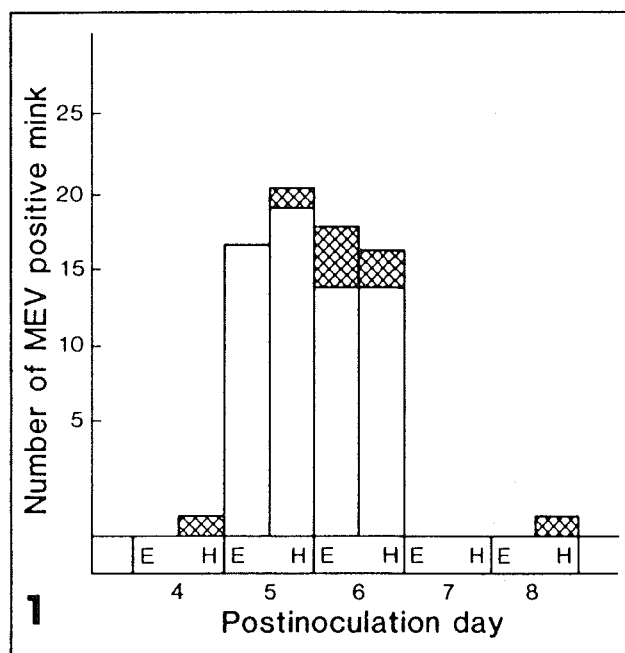


Fig 1—Detection of mink enteritis virus (MEV) in fecal specimens of 25 experimentally infected mink by use of enzyme-linked immunosorbent assay (E) and by use of hemagglutination test (H).

although viruses were found in reduced numbers by use of electron microscopy. The ELISA was specific for MEV, and the sensitivity of the ELISA for MEV was comparable with that of HA.

American Journal of Veterinary Research, Vol. 47, No. 9, p 2025-2030
16 fig., 12 references

Authors summary

Viral plasmacytosis incidence in minks (mustela vison) in captivity. Clinical, pathological and serological aspects.

Martino, P.E. & Martino, J.J.

This work describes viral Plasmacytosis in ranch-raised minks from Argentina. During the period between 1981 and 1984, observations about symptomatology, pathology and serology, were reported. It concludes that the disease is the most important in minks of our country, and produces severe economic losses. Plasmacytosis characteristics world-wide described, were found similar in Argentina.

REV.ARG.PROD.ANIM, VOL. 6 no. 3-4:223-227 (1986)

3 fig., 28 references

In SPAN Su. ENGL, SPAN

Authors summary

Mink Aleutian Disease*Long, H.*

The mink Aleutian disease is one of the three most dangerous diseases in the mink-raising industry throughout the world. Although it does not generally become lethal to the non-Aleutian series, it can cause serious damage to the pelt. The estimated loss caused by pelt damage each year is about millions of dollars.

This paper discussed the discovery of the Mink Aleutian Disease, the diseasecausing agent, the symptom and the diagnosis, and the methods of prevention and treatment. At the end of this paper, the author, according to his own experience, proposed some advice on how to take preventive measures against the Mink Aleutian disease in China.

Journal of Shanghai Agricultural College (China): 1986: v. 4(2) p. 129-134
15 refernces
In CHIN, Su CHIN, ENGL

*Authors abstract***Investigation of the biochemical changes in Aleutian disease of mink***Yao, T.X. & Han, Y.Q.*

When blood samples from 21 young and 12 adult mink with Aleutian disease and 33 healthy mink were monitored for biochemical changes, infected animals showed increases in total serum protein, gamma-globulin, urea nitrogen, SGPT, SGOT, SLDH, blood phosphate, and decreases in albumin, alpha2-globulin, the albumin/globulin ratio, blood Ca, and total serum lipids. The range of fluctuation in these biochemical values reflects the severity of the tissue damage suffered by infected animals.

Chinese Journal of Veterinary Medicine (Zhongguo Shouyi Zazhi): 11;1: 2-4, 1985
4 tabels
In CHIN

*CAB - abstract***Parasitism of Mustelidae by *Skrjabingylus petrovi*: first report in Western Europe***Gerars, Y. & Barrat, J.*

A study of the sinuses parasites was carried out on 206 skulls of small mustelidae: *Mustela putorius* (52), *M. nivalis* (17), *M. erminea* (13), *Martes foina* (102), and *M. martes* (11) from Eastern France.

Besides *Troglorema acutum* two *Skrjabingylus* species (*S. nasicola* and *S. petrovi*) were observed and *S. petrovi* described for the first time in France.

Annales de Parasitologie Humaine et Comparee; 61; 5; 575-579, 1986
1 tabel, 2 fig., 7 references
In FREN Su. ENGL

*Authors summary***Lymphotropic Strain SL3 of Aleutian Disease Virus: Identification of Replicative Form DNA, Molecular Cloning and Expression of Capsid-specific Proteins***Martin Löchelt and Oscar-Rueger Kaaden*

Replicative form (RF) DNA of the lymphotropic strain SL3 of Aleutian disease virus was isolated from infected cell cultures. A novel intermediate of about 7.6 kilobases was demonstrated in Hirt lysates in addition to single-stranded viral, double-stranded monomer and dimer RF DNA. The monomer RF DNA exhibited a length heterogeneity of 70 bp and 160 bp at its 3' and 5' termini. The two major monomer RF DNA species each contained hairpins in the extended or the foldback configurations. A central fragment between map units 0.15 and 0.88 was cloned into plasmid pUC18. The recombinant clone expressed virus-specific proteins ranging from 32000 to 74000 mol. wt.

J. gen. Virol. (1987), 68, 1041-1048.
4 fig., 41 references.
In ENGL.

Authors summary

Studies on the sequential development of acute interstitial pneumonia caused by Aleutian disease virus in mink kits

Alexandersen, S. & Bloom, M.E.

We studied different parameters during the development of acute interstitial pneumonia in mink kits caused by neonatal infection with Aleutian disease virus (ADV). When histological lesions, presence of intranuclear inclusion bodies, and intranuclearly localized ADV antigen were correlated with levels of single-standed virion and duplex replicative forms of ADV DNA in the different tissues, it was

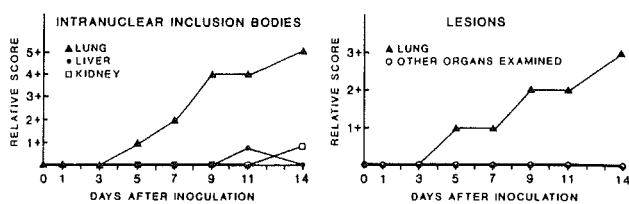


FIG. 1. Histological findings and presence of intranuclear inclusion bodies in tissues. Histological lesions were seen only in lung tissue and were scored on a scale from - (no lesions) to +++ (severe lesions involving most lung parenchyma). Intranuclear inclusions were only seen in lung, liver and kidney, and the relative numbers were scored on a scale from - (no inclusions) to +++++ (inclusions in approximately 10% of the alveolar type II cells). The + value for liver on PID 9 and kidney on PID 14 corresponds to inclusions in less than 0.1% of the cells. None of the control kits had lesions and inclusions.

concluded that the lung, probably alveolar type II cells, is the major primary target for viral replication and cytopathology. The presence of the duplex dimeric replicative-form DNA, a strong mark of parvovirus replication, was also observed in low amount in the mesenteric lymph node, suggesting replication of ADV in this organ, although no viral cytopathology could be demonstrated. Moreover, a few intranuclear inclusion bodies were demonstrated in kidney and liver from affected kits, but intranuclear localized ADV antigen could not be demonstrated in liver sections, and neither could duplex dimer replicative-form DNA, suggesting that these organs are nevertheless ADV-infected adult mink and ADV-infected permissive cell cultures, the data suggested that the pattern of ADV replication in alveolar type II cells is similar to that seen in infected cell cultures but that the replication in the other kit organs resembles the restricted pattern seen in adult mink.

Journal of Virology, Jan. 1987, p. 81-86, Vol. 61, NO. 1

1 tabel, 5 fig., 30 references

Authors summary

Mink parvoviruses and interferons: in vitro studies

Wiedbrauk, D.L.; Bloom, M.E. & Lodmell, D.L.

Although interferons can inhibit the replication of a number of viruses, little is known about their ability to inhibit parvovirus replication.

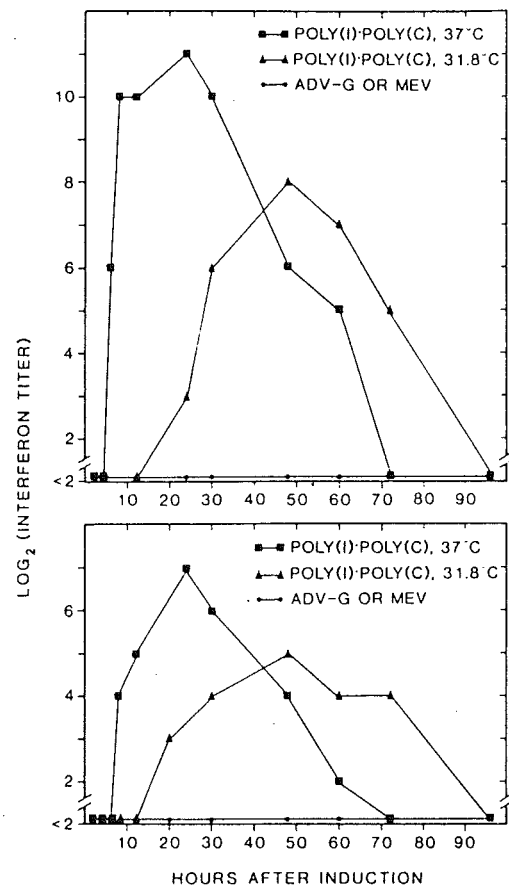


FIG. 1. Kinetics of interferon production in CCL-64 cells (top) and CRFK cells (bottom) after induction with poly(I)·poly(C)-DEAE dextran, ADV-G, or MEV. Cell monolayers were incubated with the poly(I)·poly(C)-DEAE dextran inducer, ADV-G, or MEV (virus multiplicities of infection were 10, 1.0, or 0.1) for 2 h at the indicated temperatures. The interferon inducer was removed with two phosphate-buffered saline washes, Eagle minimum essential medium supplemented with fetal bovine serum was added, and the cells were incubated as before for the indicated times. The cell-free supernatant fluids were assayed for antiviral activity on homologous cells. Because ADV-G and MEV did not induce interferon in these cells under any of the conditions imposed, the data for each cell type are shown as a single line. The variability of the interferon assay was 1 twofold dilution.

Therefore, in vitro experiments were done to determine if Aleutian disease virus and mink

enteritis virus, two autonomously replicating mink parvoviruses, (i) induced interferon, (ii) were sensitive to the effects of interferon, or (iii) inhibited the production of interferon. The results indicated that these parvoviruses neither induced nor were sensitive to the effects of interferon. Furthermore, preexisting parvovirus infections did not inhibit poly(I) · poly(C)-induced interferon production. This independence from the interferon system may, therefore, be a general property of the autonomously replicating parvoviruses.

Journal of Virology, Dec. 1986, p. 1179-1182, Vol. 60, No. 3
 4 tables, 1 fig., 24 references

Authors summary

Rivera, E.; Karlsson, K.-A. & Bergman, R.

Using microcarrier cell culture for the production of virus antigen, a formalin-inactivated feline panleukopenia virus vaccine was evaluated for protection of mink against specific mink enteritis virus infection. The vaccine showed a good immunogenic effect in mink when used either alone or in combination with *Clostridium botulinum* type C-toxid and /or *Pseudomonas aeruginosa* vaccine. A single vaccination induced persistent immune responses for periods of at least 1 year, as evaluated by ELISA and challenge tests. Neither immunological interference between vaccine constituents nor adverse reactions were observed.

Veterinary Microbiology, 13 (1987) 371-381
 3 tables, 1 fig., 23 references

Authors abstract

The propagation of feline panleukopenia virus in microcarrier cell culture and use of the inactivated virus in the protection of mink against viral enteritis

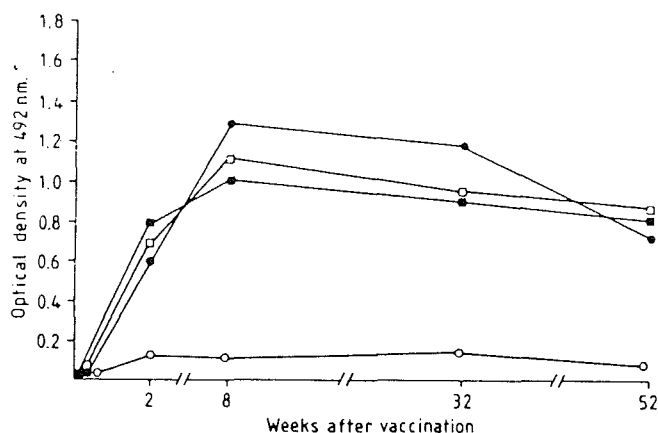


Fig. 1. Competitive ELISA. Kinetics of the antibody response to FPLV in mink serum after a single vaccination. Groups were vaccinated with a one-component vaccine, FPLV (□—□); a two-component vaccine, FPLV + *P. aeruginosa* (●—●); a three-component vaccine, FPLV + *P. aeruginosa* + *Cl. botulinum* toxoid (■—■), or were not vaccinated (○—○).

Fox minute virus-like particle

Kitagawa, H.; Satoh, H; Komatsuzaki, C; Mori, F. & Kudo, N.

Morphological investigations were carried out on basophilic intranuclear and cytoplasmic inclusion bodies in epithelial cells of the hair bulbs of anagen hair follicles in wild foxes affected with an abnormal hair coat condition. The inclusions, which were DNA-positive,

contained numerous minute virus-like particles ("FMVP"). The particles, having a diameter of approximately 13 nm, had an arrangement of capsomer-like subunits of approximately 2-3 nm in diameter and were nonenveloped. The striking resemblance to icosahedral virus was crystallographically and morphologically demonstrated.

Jpn. J. Vet. Res., 35, 21-39 (1987)
 13 fig., 22 references

Authors summary

Focal hepatic necrosis in young ferrets infected with aeromonas species

Hiruma, M.; Ike, K. & Kume, T.

Five cases of young ferrets infected with aeromonas species were observed pathologically. Macroscopic observations revealed irregular-shaped white hepatic foci, and hemorrhage and ulceration in the stomach in almost all cases. Microscopically focal necroses were detected in such organs as the liver, spleen, lung, heart, lymph node and adrenal gland. Particularly conspicuous were the hepatic lesions showing necrobiosis and coagulation necrosis of liver cells and the presence of numerous organisms in the sinusoids. Although the activation of Kupffer cells was remarkable, other inflammatory cells such as leucocytes and mononuclear cells were hardly seen. From these findings, it was suggested that focal hepatic necrosis was characteristic of Aeromonas infection in the ferret.

Jpn. J. Vet. Sci. 48(1): 159-162, 1986

1 tabel, 7 fig., 14 references

In ENGL Su JAPN, ENGL

Authors abstract

Assessment of elastase as a *Pseudomonas aeruginosa* virulence factor in experimental lung infection in mink

Elsheikh, L.E.; Kronevi, T.; Wretlind, B.; Abaas, S. & Iglewski, B.H.

Anaesthetized mink were inoculated intratracheally with an elastase-producing *Pseudomonas aeruginosa* strain (PAO1) and two mutants derived from PAO1 with defective elastase formation (strains PAO1-E64 and PAO1-las-16). Survival times were prolonged in mink infected with the mutants, and microscopic examination of lungs showed that the elastase-positive wild type strain produced more pronounced tissue damage and haemorrhages than did the elastase-defective mutant strains. The strains PAO1 and PAO1-las-16 were also compared to three strains isolated from natural infection in mink which differed in elastase production. The mink strains with high or moderate elastase production produced more severe lung damage and were associated with a higher mortality than the other strains tested. The results indicate that *P. aeruginosa* may enhance

the virulence of the bacterium in lung infections.

Veterinary Microbiology, 13 (1987) 281-289
2 tabels, 4 fig., 18 references

Authors abstract

Campylobacter jejuni infection in the ferret: An animal model of human campylobacteriosis

Fox, J.G.; Ackerman, J.I.; Taylor, N.; Claps, M. & Murphy, J.C.

Campylobacter infection in weanling ferrets (*Mustela putorius furo*) was studied as an animal model for enteric campylobacteriosis in persons. The screening of fecal cultures on selective campylobacter media showed that *Campylobacter jejuni/coli* was not present in the normal enteric flora. Intra-gastric feeding of a mixture of cat feed and 2.5×10^8 C *jejuni* isolated from ferrets with naturally occurring proliferative colitis was accomplished. All ferrets (n=8) became infected on 3 days after they were inoculated, and at 5 to 7 days, they had bile-tinged, liquid faces with excessive mucus and blood. Ferrets gradually recovered from the diarrhea, and feces were normal 10 to 14 days after inoculation was done. Feces contained C *jejuni* at 14, 23, 28, 39, 46, 60, 91, 101, 109, and 144 days.

In the second experiment, weanling ferrets initially were treated with fecal leukocytes and occult blood with occasional mucus appeared in almost all of the 21 ferrets from days 4 through 7. *Campylobacter jejuni* was isolated from the blood of 11 ferrets between 3 hours to 14 days after they were inoculated. *Campylobacter jejuni* bactericidal antibodies were present in serum samples at 14 days, with titers of 1:16 to 1:32. Intestinal lesions including cellular infiltration with mononuclear and polymorphonuclear leukocytes were in the lamina propria of the pyloric mucosa and small intestine of infected and control ferrets. The colon of 3 infected ferrets had small focal infiltrates of neutrophils on the lamina propria; one ferret had perivascular cuffing.

Since the inoculations in the ferret leads to disease mimicking that seen in persons and elicits significant circulating antibody titers to the infecting strain of C *jejuni*, the ferret may prove useful in exploring the feasibility of using vaccines to provide protection against

diarrhea caused by pathogenic strains of *C jejuni*.

Am J Vet Res, Vol 48, No 1, January 1987 p. 85-90
5 tabels, 38 references

Authors summary

Hypoglycaemia due to a functional pancreatic islet cell tumour (insulinoma) in a ferret (*Mustela putorius furo*)

Lumeij, J.T.; Hage van der, M.H.; Dorrestein, G.M & Sluijs, F.J.

The histology and the clinical and biochemical effects of an islet cell adenoma of the pancreas in a ferret (*Mustela putorius furo*) are described.

The Veterinary record. London British Veterinary Association, Feb. 7, 1987 v. 120(6): p. 129-130
1 fig., 6 references

Authors summary

A malignant nephroblastoma in an aged fox (*Fennecus zerda*)

Dillberger, J.E. & Citino, S.B.

A malignant nephroblastoma with pulmonary metastasis which was found at necropsy in an old fox is described. This is the first report of such a tumour in a fox. nephroblastoma is rare in the family *Canidae* and usually occurs in young individuals. The presence of a tumour arising from embryonal tissue in an aged animal raises questions about the genesis and behaviour of this tumour. The tumour may have contributed to the animal's congestive heart failure as a result of the generalized pulmonary involvement, an erythropoitin-induced polycythaemia, or increased peripheral resistance via the renin-angiotensin system.

J. Comp. Path. 1987 Vol. 97 (1), 101-106
2 fig., 25 refernces

Authors summary

Comparative efficacies of ivermectin, febantel, fenbendazole, and mebendazole against helminth parasites of gray foxes

Blagburn, B.L.; Swango, L.J.; Hendrix, C.M. & Lindsay, D.S.

Anthelmintic efficacies of ivermectin, febantel, fenbandazole, and mebendazole were compared in 45 adult gray foxes (*Urocyon cinereoargenteus*) naturally infected with helminth parasites. Fecal specimens were examined one week before treatment and one week and 3 weeks after treatment with each anthelmintic, using a sucrose flotation technique. Compared with pretreatment, fewer foxes in all groups were infected with helminths one week and 3 weeks after treatment. Ivermectin, febantel, and fenbendazole more effectively eliminated helminths than did mebendazole. Parasites found were *Ancylostoma* sp, *Capillaria aerophila*, and *Aelurostrongylus abstrusus* and/or *Filaroides osleri*.

JAVMA, Vol 189, No. 9, November 1, 1986, 1084-1085
1 tabel, 7 references

Authors summary

The prevalence of encephalitozoonosis in Danish farmed foxes

Henriksen, P.

The parasitic disease Encephalitozoonosis s. Nosematosis is caused by the microsporidium Encepalitoozon s. *Nosema cuniculi*, and was first described in the 1920's. The parasite can infect all mammals, but most cases are described in rodents and foxes. In Scandinavia, the prevalence of Encephalitozoonosis is increasing in farmed foxes, but is at present not exactly known.

1345 blue and 210 silver foxes from 27 farms in Denmark were screened for antibodies against Encepalitoozon *cuniculi*. Seven farms were without seropositive reactors, while the prevalence in the other 20 farms varied between 3.0% and 73.8% with an average of 19.3%. The prevalence in silver foxes was a little higher than in blue foxes.

The variation in titer in blue foxes (males and females) was evaluated in 1 farm. This titers varied in relation to sexual season

with the highest value in oestrus. The significance is not known at the moment, but is important in relation to choose the correct period for measuring of antibodies.

Nord. Vet.-Med. 1986, 38, 167-172
5 tabels, 1 fig., 13 references

Authors summary

Health status of Norwegian fur farms in 1986

Loftsgaard, G.

The situation in Norway in 1986 in respect of the disease conditions in fur-bearing animals is reviewed. No case of distemper was reported. Viral enteritis occurred on two mink farms, and

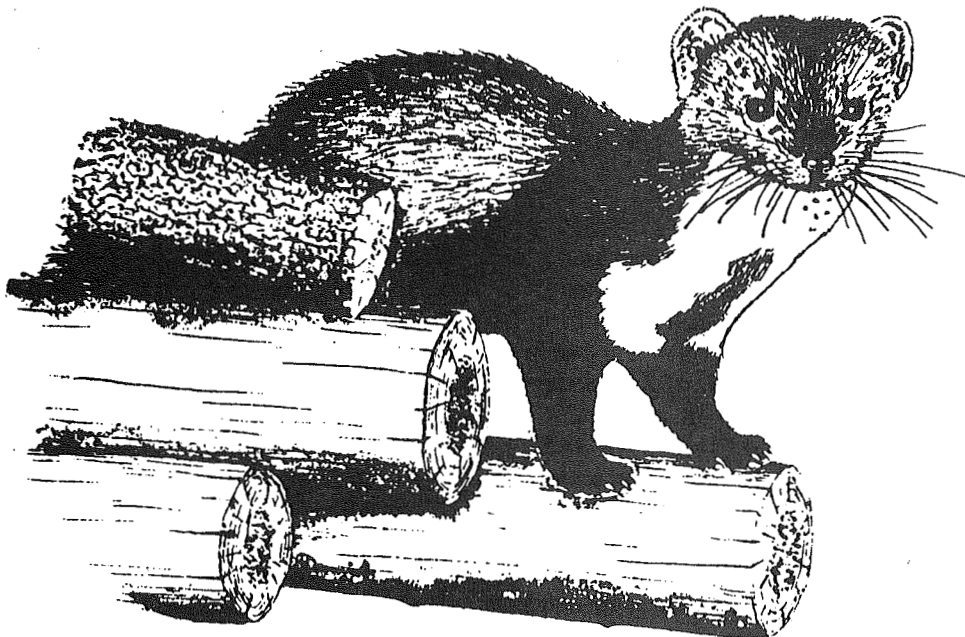
viral hepatitis on six fox farms. The campaign against Aleutian disease of mink was maintained, though mink rearing had been somewhat reduced in favour of fox breeding. The danger from mink exhibitions had been reduced to a minimum by restricting entries to those from farms negative to the agar test. A table shows the economic advantages of eradicating Aleutian disease. Salmonellosis in foxes, and *Pseudomonas metritis* in mink, were each reported on a single farm in 1986. For the first time, no *Pseudomonas pneumonia* in mink was reported. On 25 fox farms, ear mites in foxes appeared to be on the increase, and botulism caused 65% of losses in one large mink ranch, type C being identified.

Norsk Veterinærtidsskrift: 99(1): 25-27, 1987

1 tabel

In NORG

CAB - abstract



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November 1, 1987

August 21 - 28, 1988

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You are cordially invited to participate in the Fourth International Scientific Congress in Fur Animal Production to be held in Toronto, Canada and Wisconsin, U.S.A., August 21 to 28, 1988. The tentative program is enclosed with this announcement.

The scientific portion will consist of oral reports and posters and is expected to cover genetics, reproduction, nutrition, pelage, pathology and related topics in fur animal production. Manuscripts will be published in a volume which will be available at the beginning of the Conference.

This invitation includes a Call for Titles. Therefore, prior to February 1, 1988, please submit the title of your proposed research presentation.

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CALL FOR TITLES

INSTRUCTIONS TO AUTHORS

GENERAL

The proceedings of the 4th International Congress in Fur Animal Production will be published in book form and will be available for distribution at the Congress, August 21 to 28, 1988. The official language for Congress and proceedings will be English. Two copies of written version of the manuscript along with all illustrative material should be prepared and, if possible, a floppy disk containing the manuscript in MD-DOS (WordPerfect or WordStar preferred) or CP/M format should be included. IT IS IMPERATIVE THAT MANUSCRIPTS BE SUBMITTED PRIOR TO APRIL 1, 1988.

ABSTRACTS

A book of abstracts will also be distributed at the meeting. These will be the same as those which are associated with the manuscripts but are to be presented on special camera-ready forms which will be sent with the pre-registration materials. Abstracts should summarize the data and conclusions. They should not contain vague statements such as "data will be presented on" or "the results will be discussed". An excess of abbreviations should be avoided.

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5. All reports cited in the text should appear at the end of the paper in alphabetical order in the form used in Biology of Reproduction:
Jones, R.E. and Smith, A 1987. Furring, pathology and reproduction in mink caged with chickens. J. Reprod. Fert. 45:78-98;
Englemann, R.K. 1986. My life in a mink cage. In Edwards, R.E. (ed.) Strange lifestyles of scientists. Plenum Press, N.Y. pp 84-93.
6. Figures should be original drawings or clear, well-focussed glossy photographs of line drawings. Each figure should be referred to in the text. Only essential labelling should be used. Photographs should be clear and trimmed to show only the essential features. Figure legends should contain sufficient information so the figure can be interpreted without reference to the text;
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Manuscripts will be read by one or more members of the editorial board chosen by the editor. Care will be taken to ensure that manuscripts by geneticists will be read by a geneticist, those of pathologists by a pathologist, etc. The editor reserves the right to make minor corrections of an editorial nature. If it is perceived that major changes are required, the authors will be consulted.

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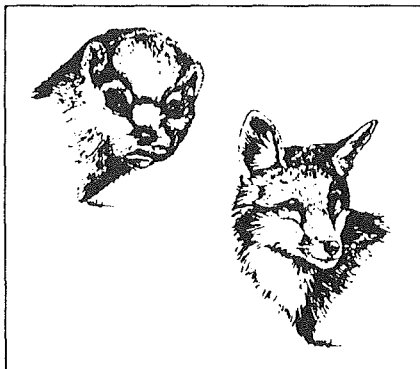
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Vitamins in the Nutrition of Fur Bearing Animals

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