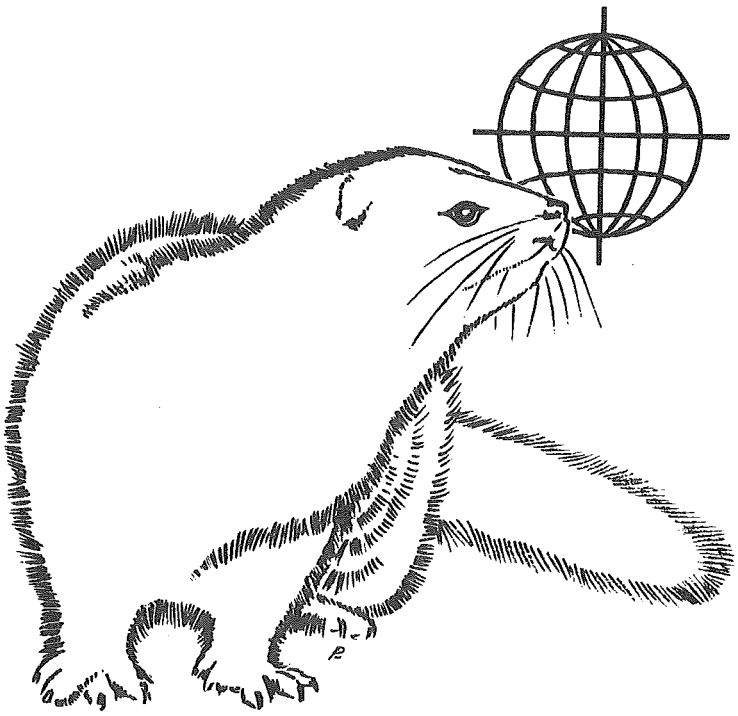

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HELMINTHS OF THE ARCTIC FOX, ALOPEX LAGOPUS (L.), IN GREENLAND. R.L. Rausch, F.H. Fay, F.S.L. Williamson, Div. of Anim. Medicine SB-42, and Dept. of Pathobiology, University of Washington, Seattle, WA, USA 98195. (Can. J. Zool. 61, 1847-1851, 1983). Code 9-F.

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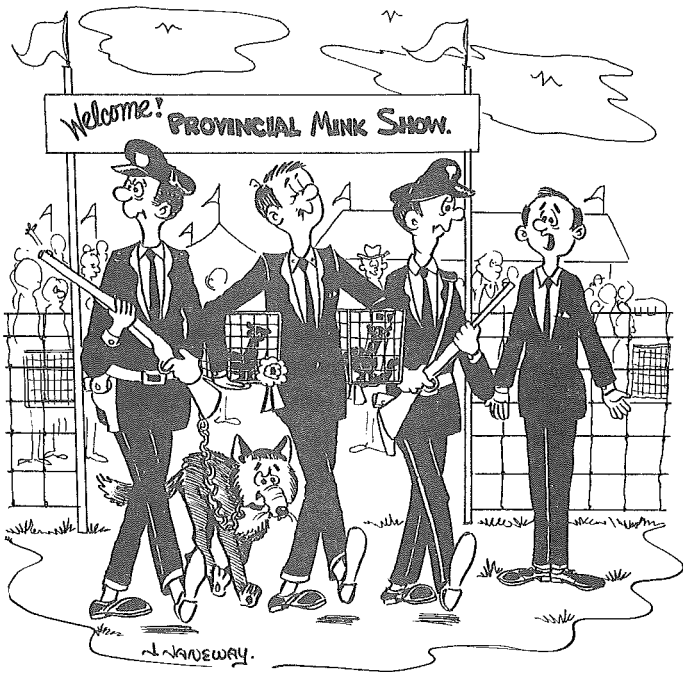
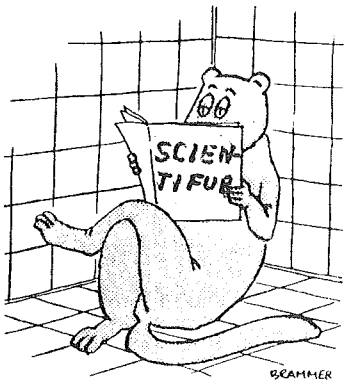


"SURE THEY'RE PRIZE MINK HARRY,
BUT AREN'T YOU OVERDOING IT A LITTLE! "



NOTES

SCIENTIFUR, VOL. 8, NO. 3, 1984.

We apologize for the delay of this issue of SCIENTIFUR. The reason is not because of lack of material - but other things such as holidays and project writings had to get the priority. Remember, SCIENTIFUR is a hobby for us - but a very dear hobby.

Under communication you will find a letter from our friend Bruce W. Smith, who under behalf of the National Board of Fur Farm Organizations reply the letter of May 1984 from the 3rd International Scientific Congress in Fur Animal Production to the host of the 4th Congress (SCIENTIFUR Vol. 8, page 169).

As pointed out in the mentioned letter we had the opportunity to discuss the 4th Congress further during my stay in the USA in August. We did not go further than already known, but the invitation to Canada-USA was underlined - we thanks for that and should be glad if we can be of help in the arrangement of the Congress.

We are of the opinion that the abstracts of reports given at the 3rd Congress have to be published in SCIENTIFUR. Therefore, in this issue we will use some space for that purpose. Publication of the abstracts will continue until everyone of them have been presented.

In this issue we - among a lot of abstracts and titles of scientific reports - present a brand new Danish book dealing with all aspects in mink production. We think that the Danish - and other Danish-reading minkproducers - during this will have a good background for improvement of the production.

From a lot of letters from several countries and from my recent visit in the USA I have a very clear feeling that such a book is needed very

much among others than Danish minkproducers. SCIENTIFUR has, therefore, asked the Danish Fur Breeders Association, who have all the rights to the book, to get allowance to translate the book into English for international distribution.

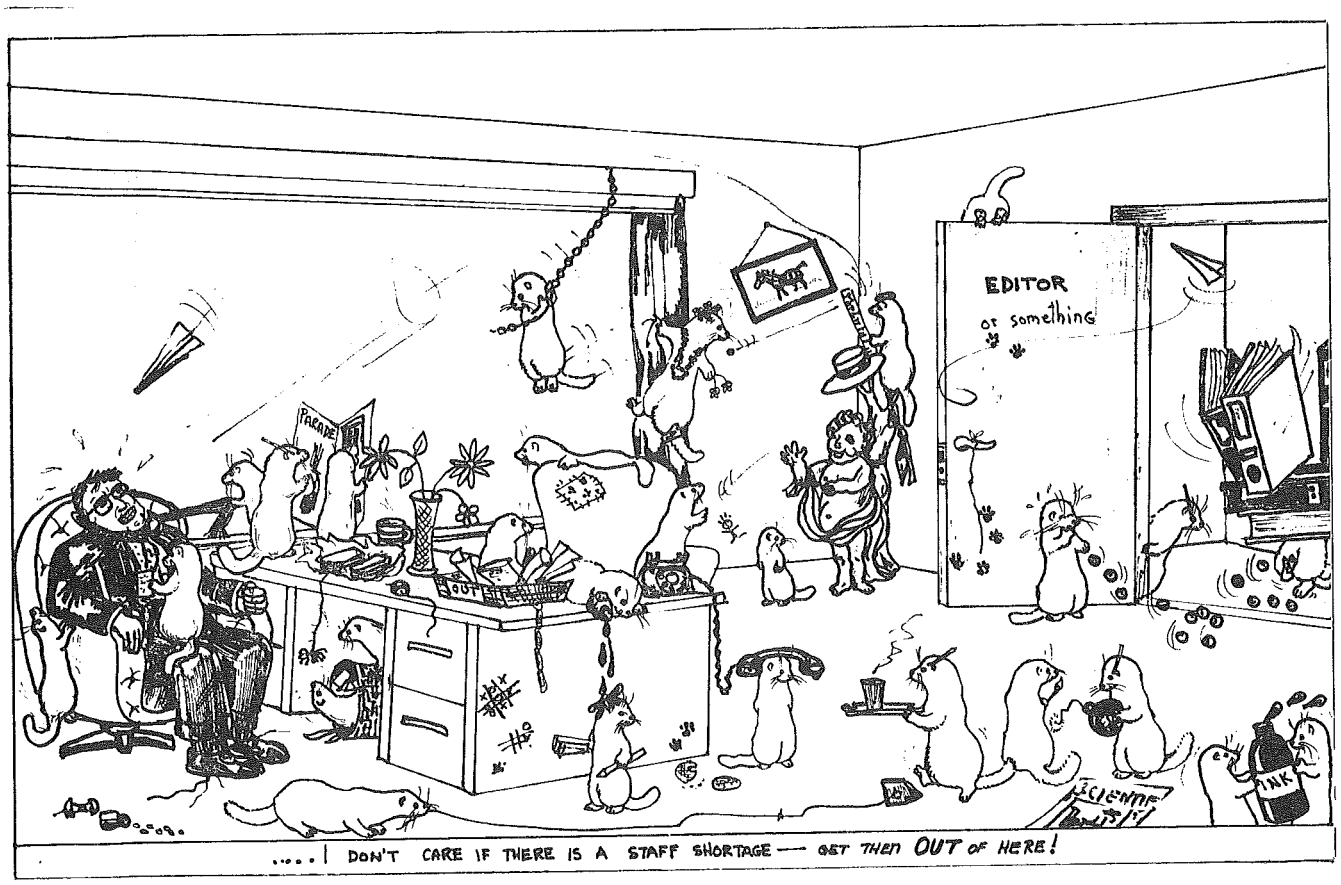
If - as we think - the Danish Fur Breeders Association agree in that, we hope that the book will be on the international market at the end of 1985.

In this issue of SCIENTIFUR you will find about 50% of the reports only mentioned under contents by titel and authors address. This tell us that the number of scientific reports regarding fur animal production are still growing. We hope you accept our opinion that as long as we cannot handle more than 4 issues of SCIENTIFUR per year, and we of economical reasons have to limit the number of pages, you may rather get a maximal knowledge to what has been published than to be able to read abstracts of a selected number of reports.

Have a nice reading.

Gunnar Jørgensen

the editor



ORIGINAL REPORT

INVESTIGATIONS ON THE POSSIBILITY OF EARLY WEANING OF GREENLAND NUTRIAS.

Stanislaw Niedźwiadek, Jacek Kowalski, Department of Small Animal Breeding, Inst. of Zootechnics, Balice/Krakowa, Poland.

During the 1970's the rearing and breeding of nutria developed significantly due to breeding politics and the possibility of exporting the furs. An essential factor in nutria breeding is the proper age of weaning. In Poland weaning is usually done at 6 or even 8 weeks of age (Bakowski, 1969; Kopański, 1979).

The purpose of the following work was to compare the growth of young nutria weaned at various ages as well as studying the possibility of shortening the period between birthings which would allow the females to be kept in good breeding conditions.

Materials and methods.

Observations on the growth of nutria in relation to the age of weaning were carried out on the Institute of Zootechnic Farm at the Animal Science Experimental Station Zator-Przereb. The experimental material consisted of 256 young Greenland nutria from birth to 8 months of age. The animals were divided into 4 experimental groups with 64 young nutria per group. Each group had equal numbers of males and females.

Group 1 - young nutria weaned at 21 days.
Group 2 - young nutria weaned at 28 days.
Group 3 - young nutria weaned at 35 days.
Group 4 - (control) young nutria weaned at 42 days.

The experiment was carried out in cages without bathing facilities. There were 8 animals of one sex per cage for all groups.

All animals were fed identically. They were fed: feed concentrate (grain), during the summer, green stuffs while in the winter, root

vegetables (carrots, beets) and steamed potatoes. Throughout the entire experimental period their feed was suplemented with Polfamiks F according to standard requirements (Frindt, 1973).

Since the animals were weaned early and were not supplement fed they were fed ad libitum. The amount of feed given and not consumed was recorded daily. This made it possible to determine exact feed consumption. All nutria had constant access to water except during the winter.

The nutria were weighed 24 hours after birth, and again at 21, 28, 35, 42 and 60 days. Further weighings were done once a month until 8 months of age. All data was analyzed statistically.

Results

The average weight of all newborn animals was similar and averaged more than 210g (Tab.1) with a variability ranging from 8.6 to 13.2%.

Table 1. Body weight of nutrias (g) at birth to 60 days of age.

Groups*	Sex	At birth		Age/days									
				21		28		35		42		60	
		$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%
	males	212	12.1	520	18.6	608	17.8	710	18.0	840	17.2	1198	17.2
1	females	218	10.3	510	19.2	597	18.0	690	17.2	805	16.0	1145	16.3
	males + fem.	216	11.8	517	18.3	601	18.0	702	17.3	820	17.1	1170	17.1
	males	210	13.2	528	19.6	600	17.3	720	18.4	851	18.4	1205	16.8
2	females	220	8.6	513	17.2	585	19.3	695	19.2	820	16.8	1168	17.4
	males + fem.	217	11.9	520	18.9	596	18.9	710	18.6	837	17.9	1184	17.1
	males	218	12.3	524	20.2	612	19.2	708	18.6	848	20.3	1194	19.8
3	females	218	14.3	512	21.3	600	20.3	690	17.4	815	16.2	1138	14.6
	males + females	218	13.8	519	20.9	610	19.3	700	18.1	833	18.0	1170	17.6
	males	219	10.6	527	19.7	607	18.7	716	17.4	852	19.3	1208	18.3
4	females	221	11.7	517	18.6	592	16.4	700	19.2	818	20.4	1153	21.4
	males + females	220	11.5	521	19.3	603	17.3	710	18.4	837	19.8	1178	19.8

* Groups 1, 2, 3, 4 - weaning of nutrias in age respectively 21, 28, 35, and 42 days.

At 21 days of age the average body weight was more than 500 g with a greater variability reanging from 17 to 20%. At 42 days of age the body weight of nutria weaned at 21, 28 and 35 days of age was on the same level as the control group and was for the males more than 840 g and for the females more than 805 g. At 60 days of age all groups had a similar body weight - about 1200 g for males and about 1150 g for females. Variability for the groups was similar and ranged from 17 to 19% for both sexes.

At 90 days of age sexual dimorphism was seen - males were about 200 g heavier than females. The body weight of all groups was on the same level and was about 1600 g for the males, and for the females 1430 - 1470 g (Tab.2).

Table 2. Body weight of nutrias (g) in age from 90 to 240 days.

Groups*	Sex	Age/days 90		120		150		180		210		240	
		$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%	$\bar{x}$	v%
	males	1685	14.7	2270	12.7	3180	11.4	3785	9.2	4450	8.6	4620	8.2
1	females	1452	16.2	2140	14.2	2895	13.1	3320	12.7	3950	10.4	4310	9.8
	males + fem.	1571	15.2	2210	13.1	3022	12.4	3558	10.6	4205	9.7	4468	9.1
	males	1658	17.3	2290	13.1	3170	12.7	3745	10.4	4435	9.6	4670	8.7
2	females	1430	14.2	2120	14.2	2820	13.2	3310	11.3	3930	10.7	4370	9.5
	males + fem.	1549	16.2	2207	13.8	2998	12.8	3530	10.9	4185	10.3	4512	9.3
	males	1700	15.8	2300	12.1	3160	13.2	3790	10.6	4470	11.2	4650	9.3
3	females	1470	19.2	2160	13.7	2880	14.2	3340	12.7	3980	11.6	4400	10.6
	males + fem.	1590	18.3	2227	12.4	3023	13.8	3562	11.1	4221	11.5	4521	10.4
	males	1690	14.3	2260	10.2	3190	11.2	3775	10.8	4440	9.8	4660	7.6
4	females	1450	12.4	2150	14.3	2820	13.8	3308	12.7	3970	11.3	4390	9.8
	males + females	1568	13.8	2203	12.2	3000	12.7	3540	11.9	4203	10.4	4518	8.8

*) Groups designation - see table 1.

During the following months the differences observed in the body weights of the nutria with respect to the age of weaning were not statistically significant. At 240 days of age the average body weights of males weaned at 21 days was 30 - 50 g lower than that of the remaining groups.

The females of this group had an average body weight of 4310 g which was 40-60 g lower the remaining groups. Beginning at 90 days of age a gradual equalizing of body weights was ascertained and at 240 days the variability coefficient was about 9-10%. The average weight gain from birth to 42 days was on a similar level and was for the males from 628 to 640 g, and for the females from 587 to 600 g.

Table 3. Gain of body weight of nutrias in different ages - arithmetical means, $\bar{x}$.

Groups*)	Sex	Periods/days 0-42	0-60	60-90	90-120	120-150	150-180	180-210	210-240	0-240
	males	628	986	487	585	910	605	665	170	4408
1	females	587	927	307	688	755	425	630	360	4092
	males + fem.	604	954	401	639	812	536	647	263	4252
	males	641	995	453	632	880	575	690	235	4460
2	females	600	948	262	690	700	490	620	440	4150
	males + fem.	620	967	365	658	791	532	655	327	4295
	males	630	976	506	600	860	630	680	180	4432
3	females	597	920	332	690	720	460	640	420	4182
	males + fem.	615	952	420	637	796	539	659	300	4303
	males	633	989	482	570	930	585	665	220	4441
4	females	597	932	297	700	670	488	662	420	4169
	males + females	617	958	390	635	797	540	663	315	4298

*) = Groups designation - see table 1.

The greatest weight gains were seen from 120 to 150 days in both males and females. The lowest gains were from 210 to 240 days. Body weight gains from birth to 240 days were similar in all groups and was for the males more than 4400 g and for the females 4100 g.

The average daily weight gains from birth to 21 days was about 14 g for both males and females. From birth to 60 days average daily weight gain in all groups was on a similar level and was about 16 g.

Table. 4. Average of daily gains in different of periods of age, g.

Groups*	Sex	Periods/days 0-21	0-42	0-60	60-90	90-120	120-150	150-180	180-210	210-240	0-240
	males	14.7	14.9	16.4	16.2	19.5	30.3	20.2	22.2	5.7	18.4
1	females	13.9	13.9	15.4	10.2	22.9	25.2	14.2	21.0	12.0	17.1
	males + fem.	14.3	14.4	15.9	13.4	21.3	27.1	17.9	21.6	8.8	17.7
	males	15.1	15.2	16.6	15.1	21.1	29.3	19.2	23.0	7.8	18.6
2	females	13.9	14.2	15.8	8.7	23.0	23.3	16.3	20.7	14.7	17.3
	males + fem.	14.4	14.8	16.1	12.2	21.9	26.4	17.7	21.8	10.9	17.9
	males	14.6	15.0	16.3	16.8	20.0	28.7	21.0	22.7	6.0	18.5
3	females	14.0	14.2	15.3	11.1	23.0	24.0	15.3	21.3	14.0	17.4
	males + fem.	14.3	14.6	15.8	14.0	21.2	26.5	17.9	21.9	10.0	17.9
	males	14.7	15.1	16.5	16.1	19.0	31.0	19.5	22.2	7.3	18.5
4	females	14.1	14.2	15.5	9.9	23.3	22.3	16.3	22.1	14.0	17.4
	males + females	14.3	14.7	15.9	13.0	21.2	26.6	18.0	22.1	10.5	17.9

*) Groups designation - see table 1.

From 90 to 120 days of age daily weight gains were greater and ranged from 19 to 23.3 g while from 120 to 150 days, from 22 to 30 g. At 150 to 180 days daily weight gain for females was 14 to 16 g while for males, from 19 to 21 g. From 180 to 210 days agerage weight gains for both sexes were high - more than 20 g daily which then decreased to 5 to 6 g for the males and 12 to 14 g for the females. The the entire experimental period the average daily weight gain was similar for the various groups and was 17 to 18 g.

Feed consumption from weaning to 240 days of age is presented in Table 5. The differences seen in the consumption of concentrate by the nutria in the individual groups were not statistically significant. However, there was a somewhat higher consumption of concentrate by nutria weaned at 21 days. In comparison to the control group this difference was 0.6 kg. Consumption of green stuffs, root vegetables and steamed potatoes was similar for all groups.

Table 5. Feed intake, kg, from weaning to age 240 days.

Groups *)	Sex	Concentrated feeding	Crops etc.	Steamed potatoes	Green forage
	males	26.7	22.1	8.6	20.5
1	females	24.3	21.8	8.2	21.2
	males + fem.	25.6	22.0	8.5	20.9
	males	26.1	23.2	8.9	21.3
2	females	24.2	22.0	8.3	19.6
	males + fem.	25.2	22.8	8.7	20.6
	males	25.9	22.7	8.4	20.8
3	females	24.3	21.9	8.0	18.9
	males + fem.	25.0	22.4	8.3	20.0
	males	26.0	22.4	8.2	20.4
4	females	24.2	22.0	8.0	19.6
	males + fem.	25.0	22.3	8.2	20.1

*) Groups designation - see table 1.

Discussion.

A body weight for newborn Greenland nutria of 210 g is high and is on the level of newborn nutria for both standard breeds (Gerber, 1971, Ocetkiewicz et al., 1960, Slawiński, 1960) and Greenland nutria (Niedźwiadek et al., 1980). Equal body weights of the newborn animals gave them all an equal start for the experimental. After 3 weeks of rearing by the females the average body weight was higher than that for standard nutria reared without bathing facilities (Slawiński, 1960).

No statistically significant difference in body weights at 60 days related to the age of weaning was observed. In all groups the body weights were on the same level and agreed with data presented by Niedáwiadek et al. (1980) for this breed and rearing system as well as for standard nutria reared without bathing facilities (Gerber, 1981; Slawiński, 1960).

The average body mass of nutria at 240 days was similar for all groups and was on the same level as for those obtained by Niedźwiadek for this breed and rearing system and for standard breeds (Gerber,

1971, Slawiński, 1960, Slawoń, 1960).

The growth rate birth to 21 days of age was relatively low, as indicated by the body weight gains and the average daily weight gains of about 14 g. Slow growth rates occurred from birth to 90 days irrespective of the age of weaning. Similar growth rates have been observed in other studies (Gerber, 1971, Niedźwiadek et al., 1980, Slawiński, 1960, Slawoń, 1960). Fast growth rates were found from 90 to 150 days of age. From 150 to 180 days of age the slow growth rate in females is related to sexual immaturity. Both sexes from 180 to 210 days had fast growth rates with definitely slowed down rates during the following months. Similar growth rates have been observed in Greenland nutria by Niedźwiadek et al.(1980) and in standard breeds (Gerber, 1971, Pećenin, 1980, Slawiński, 1960, Slawoń , 1960).

Feed consumption of concentrate was similar for all groups and agreed with data given by Cholewa (1979), Kowalczyk et al. (1975) and was somewhat higher for this same breed and rearing system than that presented by Niedźwiadek et al. (1980).

Consumption of green stuffs, root vegetables and steamed potatoes was similar for all groups and in agreement with the data of the above mentioned authors.

In conclusion it can be stated that the age of weaning did not have a significant influence on the growth of young nutria. During the following months, until slaughter, similar body weights and the same levels of feed consumption were obtained.

Weaning nutria at 21 or 28 days of age makes it possible to shorten the period between birthing by 1 month. This is significant since pregnancy latsts 4 months. Furhtermore it allows the females to be kept in proper breeding conditions.

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REPRODUKTION AND PRODUCTION QUALITIES OF THE FERRET.

(Illerens reproduktions- och produktionsegenskaper).

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In the latest 4-5 years there has been a renewed interest in ferret breeding for skin production. The ferret is easily farmed, has a pleasant temperament and a good reproduction.

In the season 1980/81 ca. 150,000 fitch skins were produced in Scandinavia, where Finland is the major producing country. The expansion has been very rapid during the last years and, as a consequence, the selection of the breeding stock has not been satisfactory. In the season 1980/81 low average prices were obtained at the auctions but the variation was great with maximum sales prices around 300-400 Sw.cr. At the January- and March auctions in 1982 the pelt quality and cleanness of the fitch showed to be improved, and the sales prices increased by 40%, compared to the same auctions the preceding season.

The breeding season of the ferret lasts from March to August. The oestrous of the female is characterised by a well marked swelling of the vulva. The ovulation is induced by the mating - ovulation can occur at any time during heat, but only after mating. If the female is not mated, the enlargement of the vulva persists throughout the breeding season, until the cessation of heat. The ovulation usually occurs 30-40 hrs. after mating. The viability of the ova is markedly decreased ca. 18 hrs. after ovulation. Therefore, if mating twice is practiced, the second mating should take place the day after the first mating. When ovulation has occurred, the vulva, 4-5 days after mating, softens and diminishes in size.

The pregnancy lasts for 42 +/- 3 days. The average litter size is usually 7-9 kits per mated female. Barren females generally comes on heat again, approximately at the time when the whelping was expected, and can be remated.

The female can give birth to two litters in a breeding season. A second

oestrous is induced if small litters are placed with other females, if all the kits in a litter die, or if the kits are early weaned (at $5\frac{1}{2}$-6 weeks of age). The net gain from this second mating is however low. These late born kits do not have a mature winter fur until January-February.

In 1980 the oestrous, the mating and the whelping were studied on a small ferret population, consisting of 20 one year old ferret females and 5 one year old males. The studies were carried out at the research fur farm of the University of Agricultural Sciences, Uppsala. The development of the kits was followed, with registrations of body weight and body length.

The prooestroum, i.e. the period between the first visible symptoms of heat until the day of male acceptance, lasted 14-30 days with an average of 22 days. The matings took place between April 7th and April 22nd. 15 females whelped, with an average litter size of 9.9 kits (148 kits altogether). The 5 barren females came on heat again, approximately six weeks after mating. The males were then quite unwilling to mate, only two of these females were remated. The matings did not lead to pregnancy. There was no attempt made to get a second litter from any female.

The average birth weight of the kits was 8.9 g. After 5 days they had doubled their weight. The most rapid growth occurred during July. The full body length was reached by the end of September, slightly later for males than for females. By the time of pelting, at the end of December, the average weights were 2050 g and 990 g for the males and the females, respectively.

Auction statistics of Scandinavian fitch, sold in the season 1980/81, were analysed. Arithmetical average prices were calculated within the different classes of pelt characteristics - cleanness, peltquality, colur, and size. The material was also studied by statistical analysis of variance. The analyses states that a fitch with pale, clean colour and a good pelt quality is desirable. The pelt characteristic that had the greatest influence on the sales price was the cleanness of the pelt colour, e.g. no rusty or yellowish shades are desired. Only 1% of the skins sold were classified as R+, the highest grade of cleanness. The deviation from the average sales price, lowgrades excluded, was for this class + 112 SW.cr. for males and for females +56 Sw.cr.

Calculation of economic profit from fitch farming was made. Because of the superiour reproduction and the lower feed intake, the fitch can be produced at a considerably lower cost than the mink. At an average skin price of 99 Sw.cr. (50% males, 50% females) the fitch leaves the same contribution to cover the fixed costs as the mink at an average price of 150 Sw.cr.

Lantbruksuniversitetet (Sweden), Uppsala, no. 103, 1982.
Thesis, 42 pp. 20 references, 15 figs., 14 Tables.
In SWED, summary in ENGL. Author's summary

SELENIUM AND GLUTATHIONE PEROXIDASE ACTIVITY IN BLOOD OF THE NUTRIA (MYOCASTOR COYPUS): COMPARISON WITH GUINEA-PIG, RAT, RABBIT AND SOME NON-MAMMALIAN VERTEBRATES.

Valentine Lance, Ruth Elsey, LSU School of Medicine, New Orleans, LA 70112, USA.

1. Plasma selenium and selenium-dependent glutathione peroxidase (GSH-Px) activity in plasma and erythrocytes were measured in the nutria (Myocastor coypus) and the alligator (Alligator missisippiensis). Plasma and erythrocyte GSH-Px activity only were measured in the rat, rabbit, chicken, quail, turtle (Chrysemys picta), snake (Nerodia fasciata), bullfrog (Rana catesbiana) and catfish (Ictalurus punctatus).

2. Plasma GSH-Px activity ranged from a low of 0.021 EU/ml in the bullfrog to a high of 1.97 EU/ml in the alligator.

3. Erythrocyte GSH-Px activity was lower in the nutria (2.8 EU/g Hb) than all other species studied. Whereas the rat had the highest activity (539 EU/g Hb). The variation among the mammalian species studied was greater than between the different orders of vertebrates. There was no relationship between plasma and erythrocyte GSH-Px activity and no phylogenetic pattern in the differences in activity between species.

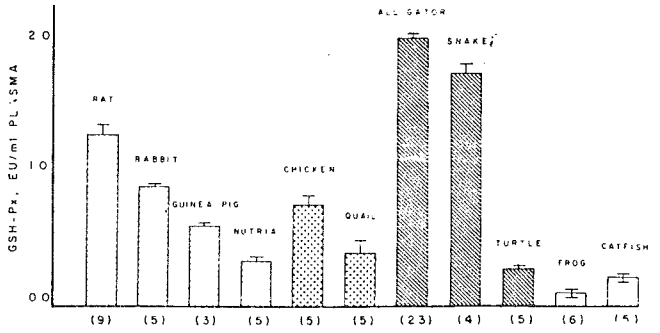


Fig. 1. Plasma glutathione peroxidase activity in various vertebrates. The bars represent the means ± SEM of enzyme activity expressed as enzyme units (EU) ml. An enzyme unit is defined as one micromole NADPH oxidized min. The numbers in parentheses are the numbers of individual samples from each species.

4. There was a relationship between plasma selenium concentration and enzyme activity: animals with the lowest enzyme activity had lowest selenium levels.

Comp. Biochem. Physiol., Vol. 75B, no. 4, pp 563-566, 1983.
2 figs., 1 table, 17 references. Authors' abstract.

NORMAL HEMATOLOGIC VALUES IN THE SILVER FOX (VULPES FULVUS).

(Valorile hematologice normale la vulpea argintie (vulpes fulvus).

N. Avram, St. Nemteanu, O. Sava, SOSEA Giulesti 333, Bucharest, Romania.

A complex hematologic study was performed in 20 silver foxes, concerning peripheral blood constants and central haematopoietic organs (marrow, nodes, spleen).

This study indicated quite a close distribution of the erytrocytic and leukocytic constants.

No variations in the erytrocytic and leukocytic values depending on the sex were observed.

The morphology of the erytrocytes and of some white blood cells is much similar to the picture obtained in the dog.

It is suggested that the hematologic values established at the end of this

study may be used for diagnosis and scientific investigations.

Lucrarile Institutului de Cercetari Veterinare si Biopreparate "Pasteur", 16, 279-287, 1982.
3 tables, 4 figs., 3 references. Authors' summary.
In ROMN, summaries in GERM, ENGL, FREN, RUSS.

NORMAL HEMATOLOGIC VALUES IN MINK AND COYPU.

(Valorile hematologice normale la nurca si nutrie).

N. Avram, St. Nemteanu, Elena Mihut, O. Sava, P. Adamescu, ICVBP, Sosea Giulesti 333, Bucharest, Romania.

A comparative study was performed in 20 minks and 15 coypus, clinically healthy, concerning the value of some peripheral haematologic indices and central hematopoietic organs. The following determinations were performed.

- for the erytrocytic series: erytrocyte counts, hemoglobin, haematocrite, erytrocyte constants (VEM, HEM, CHEM);
- for the leukocytic series: leukocyte counts and leukocytic formula;
- for the bone marrow, nodes and spleen - mean value of the various cells from the impressions of the respective organs.

The comparative results pointed out some particularities regarding the quantitative values and qualitative aspects of the peripheral and central heamatologic picture between the two species: VEM, HEM and CHEM were higher in minks than in coypus; in contrast, the latter presented higher erytrocyte counts and increased hemoglobin and haematocrite values. Higher lymphocyte, eosinophile and basophile counts were detected in the coypu.

The various cell counts in the bonemarrow, spleen and nodes, established by using the impression method did not present essential changes between the two species.

Lucrarile Institutului de Cercetari Vet. si Biopreparate "Pasteur", 16, 271-278, 1982.
4 tables, 3 references. Authors' summary.
in ROMN, summaries in GERM, ENGL, FREN, RUSS.

MORPHOLOGICAL AND BIOCHEMICAL INDICATORS OF CHINCHILLA (VELLIGERA) BLOOD.

(Morfologiczne i biochemiczne wskazniki krwi szynszyla malego (chinchilla velligera).

Henryk Bieguszewski, Romual Rajs, Zaklad Fizjologii i Anatomii Zwierzat ATR, 85-084 Bydgoszcz, ul. H. Sawickiej 28, Poland.

Fiftythree adult Chinchilla velligera were examined. There were marked number of erythrocytes, reticulocytes, leucocytes, hemoglobin concentration, hematocrit index, erythrocytes sedimentation, alfa aminoacid nitrogen in plasma, total plasma protein and plasma protein distrubution, urea and creatynin in plasma, glucose in blood, GOT and TPT in plasma.

It was determined that erythrocytes and hemoglobin concentration is higher than the analogous points in blood of other animals. Due to the distribution of plasma protein by electrophoretic method, seven frations were received. A high level of glucose and creatinine was noticed.

Zootechnica, 8, 1983, pp 5-12.
1 fig., 4 tables, 8 references. Authors' summary.
In POLH. Summaries in ENGL and RUSS.

Tabela 4. Wskaźniki biochemiczne krwi szynszyli
Table 4. The biochemical points of Chinchilla velligera blood

Wskaźnik Parameters	Wartość średnia $\bar{x}$ Mean	Odchylenie standardowe lub granice wahań ± SE	Liczba badanych zwierząt Number animals
Białko całkowite osocza krwi Total plasma protein g/l	64,3	7,9	8
Azot alfa aminowy osocza krwi Alfa aminoacid nitrogen in plasma µmol/l	3,02	0,38	8
Mocznik osocza krwi Urea in plasma µmol/l	1,60	0,32	8
Kreatynina osocza krwi Creatynin in plasma µmol/l	101,66	41,55	8
Glukoza krwi Glucose in blood g/l	1,35	0,085	25
AspAT GOT I.U.	30,23	28,39-33,40	25
AlAT GPT I.U.	12,02	5,01-19,20	25

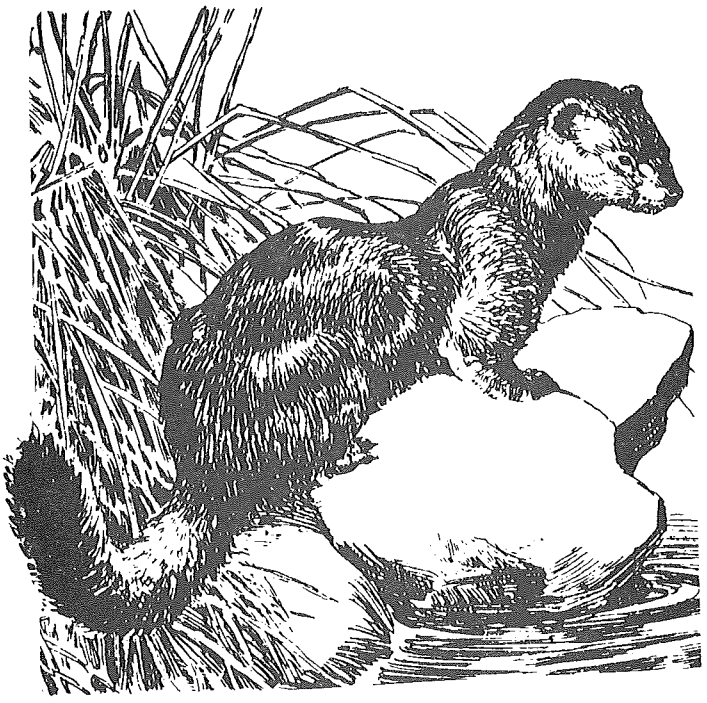
ENERGY ECONOMY OF THE POLECAT (MUSTELA PUTORIUS) DURING WINTER

Hannu Korhonen, Dept. of Applied Zoology, University of Kuopio, POB 6, SF-70211 Kuopio 21, Finland.

Energy economy of the polecat (Mustela putorius) was evaluated during the winter period (December–April) by studying feed consumption, locomotor activity, and nest temperatures of two polecat couples held under farm conditions. In winter, polecats spent most of the daily 24 hour period inside a nest where temperature was about 10^{o} C higher than the ambient air temperature. The animals moved outside the nest at intervals of about 3 h to feed and defecate. Feed consumption of the couples stayed steady during the course of the study, being 325–350 kcal/couple/day. Weights of both females (1.0 and 0.9 kg) remained the same throughout the study whereas weights of males stayed steady or tended to increase during December–February. Thereafter, weights of both males clearly decreased until late April. During the March–April polecat locomotor activity was higher than in early winter. Nest provided adequate thermal protection for polecats in winter. The time of greatest energy demand was mating season with males having a greater energy demand than females.

Savon Luonto 15(2):53–60, 1983.
3 figs., 8 references.
In Finnish, summary in English.

Author's summary



SEASONAL CHANGES IN THERMOREGULATION OF THE RACCOON DOG (NYCTEREUTES PROCYONOIDES GRAY 1834).

Hannu Korhonen, Mikko Harri, Dept. of Appl.Zoology, Univ. of Kuopio, Finland.

1. Oxygen consumption (ml x $kg^{-0.75}$/min) in relation to ambient temperature (T_a) in the raccoon dog whelps at the ages of 7-9 weeks and 17-19 weeks is described by equations y = 32.9-0.69x and y = 26.2-0.49x, respectively. The corresponding equations to adults in summer and winter pelages are y = 19.6-0.46x and y = 14.5-0.32x, respectively.

2. The cooling constant (min^{-1}) of deceased raccoon dogs decreased exponentially with increasing body mass, while $M^{-0.75}$ specific heat transfer coefficient (W x $kg^{-0.75}$/°C) regressed linearly on body mass, y = 0.124-0.00066x.

3. Cooling rate of deceased animals were more dependent on body mass than on pelage quality.

Comp. Biochem. Physiol. Vol. 77A, bo.2, 213-219, 1984.
3 tables, 3 figs., 4 references. Authors' summary.

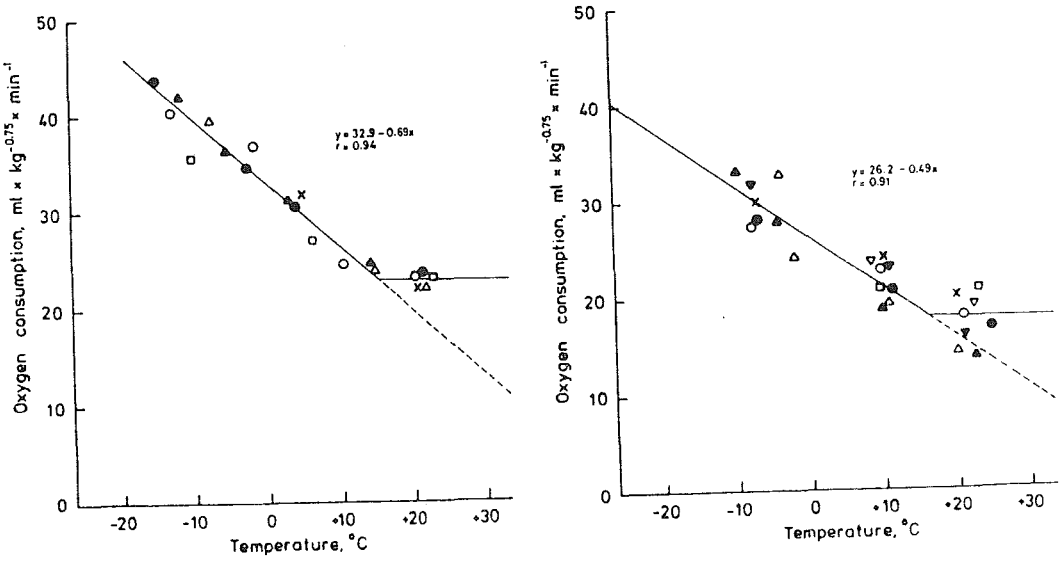


Fig. 1. Metabolic responses of raccoon dogs to ambient temperature. Left: whelps, 7-9 weeks of age. Right: whelps, 17-19 weeks of age. The curves of metabolism on temperature below thermoneutrality were fitted by means of least squares.

COMPARATIVE STUDIES ON THERMOREGULATION AND ENERGY METABOLISM OF FARMED RACCOON DOG (NYCTEREUTES PROCYONOIDES GRAY 1834)

Hannu Korhonen, Dept. of Applied Zoology, University of Kuopio, POB 6, SF-70211 Kuopio 21, Finland.

The metabolic rates, energy requirements, non-shivering thermogenesis, thermal conductances and thermoregulatory significance of the basking behaviour were studied in the farmed raccoon dog (Nyctereutes procyonoides Gray 1834) . Some comparative studies were performed with other farmed furbearers. The resting metabolic rate (RMR) of the raccoon dog was a typical value for an animal of that body size and shape. The RMR of the whelps was higher than that of the adults, and it gradually decreased when the whelps grew and reached a steady adult level in early September at the latest. The lower critical temperature (T_{lc}) of the raccoon dog was high when compared to that of the blue fox (Alopex lagopus) which reflects differences in the original live habitats and habits of these two species. A calorigenic response to noradrenaline was observable in juveniles whereas in adults it was totally absent. Thus raccoon dogs have to resort to shivering or motor activity in conditions where extra heat production is needed. Body cooling and thermal conductances were more dependent on body mass than on pelage quality. In the canids, the overall thermal conductance was low. The recommended metabolizable energy (ME) supply fitted the ME needs of juveniles well. From mid-September onwards the amount of supplied energy was too high which easily led to excessive obesity. Basking behaviour associated with the black chest colour played a role in the thermoregulation of the raccoon dog during spring. Thermoregulatory properties and the energy metabolism of the raccoon dog differ partly from that of the blue fox which support the conclusion that the conventionally used housing practice of foxes is not necessarily the most economical one for the raccoon dog.

A thesis for the Licenciate in Philosophy examination, University of Kuopio, Finland, 1984. 7 figs., 7 tables, 85 references.
In English, summary in Finnish.

Author's summary

MOULTING AND SEASONAL PELAGE VARIATIONS IN THE RACCOON DOG.

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University of Kuopio, POB 6, SF-70211 Kuopio 21, Finland.

An examination was made of the moult and seasonal pelage variations in adult and juvenile raccoon dogs, Nyctereutes procyonoides (Gray, 1834) from Eastern Finland. The Arctic fox (Alopex lagopus) served as a reference animals. Raccoon dog pelage is composed of four types of hairs: guard hairs, long pile hairs, short pile hairs, and underfur. Whelps moult at the age of 4-5 weeks to a new summer pelage. Growth of dense winter pelage takes mainly place during September, October, and November. The dense winter pelage is maintained until late March. The dense underfur is replaced by a thinner summer one by mid-June. Timing of guard hair moult is rather individual. total and underfur hair weights on the back and abdomen remain fairly constant during June-August, but increase as winter pelage developes. Shortest guard hair and underfur lengths are found in summer. Skin thickness is highest in summer. Total and skin weights of blue (Arctic foxes and raccoon dogs in winter are about the same order of magnitude.

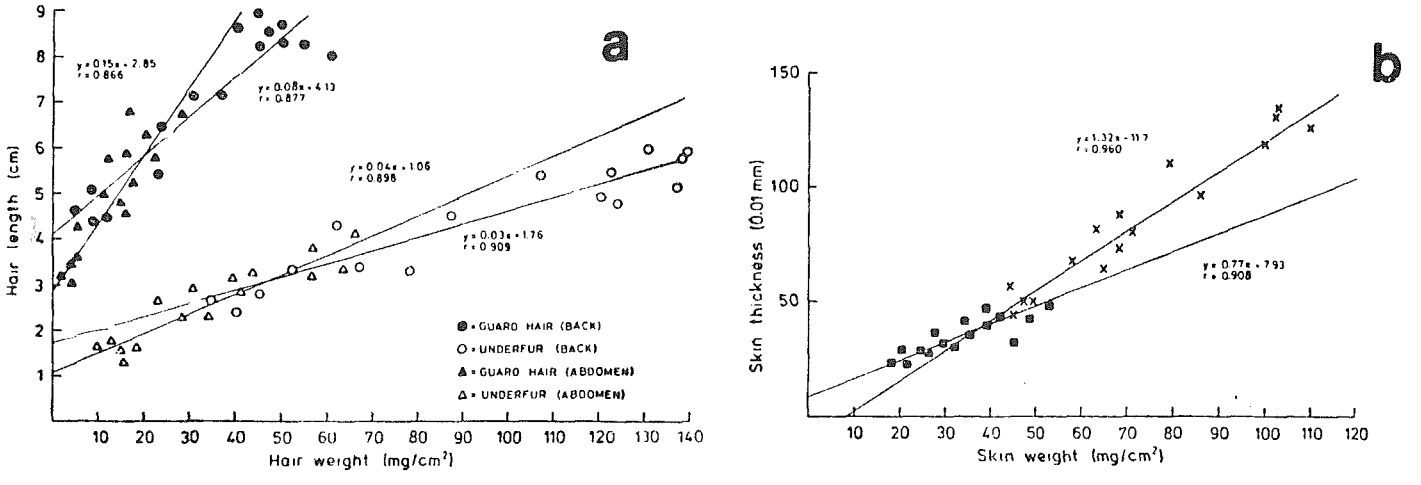


Fig. 7. Correlations between hair weight and length (a) and between skin weight and thickness (b) in the raccoon dog. x — back, ■ — abdomen.

Length of guard hair and underfur is shorter in the blue fox, especially on the back. Total weight of the raccoon dog winter pelage is highest on the back and tends to be lower on sides and abdomen. Considerable site-specific variations were found in different pelage parameters.

Good correlations between hair length and weight and skin weight and thickness were found.

Acta Theriologica, Vol. 29, 7, 77-88, 1984.
2 tables, 7 figs., 28 references. Authors' summary,
In ENGL. Summaries in ENGL and POLH.

HISTOLOGICAL STUDIES OF THE SKIN IN STANDARD MINK AND SILVER FOX.

(Studiul histologic al tegumentului la nurca standard si vulpa argintie).

E. Muresan, Z. Pápay, Cornelia Duca, M. Miclea, Romania.

The structure characteristics of the skin was studied by biopsy in two-months-old Standard mink and Silver fox. Some quantitative measurements were also made: the number of follicles per squared centimeter (24,620 in mink and 8,031 in fox), the total number of follicles in a follicle group (37.2 in mink and 13.5 in fox), the inner diameter of the hair (36.6 microns in mink and 40.3 microns in fox), the inner diameter of the fine fibres (14.5 microns in mink and 15.2 microns in fox), the hair fine-fibres ratio per follicle 1:26.4 in mink and 1:17.5 in fox), the dermis thickness (1,362 microns in mink and 949 microns in fox), the depth of hair implantation (1,298 microns in mink and 876 microns in fox).

These indices will be used to assess the optimal time for slaughter.

Bull. Inst. Agronomic Cluj-Napoca, Zootehnie si Medicina Veterinara, 36, 11-14, 982.
1 table, 4 figs. Authors' summary.
In ROMN. Summary in ENGL.

CHANGES IN COAT TRAITS, STRUCTURE AND SIZE OF BLUE FOX OCCURRING WITH AGE.

(Zmiennosc z wiekiem cech okrywy wlosowej oraz budowy i wielkosci niebieskiego lisa polarnego).

R. Cholewa, Akademia Rolnicza w Poznaniu, ul. Dozynkowa 9 bl. H, Poland

In order to investigate changes in the coat of blue fox occurring with its advancing age, the author took laboratory measurements of 619 samples of hair from 187 animals in a farm i Poznan, belonging to State Animal Breeding Station. The samples were taken i January in successive years from the back of the same animals. The laboratory analysis included determination of the percentages of four anatomic types of hair, their height and length, the height to length ratio reflected in orinpiness, the height and length ratios of underhair to overcoat hair. Mean diameters of hair and medulla (using a lanameter) and the percentage of medulla in the hair, the content of cystine and cysteine as well as indices of colour of underhair and overcoat were determined. In part of the tested animals the following zoometric measurements were made: length, width and circumference of head, chest girth, length of animal of tail and total length and live weight.

There were significant differences in coat quality between yearlings and older animals. The coat of one year old females contained less down hair and more awn hair than in older females. Values for height and length were lower in down hair of young animals, while in the remaining types of hair they were higher. This difference was more pronounced in females. The hair and medullae of one year old animals of both sexes were thinner by about 5% than in older animals, while in 4 years old foxes the medullae were markedly thicker. The contents of sulphuric amino acids: cystine and cysteine, were higher in yearlings than in older animals.

The most characteristic trait of coat colour, namely the colour zones were longer in yearlings, particularly in awned down and awn hair. The males and females did not differ in the colour of underhair which was lighter in one year old animals by about 25% and had the highest value of the XYZ sum determined with a colorimeter.

Among the traits of animal structure and size, only the length of head, of tail and total length differed in yearlings of both sexes from those in the same animals in the successive years, while the live weight of males was the highest when they were one year old.

In view of low coefficients of correlation (r_{xy} =0.2-0.3) between the coat traits in successive years, there seems to be little chance of predicting fur quality (except colour) basing on the coat maturity in the first winter.

Poznan (Poland), Akademia Rolnicza w Poznaniu, 1982. Dissertation (Dr.Hab.) 11 tables, 44 references, 53 pp. ISSN: 0208-8436.
In POLH. Summaries in ENGL and RUSS. Author's summary.

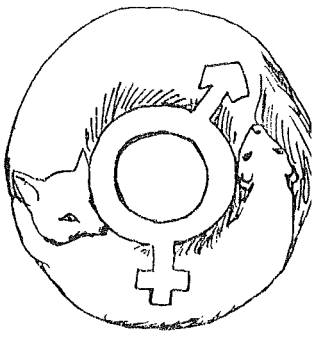
NORMAL DIFFERENTIATION OF MASCULINE SEXUAL BEHAVIOR IN MALE FERRETS DESPITE NEONATAL INHIBITION OF BRAIN AROMATASE OR 5-ALPHA-REDUCTASE ACTIVITY.

Michael J. Baum, Jacob A. Canick, Mary S. Erskine, Cathrine A. Gallagher, John H. Shim, Dept. of Nutrition and Food Science, Massachusetts Inst. of Technology, Cambridge, MA 02139, USA.

Male ferrets born in the laboratory received subcutaneous Silastic capsules containing either the aromatase inhibitor, androst-1,4,6-triene-3, 17-dione (ATD), the 5 α-reductase inhibitor, testosterone-17β-carboxylic acid (17βC), or no hormone, for 15 days beginning on the day of birth; an additonal group of females received empty Silastic capsules. All ferrets were gonadectomized when 11 weeks of age and were subsequently tested for masculine sexual behavior after a latin-square sequence of treatments with subcutaneous Silastic capsules containing testosterone (T), estradiol (E), or dihydrotestosterone (DHT). After T, control males displayed significantly more neck grupping, mounting and pelvic thrusting than control females, and males treated neonatally with ATD or 17βC were no less responsive than control males. After DHT, little masculine sexual behavior was shown by any group. After E, the duration of mounting was significantly longer in control and ATD males than in control females or 17β

males. Subsequently, however, there were no differences between control and 17 β males on any parameter of masculine sexual performance, when they were retested sequentially after subcutaneous implantation of E followed by E + DHT. Additional groups of newborn male and female ferrets received subcutanous capsules containing either ATD, 17βC, or no hormone and were killed on postnatal day 7. Administration of ATD, but not 17β C, strongly inhibited aromatase activity in the hypothalamus + preoptic area. In all groups, the formation of DHT from T was very low in both H + POA and cerebral cortex; however, neonatal administration of 17β C, but not ATD, significantly inhibited cortical 5α-reductase activity. Plasma concentrations of T were equivalent on postnatal day 7 in males given each of the neonatal treatments. These results suggest that behavioral masculinization in the male ferret results primarily from the neonatal action in brain of T itself, and not from its estrogenic or 5α-reduced androgenic metabolites.

Neuroendocrinology, 36, 4, 277-284, 1983.
2 figs., 3 tables, 24 references. Authors' summary.



GENETICS

A STUDY OF THE HYPOTHALAMO-HYPOPHYSIAL NEUROSECRETORY SYSTEM IN SILVER FOXES WITH VARIOUS HEREDITARILY DETERMINED BEHAVIOUR BEFORE THE RUT.

ИССЛЕДОВАНИЕ ГИПОТАЛАМО-ГИПОФИЗАРНОЙ НЕЙРОСЕКРЕТОРНОЙ СИСТЕМЫ У СЕРЕБРИСТО-ЧЕРНЫХ ЛИСИЦ С РАЗЛИЧНЫМ НАСЛЕДСТВЕННО ДЕТЕРМИНИРОВАННЫМ ПОВЕДЕНИЕМ В КАНУН ГОНА

M.N. Yurisova, L.N. Ivanova, USSR.

A morpho-functional study of nerosecretory, glial and vascular components of the peptidergic Gomori-positive hypothalamo-hypophisial nerosectory system (HHNS) and monoaminergic arcuate nucleus (AN) was carried out in silver foxes selected and nonselected by domestic features of behaviour in December, before the rut. At that period, in comparison with November, a reduction of the nerosecretion throughout the HHNS have been found in all animals studied. However, in the group of selected animals, the activation both of peptidergic (supra - and postoptic nuclei, the median eminence and posthypophysis) and monoaminergic (AN, median eminence) structures of the hypothalamo-hypophysial system was significantly less pronounced than in nonselected foxes. It is supposed that the lower metabolism level in the hypothalamo-pituitary structures, directly or indirectly controlling the gonadal activity, is functionally related, in tame foxes, with a decrease in their sensitivity to signal significance of environmental factors.

Izvestiia Sibirskogo Otdeleniia Akademii, Apr. 1981, 5, 130-134.
1 table, 14 references. ISSN 0568-6547. Authors' abstract.
In RUSS, summary in ENGL.

A COMPARATIVE CHROMOSOME-BANDING STUDY IN THE SILVER FOX, THE BLUE FOX, AND THEIR HYBRIDS.

Auli Mäkinen, Ingemar Gustavsson, Dept. of Applied Zoology, University of Kuopio, POB 138, SF-70101 Kuopio 19, Finland.

The silver fox (Vulpes fulvus Desm.) (2n = 34 to 42) and the blue fox (Alopex lagopus L.) (2n = 48 to 50) represent different genera but, nevertheless, produce viable, though sterile, offspring. The variations in chromosome number are due to B chromosomes in the silver fox and a centric fusion translocation in the blue fox. Silver and blue foxes with 2 = 34 and 48, respectively, have two-armed chromosomes exclusively. Chromosome-banding techniques applied to pure silver and blue foxes as well as to hybrids showed whole chromosome arm homologies to be very common, there being few dissimilarities caused by pericentric inversion and tandem fusion translocation. Only a few chromosomes could not be homologized. The amounts of constitutive heterochromatin differed considerably, being sparse in the silver fox, but abundant, in the form of twenty chromosome arms, in the blue fox.

The common ancestor of the two foxes probably had a karyotype with almost exclusively one-armed chromosomes. The X and one autosomal pair were probably the only two-armed chromosomes. The karyotypes of the genera Vulpes and Alopex evolved in independent directions by centric fusion translocations of one-armed chromosomes. In karyotype evolution of Vulpes a tandem fusion of the ancestral two-armed autosome and a one-armed autosome occurred later. In Alopex two inversions occurred, as well as a large amount of constitutive heterochromatin in the form of new chromosome arms.

The interspecific dissimilarities with regard to chromosome number and morphology are so extensive that no production of chromosomally balanced gametes can be expected. This would explain the sterility of the hybrids.

Heriditas, 97, 289-297, 1982.
1 table, 8 figs., 27 references. Authors' summary.

VARIATION IN CHROMOSOME NUMBER IN THE BLUE FOX (ALOPEX LAGOPUS) AND ITS EFFECT ON FERTILITY.

K. Christensen, H. Pedersen, Dept. of Animal Genetics, The Royal Vet. and Agricultural University, Bülowsvej 13, DK-1870 Copenhagen V.

Effects on fertility exerted by polymorphism for a centric fusion between chromosome Nos. 23 and 24 were investigated in the blue fox (Alopex lagopus). The pregnancy rate was not affected by the chromosome type, but the litter size was lower for the centric fusion heterozygotes compared to the homozygous animals. The pregnancy rate was affected by the time of mating, and the litter size was also affected by parity. The survival rate was higher among the centric fusion heterozygotes compared to the homozygous animals. It is concluded that the centric fusion polymorphic system is balanced, the higher survival rate among heterozygotes counteracting the lower litter size of these animal.

Hereditas, 97, 211-215, 1982.
3 tables, 2 fits., 8 references. Authors' summary.

ANOMALITIES OF EYES AND VISUAL PATHWAYS AND THEIR GENETICS IN ALBINOTIC MAMMALS.

(Anomalitäten des Auges under der Sehbahnen und ihre Genetik bei albinotischen Säugetieren).

Hansjochem Autrum, Zoologisches Institut der Universität München, Luisenstr. 14, D-8000 München 2.

The visual pathways in albinotic mammals and human beings are anomalous. In albinos, the number of retinofugal axons crossing to the contralateral nuclei in the chiasma opticum is diminished. The optic pathways in the superior colliculus and from the cortex to the LGN and the contralateral hemisphere are anomalous too. These defects are genetically determined. It is suggested that anomalous metabolic processes in the ocular pigment epithelium are the primary basis of these anomalities.

Biol. Zbl. 101, 213-222, 1982.
4 figs., 75 references. Author's summary.
In GERM. Summary in ENGL.

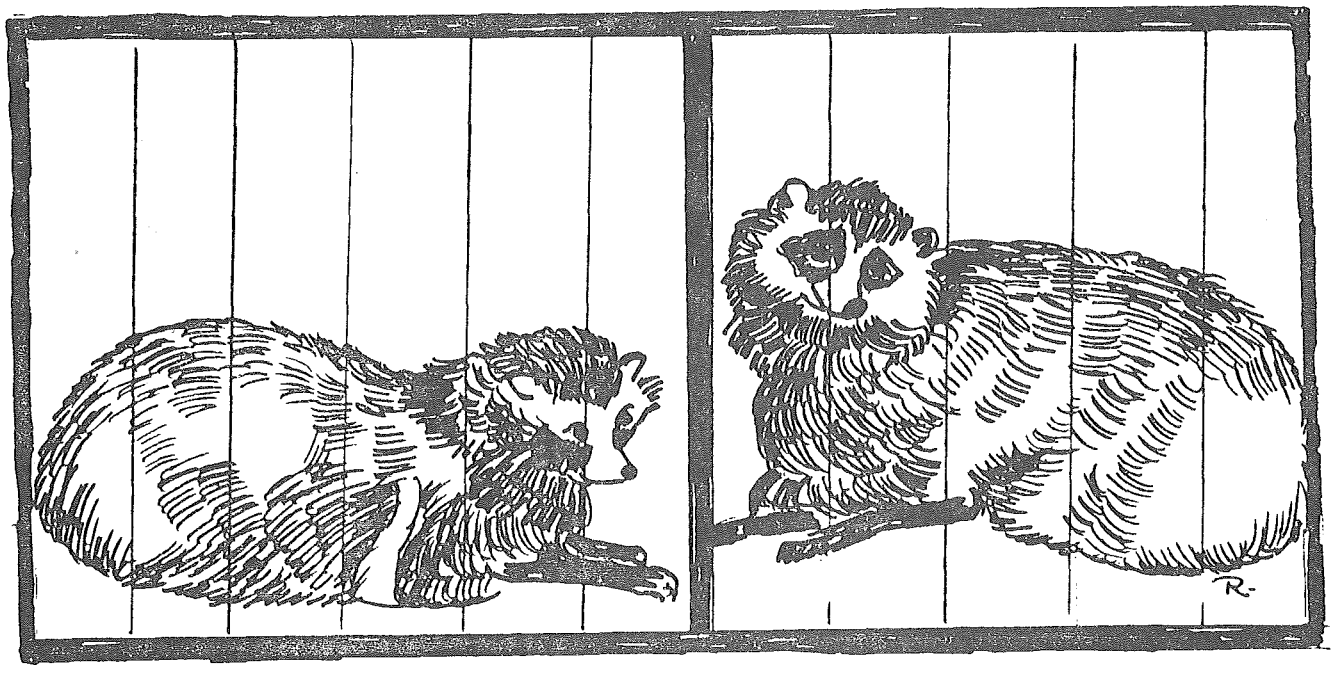
RESEARCH ON RELATIONSHIP AND INBREEDING OF ARCTIC FOX FROM LACHWO FARM.

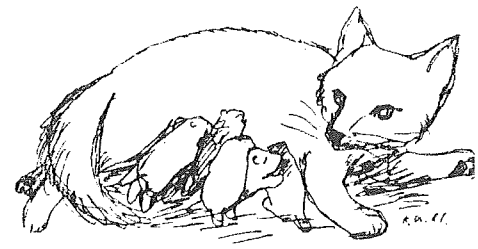
(Badania nad spokrewnieniem i inbredem lisów polarnych (niebieskich) w fermie lisów w Lachowie).

Henryka Bernacka, Zaklad Hodowli Owiec i Koni ATR, 85-084 Bydgoszcz, ul. H. Sawickiej 28, Poland.

Investigations were carried out on 655 foxes (504 females and 151 males). Relationship and inbreeding coefficients were calculated according to Wright's formula. The values of relationship coefficients in females line were from 11.9% to 50% and in males line from 22.9% to 33.3%. The values of inbreeding coefficients were between 0.78% and 28.12% in females and 0.78% and 12.30% in males.

Zootechnika 8, 1983, 23-27.
2 tables, 5 references. Author's summary
in POLH. Summaries in ENGL and RUSS.





REPRODUCTION

EGG TRANSFER IN CARNIVORES AND RODENTS, BETWEEN SPECIES, AND TO ECTOPIC SITES.

C.E. Adams, ARC Inst. of Animal Physiology, Animal Res. Station, Cambridge, UK.

A review of work on the cat, dog, ferret, mink, golden hamster and Mongolian gerbil.

Boca Raton, Florida, USA, CRC Press. ISBN 0-8493-6140-0.
Part of collective document, pp 49-61, 1982.
2 tables, 2 figs., 100 references. CAB-abstract.

STUDIES ON THE CAUSES OF DECREASED FERTILITY IN ARCTIC FOX.

(Badania nad przyczynami obnizenia plodnosci u lisów polarnych).

Irena Narucka, Jerzy Szuman, Marek Switoński, Akademia Rolnicza, Poznan, Poland.

Investigations were carried out on two herds of arctic fox concerning: cannibalism, external deformation and karyotype polimorphism. Cannibalism was observed in 15 females which devoured their litters in their first reproductive season. The obtained results excluded genetic determination of cannibalism in females. External deforminations were observed in 14 individuals (1.7%) among 822 whelps. The Anasarca's deformation was the most frequently found defect. In 8 males in the breeding herd, a deformation of testis was observed. The genetic determination of all these defects could not be studied as it would require more animal material and longer observations. Cytogenetic studies of 401 animals showed the occurrence of a distinct kariotype polimorphism in this population. This polimorphism was caused by Robertsonian translocation: 27.6% of animals had normal karyotype (2n = 50), 43.6% had heterozygous karyotype due to translocation (2n = 49) and 27.6% had homozygous kario-

type due to translocation (2n = 48). Preliminary results indicated a possible influence of this chromosomal aberration on fertility.

Zootechnika (Poland) 139, 169-178, 1982.
6 tables, 27 references. Authors' summary.
In POLH. Summaries in ENGL and RUSS.

OVARIAN AND TESTICULAR FUNCTION IN THE BLUE FOX (ALOPEX LAGOPUS) AFTER ORAL ADMINISTRATION OF FENCHLORPHOS DURING THE BREEDING SEASON.

Gunnar N. Berge, Michelle Mondain-Monval, Adrian Smith, Ordin M. Møller, Dept. of Pharmacology and Toxicology, Norwegian College of Vet. Med., P.O.Box 8146 Dep., Oslo 1, Norway.

The possible effect of fenchlorphos, 0-0-dimethyl-0-(2.4.5-trichlorophenyl) phosphorothioate, upon the reproductive endocrinology in blue foxes (Alopex lagopus) was investigated. Five females were administered fenchlorphos orally at a dose of 100 mg/kg daily from 10 days before oestrus and up to the 21st day of gestation. This dose represents the therapeutic dose for the treatment of sarcoptic mange. Blood samples were collected for the analyses of progesterone, oestradiol-17β and luteinizing hormone (LH) in plasma.

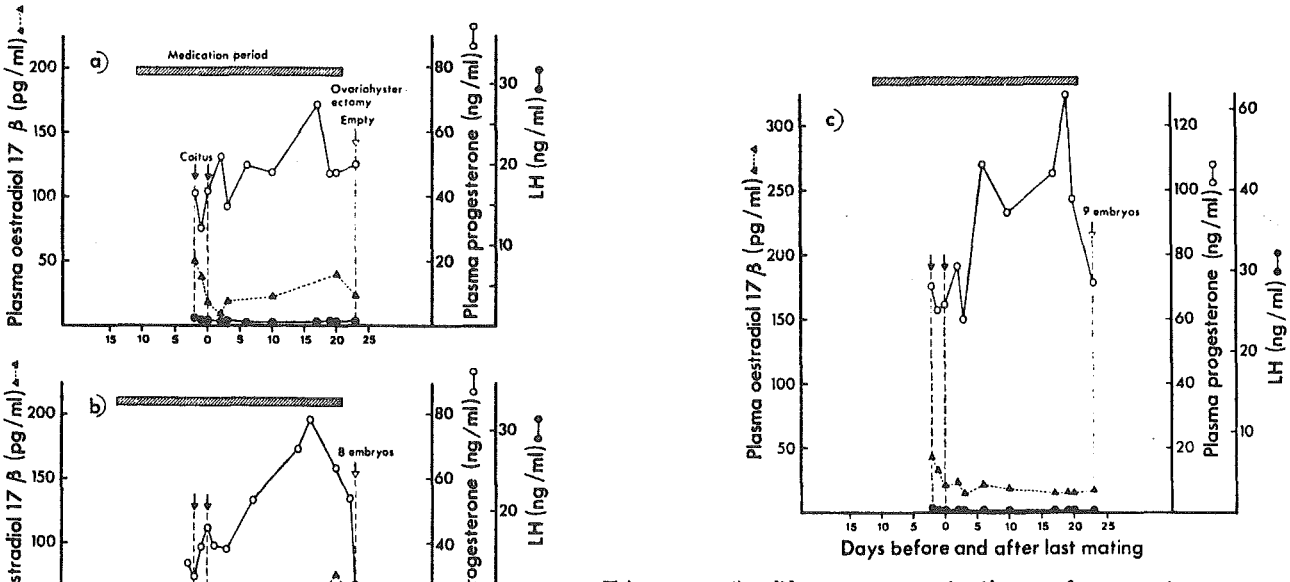


Figure 2. Plasma concentrations of progesterone, oestradiol-17β and luteinizing hormone (LH) in 3 blue foxes which were administered fenchlorphos (100 mg/kg) orally 9 or 12 days before mating and up to the 21st day of gestation.

The vixens were ovario-hysterectomized on day 23, except 1 animal in the control group which was operated on day 17. Additionally, sperm quality and mating performance in 3 male blue foxes, which were administered 100 mg/kg fenchlorphos daily during the first 3 weeks of the mating season, were examined.

Pregnancy was recorded in 2 medicated and 4 control animals. No pathological changes were observed in the uterus and the ovaries. The plasma concentrations of the hormones were similar to those obtained from the control group. No evidence of any disturbances concerning spermatogenesis in the males was observed. However, their libido appeared to be reduced. None of the males achieved a mating during and after the period of medication.

Acta vet. scand., 1983, 24, 200-210.
1 table, 3 figs., 12 references. Authors' summary.

ACROSOMAL DAMAGE CAUSED BY PROCESSING OF FROZEN SEMEN FROM THE SILVER FOX (VULPES ARGENTEUS) AND THE BLUE FOX (ALOPEX LAGOPUS).

W. Zalewski, K. Andersen Berg*), * Dept. of Reproductive Physiology and Pathology, Vet. College of Norway, POB 8146 Dep., Oslo 1, Norway.

The effect of cooling, of glycerol equilibration and of freezing and thawing on the acrosomal integrity of spermatozoa from 9 silver foxes and 8 blue foxes was studied. Further the sperm motility was estimated after thawing for each animal. No significant difference was found between the percentage of intact acrosomes (IA) before cooling and after equilibration, but this percentage was significantly lower after thawing than after equilibration. The correlation between post-thawing IA and motility was low. The possibility of using IA as a parameter for evaluating semen quality after thawing is discussed.

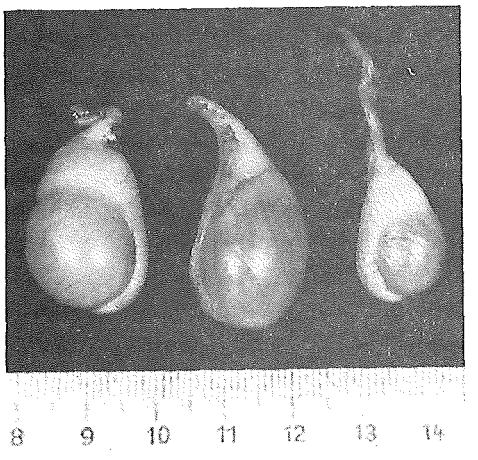
Zuchthyg. 18, 22-26, 1983.
4 figs., 1 table, 13 references. Authors' summary.
In ENGL. Summary in GERM.

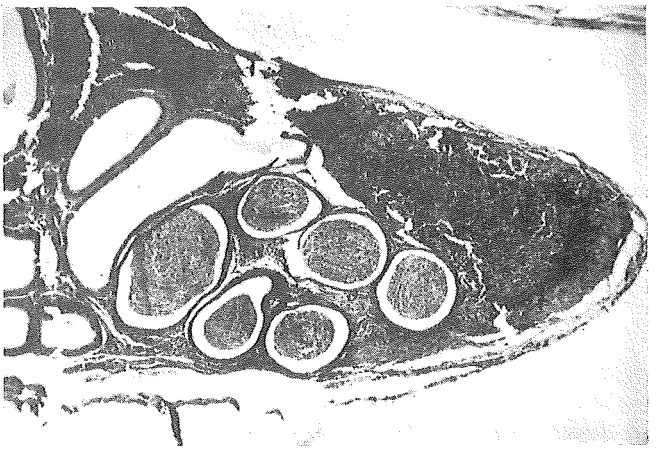
DISORDERS TO REPRODUCTIVE CAPACITY OF MALE MINK.

(Fortpflanzungsstörungen bei Nerzrüden).

J. Hartung, W. Seffner, Bezirksinst. für Veterinärwesen Leipzig, Karl-Marx-Universität Leipzig.

Reproductive disorders were exhibited by 36.3 per cent of 9,262 male minks kept for breeding on nine mink farms. The following alterations were recorded by pathologico-anatomic and histological examinations of both testicles of 901 males which had been sorted out for impaired mating performance and failure of fertilisation: testicular hypoplasia (68 animals), seminal obstruction (62 animals), epididymal aplasia (46), cryptorchism (24), epididymitis (22), testicular degeneration (14). These changes had caused 75 per cent of all reproductive disorders, while extragenital factors had caused 80 per cent of the disorders in mating performance. Conclusions are proposed for action on fertility disorder of male mink.





1 Von l. n. r.: normaler Hoden mit Nebenhoden, Hoden ohne Nebenhoden (Aplasie), unterentwickelter Hoden (Hypoplasie) beim Nerz

2 Samenstauung im Nebenhodenkopf beim Nerz im histologischen Bild

Mh. Vet.-Med. 38, 1983, 611-617.
5 tables, 9 references. Authors' summary.
In GERM. Summaries in RUSS and ENGL.

PRE-MATING BODY WEIGHT CHANGES AND REPRODUCTIVE PERFORMANCE IN FEMALE MINK.

Anne-Helene Tauson, Eva Aldén, Dept. of Animal Husbandry, Swedish Univ. of Agric. Sciences, Funbo-Lövsta Expt. Station, S-755 90 Uppsala, Sweden.

Reproductive results of one-year-old mink females are often inferior to what could be expected when compared with older females. In practice the females are often raised on a high feeding intensity followed by slimming to reduce the weight in the winter. In a field experiment for two consecutive years and in a station experiment for one year, two groups of each 50 and 15 one-year-old standard females respectively were fed according to the following model prior to their first reproductive cycle. Group 1 was raised on a high feeding intensity in the autumn and after that slimmed until late February. Animal live weights were reduced by on average more than 300 g. Group 2 animals were kept in a moderate condition throughout the autumn and winter resulting in a weight reduction less than 30 g. In the field experiment, the number of live born kits per litter as well as per mated female were statistically significant better for the non-slimmed females. There was also a tendency towards lower barren percentage and lower kit losses in this group. Regardless of group, detrimental effects ofgreat weight reduction in the winter were confirmed. In the station experiment the result showed the same tendency.

Acta Agric. Scand. 34, 177-187, 1984.
10 tables, 3 figs, 14 references. Authors' abstract.

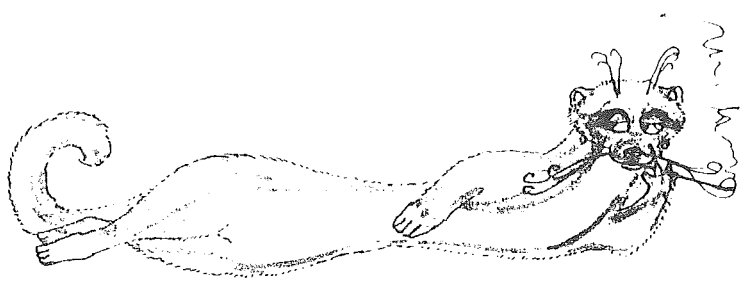
"She knows, she will be the winner. She don't need Anne-Helene's and Eva's slimming-program!"

TESTICULAR FEMINIZATION IN THE FINNISH RACOON DOG.

A.J. Smith, N. Nes, K. Andersen Berg, M. Valtonen, A. Makinen and A. Lukola, The Norwegian College of Veterinary Medicine, P.O. Box 8146 Dep., 0033 Oslo 1, Norway.

The condition of testicular feminization has been described in several species, including the rat, mouse, dog, cattle, horse and man. A 2½ year old racoon dog, assumed to be a female, was presented for examination during the breeding season (January-February) in 1981. The vulval lips were of normal size for a female in anoestrus. The clitoris was enlarged and protruded from the vulval opening. Palpation revealed in addition two testes in a poorly developed scrotum. The vulval lips showed no indication of swelling during the breeding season. In all tissues examined, the modal chromosome constitution was 2n = 56, XY (normal male karyotype). On post-mortem examination, the vulva was found to be of normal size and led into a shortened blind-ending vagina approximately 18 mm deep. The urethra opened into the vagina in the normal position. There was no evidence of ovarian or uterine tissue. Both testes had a prominent epididymis, from which ran a hard cord of tissue independently through the pelvis before merging with the connective tissue cranial to the clitoris.

Histological examination of the testes showed that some tubules were underdeveloped, and a few were completely filled by Sertoli cells in varying stages of degeneration. The Leydig cells were active, but did not appear to be hyperplastic. The great majority of the germinal cells were premeiotic, represented mainly by several generations of spermatogonia, apparently in active mitosis. In addition there was a large population of primary spermatocytes. Some haploid cells with the appearance of secondary spermatocytes were present in a few tubules. The occasional round of elongated spermatid was observed, while free spermatozoa were seen in only a very few tubules. The histological picture was one of a relative arrest during the



Perhaps not Racoon Dog - but feminine!

first meiotic division, probably at prophase. Sections of epididymis appeared normal except for a complete absence of spermatozoa.

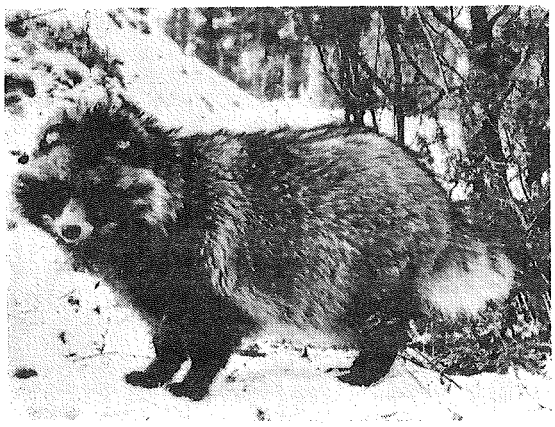
Six similar cases were registered in Finland in 1982. In 3 of the 6 cases the clitoris contained a small cartilaginous "os penis". Since the basic defect in the testicular feminized male is believed to be a specific partial or complete insensitivity of end organs to androgens, testicular material from these 6 animals was subjected to an assay for the presence of cytoplasmic androgen receptors. Receptors were not detected in 5 of the 6 cases. A concentration of 2.0 fmol/mg protein was found in the sixth case.

Testicular feminization is believed to be caused by an X-linked recessive gene transmitted by heterozygous females to half their offspring. Consequently, the dam and other female relatives of affected animals are potential carriers of the condition and should be excluded from the breeding stock. Genetic males either express the condition fully and are therefore infertile, or are normal and do not carry the gene further. No restrictions need therefore be placed on the use of normal male relatives.

Nord.Vet.-Med. 35, 452-459, 1983.

1 table , 4 figs., 18 references. Authors' summary.

In ENGL, summary in NORG.



Perhaps not feminine - but Racoon Dog.

NUTRITION

NUTRITIONAL STATUS OF ADULT MALE MINK DURING THE YEAR. I. LIVE WEIGHT, FEED INTAKE LEVEL, DIGESTIBILITY AND NITROGEN RETENTION.

(Variation au cours du cycle annuel de l'état nutritionnel du vison mâle adulte. I. Poids vif, niveau d'ingestion, digestibilité, rétention azotée).

Geneviève Charlet-Lery, Michèle Fiszlewicz, Marie-Thérèse Morel, J. Rougeot, I.N.R.A., Ctr. de Recherches zootechniques, Lab. de Physiologie de la Nutrition, Toisons et Fourrures, F 78350 Jouy-en-Josas, France.

Three groups of Pastel adult male mink fed ad libitum the same pelleted diet were studied 14 monthes consecutively:

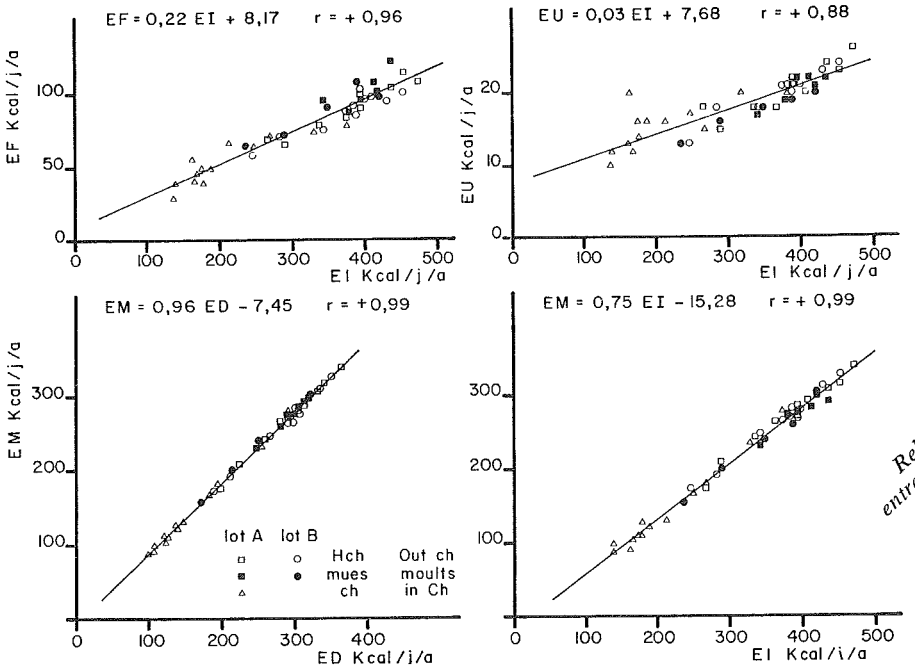
- the 6 minks of group V were kept in the mink farm. They were regularly weighed as was ingested food;

- the minks og groups A and B (n = 4 + 4) were kept in an experimental room (natural leight and no heating). Precedent controls were done. Digestibilities and N balances were measured every month. Moreover after each balance, the 4 minks of group A stayed in a respiratory chamber.

Weight variation of adult minks were large: they are shown in table 2 and figure 1. Cyclical, they occurred again every year: weight loss during mating period, in summer and at the end of December, weight gain after mating period, in autumn and before mating period. These variations were highly correlated with the level of feed intake (r = 0.96), lower when animals were loosing a part of their weight than when they were gaining. But when feed intake was calculated on the basis oflive weight (kg), large differences were noted: before mating gain (+ 7.3 g/d) and summer loss (-2.6 g/d) were obtained with the same feed intake (40.1 and 40.5 g/kg LW).

The variations of feed intake, even when they were observed in respiratory chamber, changes neither dry matter, energy and N digestibility

nor ME/IE and ME/DE. But large variations were observed for N balances highly correlated with Ni (r = +0.88). Urinary N highly correlated with Ni (r = +0.95) was lower during furring process as shown i figure 5. This result indicates a slightly higher N retention at this time.



Relations entre l'énergie fécale ou urinaire et l'énergie ingérée, entre l'énergie métabolisable et l'énergie digérée ou ingérée (n = 44).
Relationship between faecal or urinary and ingested energy, between metabolisable energy and ingested or digested energy (n = 44

FIG. 4

Some practical results are simultaneously shown: it is possible to feed male minks only with pellets withouttrouble in reproduction. The weight losses observed in summer and in December could be perhaps related with mortality observed in mink farms at these moments.

Ann. Zootech., 33, 1, 73-98, 1984.
7 tables, 7 figs., 38 references. Authors' summary.
In FREN. Summary in ENGL.

EFFECT OF DIETARY NaCl ON THE WATER AND ELECTROLYTE BALANCE ON MINK.

L. Eriksson, M.H. Valtonen, J. Mäkelä, Dept. of Physiology, Coll. of Vet. Med., Helsinki, Finland.

There are somewhat contradictionary views of the optimum level of sodium in mink food. Accidental salt poisoning killed thousands of minks in Finland spring 1982. Also experimental poisonings are reported (Pedersen 1972). On the other hand, sufficient amount of sodium is important for

lactating minks and salt increases the palatableness of food (Kangas 1974, Lund 1979). Therefore, we have studied, how salt content of food influences fluid balance in mink.

Adult healthy male minks were housed individually in metabolism cages at a room temperature of 18-20° C. There were 4 minks in every test group. They had an adaptation period of one week on the test diet. The test period lasted for 4 days. Water consumed and food eaten as well as the amount of faeces and urine was quantitatively measured. The control diet of fresh fish and meat offal contained 0.5% NaCl. The additon of salt into the diet varied from 0.5 to 2% of the wet weight.

The animals showed no signs of discomfort on the high salt diet and their appetite was good. Food consumption increased about 65%, when the salt concentration was elevated from 0.5% to 1.5 or 2.5%. There was parallel increase in the amount of faeces. The feacal water concentration was around 60-65% on all diets, and there were no significant changes in the faecal electrolyte concentrations. The faecal Na^+ excretion was about 30% of the renal Na^+ excretion on the control diet. The increase of faecal Na excretion on the high salt diets was thus attributable to increases of faecal amount.

The following table shows the mean daily drinking water consumption, urine volume, urine concentration and renal Na^+ excretion (means +/- SD).

NaCl % in food	drinking water (ml/d)	urine (ml/d)	Na^+ excr. (mmol/d)	osmolality (mOsm/kg)
0.5	64 $\pm$ 8	67 $\pm$ 19	9 $\pm$ 3	2014 $\pm$ 252
1.0	73 $\pm$ 18	80 $\pm$ 48	20 $\pm$ 10	2087 $\pm$ 158
1.5	128 $\pm$ 16	154 $\pm$ 28	53 $\pm$ 8	1798 $\pm$ 86
2.5	247 $\pm$ 19	269 $\pm$ 22	92 $\pm$ 4	1456 $\pm$ 133

Our result show that healthy minks well tolerate relatively high concentration of salt in their food, provided they have free access to water. High water intake and urinary Na^+ output are main means for elimination of salt excess.

Acta Physiologica Scand., (Sweden). Scand. Physiological Society Meeting, Oslo (Norway) 15-16 Apr. 1983. Vol. 118, 2, 35 A, June 1982, conference summary. (Only received summary).

3 references. ISSN 0001-6772. Authors' summary.

EFFECT OF DEXTROFER-100 AND DEXTROFER-100 WITH B12 ON THE GROWTH AND FERTILITY OF MINKS.

ВЛИЯНИЕ НА ДЕКСТРОФЕР 100 И ДЕКСТРОФЕР 100 С B_{12} ВЪРХУ РАСТЕЖА И ПЛОДОВИТОСТТА НА НОРКИ

N. Nankov, P. Gabrashanski, Central Laboratory of Biology and Diseases of Game Animals and a Clinic for Small Animals, Sofia, Bulgaria.

The effect ,was followed up of dextrofer-100 and dextrofer-100 with B12 on the growth and fertility of minks. It was found that the i/m injection of dextrofer-100 at the rate of 0.5 cm^3 per head (50 mg Fe^{3+}), twice, at the interval of 45 days to a total of 45-day-old minks did not effect essentially their growth. The i/m application of dextrofer-100 with vitamin B12 at 0.5 cm^3 per animal (50 mg Fe^{3+} and 40 mcg B12), singly in the beginning of the mating period to young female minks (at the age of 11 months) resulted in raising the number of offsprings from 3.4 to 4.68 (with impregnated females), and from 4.05 to 5.13 (with those that gave birth), and in lowering the number of those of the males that did not give birth as well as of those that gave birth but ate their offsprings. The weight of the obtained offsprings of the test and control males did not differ essentially between the age of 40 days and the age of 24 weeks.

Veterinary Science, 20, 3-4, 1983.
3 tables, 15 references. Authors' summary.
In BULG. Summaries in ENGL and RUSS.

"Now I have got a lot of kits.
How to get them growing?"

IRON AND TOTAL BINDING CAPACITY OF IRON BY SKUNKS AND FERRETS BLOOD PLASMA AND BY VIXENS BLOOD PLASMA FED WITH FEEDS WITH ADDITION OF FODDERS CONSERVED WITH CHEMICALS.

(Zelazo icalkowita zdolnoŝc jego viazania przez bialka osocza krwi tchòrzofretek (Mustela Putorius) i lisòw polarnych (Alopex lagopus L.) zywionych karma z dodatkiem pasz konserwowanych ŝrodkami chemicznymi).

Henryk Bieguszewski, Barbara Stanislawska, Oskar Lorek, Wojciech Rewers, Zaklad Fizjologii i Anatomii Zwierzat ATR, 85-084 Bydgoszcz, ul. H. Sawickiej 28, Poland.

Three experiments were performed: two on skunks and ferrets (males) and one on vixens-pregnant and lactating. In the first experiment the control group was given standard feeds in which 60% were plant feeds and 40% feeds of animal origin. In the experimental grouphalf the feeds of animal origin were replaced by conserved slaughter blood (conserved with sodium benzoate and sulphuric acid). In the second experiment the control group was feed on a standard dose, and in the experimental group half the feed of animal origin was replaced by conserved blood (25%) and conserved (with formaldehyde) slaughter offal (25%). In the third experiment, the control group of vixens was given the feed in which 60% were the feeds of animal origin-fresh slaughter blood and fresh slaughter offal. In the experimental group, the same amount of conserved blood (15%) was given and instead of half the fresh slaughter offal (15%) conserved slaughter offal was given. The level of Fe was marked in skunks and ferrets heart blood and in vixens taken from the v. cephalica antebrachii. The total binding capacity of iron by blood plasma was marked and the indicator of saturation of the blood plasma with iron (ISI) was counted. A statistically significant higher level ($P_{0.01}$) of blood plasma iron was found and higher possibilities of binding capacity of iron by blood plasma protein in both experimental groups of skunks and ferrets. the level of the examined factors in vixens group did not show any higher difference.

Zootechnika, 8. 1983, 13-22.
3 tables, 16 references. Authors' summary
In POLH. Summaries in ENGL and RUSS.

EFFECTS OF CHRONIC DIETARY HEXACHLOROBENZENE EXPOSURE ON ON THE REPRODUCTIVE PERFORMANCE AND SURVIVABILITY OF MINK AND EUROPEAN FERRETS.

M.R. Bleavins, R.J. Aulerich, R.K. Ringer, Dept. of Animal Science and Center for environmental Toxicology, Michigan State University, East Lansing, Michigan 48824-1225, USA.

Feeding adult mink and European ferrets diets that contained 1, 5 or 25 mg|kg added hexachlorobenzene (HCB) resulted in reduced reproductive performance as indicated by decreased litter size, increased percentage of stillbirths, increased kit mortality, and decreased early kit growth. Diets treated with 125 or 625 mg/kg HCB were lethal to the adults of both species. In general, the mink were more sensitive to the toxic effects of HCB than were ferrets.

In a second experiment, the cross-fostering of mink kits whelped by untreated dams to females fed 2.5 mg/kg HCB, and vice versa, resulted in increased kit mortality when compared to untreated controls. The in utero exposure to HCB, however, resulted in higher kit mortality than exposure via the dam's milk.

Arch.Environ.Contam.Toxicol. 13, 357-365, 1984.
8 tables, 47 references. Authors' summary.

HEXACHLOROBENZENE-INDUCED EFFECTS ON THE LYMPHOCYTE BLASTOGENIC RESPONSE TO CONCANAVALIN A IN THE MINK AND EUROPEAN FERRET.

Michael R. Bleavins, Richard J. Aulerich*, Robert K. Ringer,
* Dept. of Animal Science, Michigan State University, East Lansing, Michigan 48824, USA.

Hexachlorobenzene (HCB) was found to depress the lymphocyte blastogenic response of mink (Mustela vison) and European ferrets (Mustela putorius furo) to the plant lectin Concanavalin A (Con-A). A significant reduction in the incorporation of [^{3}H]thymidine was seen in

the lymphocytes from adult animals consuming 25 ppm dietaryHCB for 8 months. This effect was observed in animals showing no physical signs of distress or toxicity.

The in utero and early postnatal exposure of young mink to HCB also resulted in a significant depression of lymphocyte responsiveness. Exposure levels as low as 1 ppm in the dam's diet caused an impaired T-cell response. In the young ferret exposed to HCB in utero and during nursing, no change in the stimulation index was seen.

The monitoring of immunocompetence in animals exposed to toxicants, either through the diet or indirectly via their dam, provides a sensitive indicator of toxicity. Effects were seen in activation of lymphocytes from the mink and ferrets used in this study without grossly observable clinical signs being present.

Environmental Toxicology and Chemistry, Vol.2, 411-418, 1983.
4 tables, 38 references. Authors' summary.

HOW AND ON WHAT NUTRIAS ARE TO BE FED.

ЧЕМ И КАК КОРМИТЬ НУТРИЮ

V.F. Kladovshchikov, USSR.

Practical suggestions are given on feeding of nutrias. A table gives daily feed requirement in relation to age.

Krolikovodstvo i Zverovodstvo, no. 3, 30-32, 1983.
1 table. CAB-abstract.
In RUSS.

NEWS OF NUTRIAS

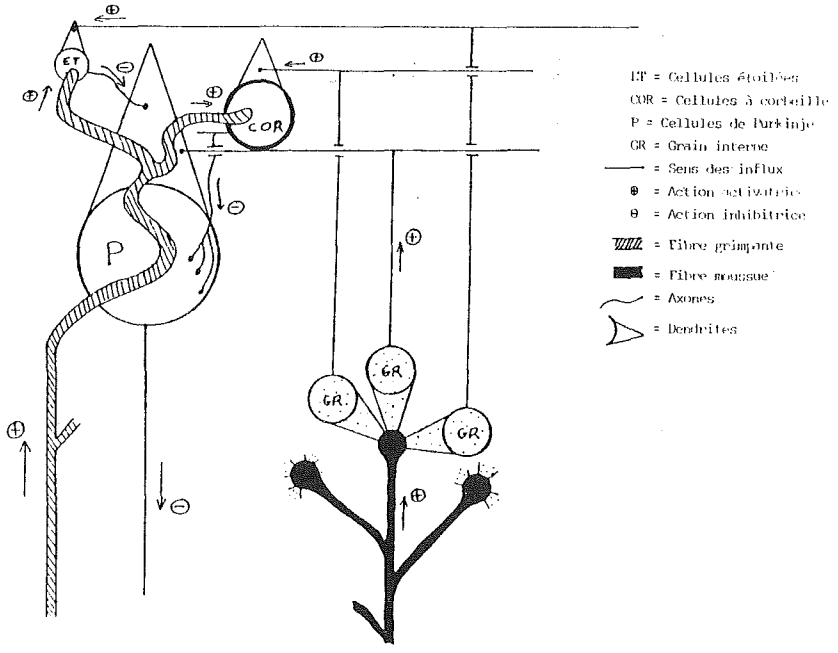
CONTRIBUTION TO MORPHOLOGIC STUDY OF CEREBELLOUS HYPOPLASIA STIMULATED IN KITTEN AND FERRET.

(Contribution a l'etude morphologique de l'hypoplasie cérébelleuse provoquée chez de chaton et le fureteau).

Erwan Longeart, Ecole Natl. Veterinaire de Toulouse, France.

It was the purpose of this work to produce lesions of hypoplasia cerebellosis and to study the morphological aspects. It was produced by neonatal inoculation of MEV 3 (parvovirus of mink) to the cat and to the ferret, and diluted PLI 4 of FPV (parvovirus of cat) which shows also a residual pathological activity.

The type of lesion observed compared to those given in the cerebel histogenesis allows to think that the parvoviridae besides their mitolytic action, show pathologic activity at the level of immature cells such as the Purkinje's cells.



Ecole Natl. Veterinaire, Toulouse, France, 1982. Thesis, 75 p.
37 figs, 3 tables, 35 references.
In FREN.

Summary translated by Nelly Blumenkrantz.

AUJESZKY'S DISEASE IN MINK.

(Ziekte van Aujexzky bij nertsen).

L.M.G. Geurden, A. Devos, N. Viaene, M. Staelens, Belgium.

The authors mention cases of pseudorabies that occurred in a mink farm but remained localized to some parts. Symptoms were: tonic and clonic muscular contractions, troubles of the equilibrium, alteration of periods of excitation with periods of depression, itch, automutilation. The evolution was very fast with death after 24 to 96 hours. The observed lesions were: infarcti in a no much enlarged spleen, lung congestion and oedema, liquid in the pericard, hearths of degeneration in the myocard. The diagnosis was confirmed by the inoculation of the brain in rabbits. The authors discuss extensively the possible origin of the disease. After having excluded contamination by infected rats, they make on this subject some hypotheses: contamination by means of blood of infected pigs, propagation bythe needle used a few days before in the vaccination against distemper, transmission of the disease by ectoparasites. All attempts for immunizing rabbits against pseudo-rabies were vain. As the total mortality was relatively important (6.7%), pseudorabies seems to may be added to the classical infections (anthrax, tuberculosis) that provoke serious losses in mink farms.

Vlaams Diergeneeskundig Tijdschrift, 1963, 32,2, 36-47.
5 photos, 9 references. Authors' summary.
In DUTH: Summaries in FREN, GERM and ENGL.
(Translated from Dutch, TT 80-53940, Natl. Call no. Transl.29056)

SENSITIVE RADIOIMMUNE ASSAY FOR MEASURING ALEUTIAN DISEASE VIRUS ANTIGEN AND ANTIBODY.

Bent Aasted, Marshall E. Bloom, Royal Vet. and Agric. University, Dept. of Vet. Virology and Immunology, Bülowsvej 13, DK-1870 Copenhagen V.

A solid-phase, one-step radioimmune assay was developed which could detect as little as 0.02 µl of a standard Aleutian disease virus antigen

preparation, approximately 3.2 ng of viral protein. Virus antigen was measured in different mink organs and cell types during experimental intraperitoneal infection. The gut and kidney were the first organs in which virus antigen could be detected (day 3 to 6 after infection). On day 6 or later virus antigen was found in spleen, liver, kidney, lymph nodes, peritoneal exudate, and bone marrow cells. With inhibition of antigen binding, a radioimmune assay was developed for antibody detection. Viral antibodies could be detected as early as 3 days after infection. Antibody titers from $1/10^5$ to more than $1/10^6$ were found i plasmacytotic mink. When the sensitivity of the antibody radioimmune assay was compared with that of other known methods for anti-Aleutian disease virus quantitation, the radioimmune assay was considerably more sensitive, detecting as little as 5 ng of antibody.

Journ. of Clin. Microbiology, 18,3, 1983. 637-644.
3 figs., 2 tables, 16 references. Authors' summary.

STUDIES OF THE PATHOGENESIS OF ALUTIAN DISEASE OF MINK. XI. DIFFERENTIATION OF IMMUNE COMPLEX GLOMERULONEPHRITIS.

R. Müller-Peddinghaus, G. Trautwein, Kali-Chemie-Pharma, Exp. Pathol., Hns-Böckler-Allee 20, D-3000 Hannover 1.

New knowledge concerning the clinical course and pathogenesis of Aleutian disease (AD) of mink can be gained by classifying the glomerulopathies occurring in this disease into 4 basic forms, i.e. exudative, kesangioproliferative, mesangial-sclerosing, and membranous glomerulonephritis (GN). These different forms occurred in 4 experiments with different frequency. The severity of glomerular lesions increased markedly between 4 to 8 weeks post infection. Exudative GN occurred only in mink with severe clinically manifest AD (14/105; 13%). Additionally, vascular changes, i.e. necrotizing arteritis, in the kidneys and other organs were frequent. Mesangioproliferative GN was diagnosed in 18% (19/105) of mink with serological and histological manifestation of AD. In the majority of mink with mesangial-sclerosing GN (65/105; 62%) the glomerular changes were graded as minimal or slight (n = 49).

Twenty of the latter had inapparent AD. In some cases mesangial-sclerosing GN was associated with necrotizing arteritis. Membraneous

gN with spikes was diagnosed in 7 out of 105 mink (7%). This form is not associated with necrotizing arteritis. Only 2 og 21 control mink were devoid of glomerular changes. The degree of lesions in the liver, spleen, and interstitial tissue of the kidneys was strikingly correlated with the severity of GN. It is assumed that circulating pathogenic immune complexes are responsible for the vascular lesions present in the kidney, liver, lung, and central nervous system. The feasibility and necessity of sequential studies in individual mink underline the importance of AD as a model for humam Systemic lupus erythematosus.

Zbl. Vet. Med.B. 30, 434-454, 1983.
12 figs., 4 tables, 67 references. Authors' summary.

AUTOIMMUNITY IN ALEUTIAN DISEASE: CONTRIBUTION OF ANTIVIRAL AND ANTI-DNA ANTIBODY TO HYPERGAMMAGLOBULINEMIA.

Edwin C. Hahn, Patricia S. Hahn, College of Vet. Med., University of Illinois, Urbana, Illinois 61801.

The contributions to Aleutian disease gammopathy of specific antiviral antibody and an autoimmune component, anti-DNA antibody, were studied with pastel ranch mink naturally infected with Aleutian disease virus. Specific antibody activities were determined by countercurrent immuno-electrophoresis and radioimmune assay, respectively. Gamma globulin levels (percent γ) were determined by serum electrophoresis. Within an infected mink population, it was possible to predict the level of gammopathy from measurement of the two antibody levels. For the mink serum samples used, there was better correlation between anti-DNA antibody levels and total serum immunoglobulin than between anti-Aleutian disease virus antibody titer and percent γ. With serum samples taken over a 2-week interval, significant incrases were measured in anti-DNA antibody and percent γ. Increases in anti-Aleutian disease virus titers during this period were not significant.

The results suggest that the continuing increases in serum immunoglobulin in Aleutian disease virus-infected mink are due to both a specific antiviral response and an autoimmune response, as reflected in generation of anti-DNA antibody.

Infection and Immunity, 41,1, 1983, 494-500.
4 tables, 3 figs., 27 references. Authors' summary.

VIRUS HEPATITIS ASSOCIATED WITH ABORTION IN COYPU.

(Elvetéléssel járó vírusos májgyulladás nutriában).

M. Dobos-Kovács, J. Skultéti, Budapest, Landler J.u.2, 1400, Hungary.

In a private coypu (Myocastor coypus) stock, a disease was observed that affected only the pregnant females out of the animals with different ages kept together. The clinical symptoms lasting for 12 to 24 hours were anorexia, weakness, staggering gait and abortion. All the affected animals (half of the pregnant females) died.

The pathological and histopathological examinations revealed that the coypus died due to a virus hepatitis characterised by a hepatic dystrophy (with necrobiotic fatty ilfiltration and necrosis of solitary and grouped hepatocytes), diffuse activation and focal proliferation of RHS cells in the liver, as well as by a subacute perivascular infiltration by inflammatory celles around the portal blood vessels and nuclear inclusions in the hepatocytes.

The electron microscopic examination revealed numerous viral particles in the intranuclear inclusions of hepatocytes. On the basis of their size and morphology, the particles were identified as adenovirus.

It is supposed that the disease may be identical with that reported by Karstad an Budd (1963) in Canada in coypus.

Magyar Állatorvosok Lapja 38, 3, 1983. 176-179.
5 figs., 2 references. Authors' summary.
In HUNG. Summaries in ENGL and RUSS.

USE OF AUTOVACCINE AND VACCINE POLYTYPHOVAC IN THE PROPHYLAXIS AGAINST SALMONELLOSIS IN FOXES.

(Wyniki stosowania autoszczepionki i szczepionki Polityphovac w zapobieganiu salmonelozie lisów).

A. Kopczewski, M. Stryszak, C. Chyliński, ul. Kaprów 10, 80-316 Gdańsk-Oliwa, Poland.

The purposes of the examinations was to determine the efficacy of prophyylactic vaccinations against salmonellosis taking into consideration the breeding results of animals vaccinated and controls. The studies were performed on a fox farm including 2040 animals of basic flock and 10,968 born, and 9166 reared pups. The animals were divided into three groups. The first group of foxes was vaccinated with autovaccine, the second with vaccine Polityphovac-Biowet and the third constituted the control one. After the vaccinations the foxes were under strict control during mating, pregnancy, parturition, and rearing of pups. It was found that the vaccinations protected the animals against salmonellosis especially the group of animals that had been given autovaccine. The percentage of reared foxes was higher in vaccinated than in control animals.

Medycyna Weterynaryjna, 39,5, 1983, 264-266.
2 tables, 18 references. Authors' summary.
In POLH. Summaries in RUSS and ENGL.

EXPERIMENTAL INFECTIONS OF SARCOCYSTIS CRUZI, SARCOCYSTIS TENELLA, SARCOCYSTIS CAPRACANIS AND TOXOPLASMA GONDII IN RED FOXES (VULPES VULPES).

J.P. Dubey, Animal Parasitology Institute, U.S. Dept. of Agriculture, Agricultural Research Service, Beltsville, Maryland 20705, USA.

Four littermate 6-wk-old red foxes (Nos. 1-4) were fed Toxoplasma gondii, Sarcocystis cruzi, S. tenella and S. capracanis. One littermate fox (No. 5) served as the control. Two foxes (Nos. 1,2) were fed tissue cysts of T. Gondii and two foxes (Nos. 3,4) were fed oocysts of T. gondii. Twenty-one to 42 days later, the same five foxes were used to test the

infectivity of meat og goat, sheep, and ox experimentally inoculated with Sarcocystis. Fox 2 was fed goat meal and shed S. capracanis-like sporocysts 10 days later. Foxes 3 and 4 were fed beef, and they shed S. cruzi-like sporocysts 9 days later. Fox 5 was fed sheep meat and shed S. tenella-like sporocysts 8 days later. Foxes were killed between 36 and 55 days of the experiment and their tissues were inoculated into mice to recover T. gondii. All foxes remained clinically normal and T. gondii was recovered from all inoculated foxes and not from the control. Sarcosystis sporocysts from foxes induced lethal infections in goats, sheep, and ox. The sporocysts, meronts, merozoites, and sarcocysts of fox-derived parasites were similar to those derived from coyotes or dogs. It was concluded that the red fox can act as a final host tor the three pathogenic species of Sarcocystis in cattle, sheep, and goats.

Journ. of Wildlife Diseases, 19,3, 1983, 200-203.
1 table, 20 references. Author's summary.

HEALTH PROBLEMS IN A NEWLY ESTABLISHED FUR FARMING AREA IN EASTERN FINLAND.

Hannu Korhonen, Mikko Harri, Dept. of Applied Zoology, University of Kuopio, POB 138, SF-70101 Kuopio 10, Finland.

Health problems of newly established fur farms were defined in Kuopio Province. Three methods of data collection were used:
1) interviews with local farmers,
2) authors' personal observations, and
3) determination of endoparasitic infestation.
Sanitation on farms were found to be rather good. The most commonly occurring diseases were urinary tract inflammations, intestinal infections and ectoparasites. However, health conditions were found to be satisfactory and most problems were of economic nature.

Nord. Vet.-Med., 35, 1983, 95-100.
5 tables, 14 references. Authors' summary.
In ENGL. Summary in SWED.

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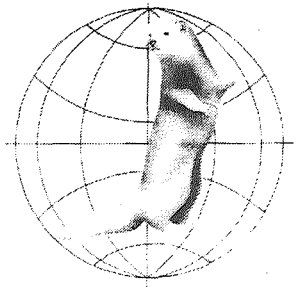

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RESUME DES COMMUNICATIONS
ABSTRACTS OF PAPERS

VERSAILLES

25-27 AVRIL 1984

Genetics and Selection

EVOLUTIONARY AND SELECTIONAL ASPECTS OF IMMUNOGENETIC SYSTEMS OF MINK

Oleg K. Baranov and D.K. Belyaev

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

In our laboratory, peculiarities of genome evolution of mink (M.vison) are studied on immunogenetic models. These models are genetic systems combining alloantigens (allotypes), which are diverse and the most powerful of all serum proteins of this species of fur animal. A rapid and considerable reorganization of the Lpm system took place during evolution. The twelve Lpm genes known in mink can be divided into two classes, contrasting in their phylogenetic and populational expression. The first class consists of constitutive genes Lpm ^{6,9,10,11}, which are encounted in the monomorphic or almost monomorphic state in all studied species of mustelids. The genes Lpm $^{1-5,7,8,12}$, of the second class are found only in mink. They make the principle contribution to the intraspecific Lpm polymorphism in mink. Compared to the essential modifications in other mustelids, those in mink occurred in the gene complex of the immunoglobulin heavy chains. This fact was confirmed by testing the allotypes and isotypes of mink immunoglobulin subunits in different species of mustelids. Each of the simple genetic systems of immunoglobulin light chains (Ll) and low-density lipoprotein (Ld) has one phylogenetically ancient gene (Ll^A and Ld^1, respectively) and one presumably specific to mink (Ll^B and Ld^2, respectively). Thus, in each of the mink immunogenetic systems considered qualitative changes occurred which are mostly expressed in the multigenic Lpm families and the heavy immunoglobulin chains. Of great interest is the elucidation of selective value and evolutionary genetic mechanisms of such striking reorganization of the genome elements during the course of species evolution in domesticated mink.

SPONTANEOUS CHIMEARAS AT THE EARLY POSTNATAL PERIOD IN MINK

D.K. Belyaev, - Galina K. Isakova

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

Chromosome complements of 0.5-1.5-day old mink (both Standard Dark and mutant for the coat colour) were analysed. Among 102 pups, 10 were found to be composed of two cell lines : diploid-triploid chimeras 2n/3n (3 pups, one Standard Dark and the others mutant) and sex chromosome chimeras 2n,XX/2n,XY (7 pups, two Standard Dark and the other mutants). All three 2n/3n and the two XX/XY chimeric pups were of normal body weight. Chimaerism frequency tended to increase in mink homozygous or heterozygous for Aleutian, Shadow, or Hedlund genes. Possible sources of chimaerism are discussed. It is supposed that chimaerism in mink may be both of primary and secondary origin.

SELECTION FOR LITTER SIZE IN MINK

- Preleminary results after 4 generations of selection -

Einar J. Einarsson

Department of Poultry and Fur Animal Science, Agricultural University of Norway, Box 17, 1431 Ås-NLH, Norway.

In 1978 three lines were established from a base population of 230 litters of dark mink. Increased litter size was selected in one line (H), decreased litter size in another (L) and an unselected line was kept as a control (C). Each line consisted of about 55 females and 20 males per year. In order to minimize the generation interval, only 1-year old animals were used. Selection was carried out according to an index which included information about total kits born (alive and stillborn) from different sources. The information sources used in the index were : dam, fullsisters and halfsisters of the dam and fullsisters and halfsisters of the sire. After 4 generations of selection, the average yearly deviation from the control line of total kits born per litter was + 0.12 for the high line and - 0.09 for the low line. The corresponding figures per year for litter size at weaning per mated female were + 0.16 and - 0.14. There were indications of decreased postnatal mortality in the high line. Selection for litter size did not seem to affect other parameters, i.e. pelt characteristics (density, colour, hair quality, and general fur quality), body weight and body length at pelting.

SELECTION INDEX OF FERTILITY IN MINK

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Reproduction is an essential trait in mink breeding as it is in other species. Heritability for trait litter size at three weeks of age has been estimated as about 20% in different investigations. This trait includes litter size at birth as well as maternal ability and survival rate of the kits, and it is therefore suggested that this trait be used in breeding evaluation of mink for fertility. A selection index for litter size at 3 weeks of age has been constructed. In calculating the pedigree index of kits in a litter, the dam, the full sibs of the dam and the sire, as well as the maternal and the paternal grand dams, are used as sources of information. The reliability of the dam index was tested. The regression of litter size of young daughters on index values of their dams was found to be 0.15 which is close to the expected value 0.16. Selection in mink breeding is usually carried out in different stages. Primarily, one should select litters already at the age of weaning, depending on index values for litter size. Kits with low indes values, being non-potential breeding animals should be placed in separate houses. The pedigree index is also taken into consideration in the final selection of breeding animals, as well as the female index when culling older females. The expected genetic trend of litter size, defined by the selection index and using assumptions corresponding to a "normal" situation, has been calculated as + 0.1 kits per year.

RESULTS OF CROSSING RED FOX WITH SILVER FOX

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The increasing demand for warm-colour fox skins has caused many breeders in Poland to start keeping wild red fox in cages. However, the great variability of colour and the weak structure of the hair cover of that fox have necessitated crossing it with silver fox. Crossbreeds from the first generation are characterized by a red colour and the quality of fur structure is improved, being thicker and softer ; hair length is also equalized. Back-crossings of crossbreeds with silver fox were carried out in order to preserve red colour as the dominant trait and to attain silver fox fur structure at the same time. Simultaneously, the foxes were selected according to intensity of pigmentation and reduction of silvering. After having achieved a satisfactory level of fur structure features after 4-5 generations of back-crossing, we began crossing the so-called "flaming" (as the new variety is called) foxes among themselves. 11 cases of flaming x flaming crossing and flaming x silver were analyzed in 1983. The first kind of crossing resulted in 49 young foxes : 40 flaming and 9 silver ; the second in 225 young foxes : 97 silver, 112 flaming and 16 "bay" i.e. silver with red guard hair. The bay fox is particularly interesting due to the genetic conditioning of its colour. The hair cover of the bay fox is black as in silver fox, however, a large portion of guard hair, near the mouth, legs and on both sides, is red. By investigating colour splitting among young foxes originating from various kinds of crossings, the authors conclude that hereditary conditioning of the red colour is not so simple as it was thought to be and the colour of the bay fox seems to confirm this view even more.

A REVIEW OF NAMES AND GENETIC SYMBOLS OF MUTATIONS IN FUR ANIMALS

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Mutations are fairly common among all farm-bred fur animals. Especially numerous colour types are known in all species of fur animals. In many cases, these mutations have been discovered or examined independently by scientists in different countries and, therefore, different names and gene symbols have been used for the same mutation. Geneticists in Scandinavia agreed on a common system of mutation names and gene symbols for mink in 1963 and of foxes in 1981. The other more known systems are the American and east European ones. The existence of different gene-symbol systems often causes confusion and difficulty when studying the literature from the different countries. In order to help scientists and others working on or interested in qualitative genetics, a review of mutation types has been compiled which gives the corresponding genetic names and symbols in the above three systems. The review includes mutations in mink (Mustela vison), foxes (Vulpes vulpes and Alopex lagopus), raccoon dog (Nyctereutes procyonoides) and ferret (Mustela putorius). Reference is also made to special marketing names in cases where they are in common use.

Poster

NEW COLOUR MUTATIONS - WHITE RACCOON DOG AND PASTEL FERRET

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Mutations affecting coat colour are fairly common in all farm-bred fur animals. Several genetically different colour types are known (e.g. mink : Mustela vison, fox : Vulpes vulpes and Alopex lagopus ; coypu : Myocastor coypus ; chinchilla : Chinchilla lanigera). With the increasing production of raccoon dogs (Nyctereutes procyonoides) and ferrets (Mustela putorius) the tendency to mutations has also become evident in these species. The wild-type raccoon dog has a greyish brown coat colour. The underfur has varying shades of grey, sometimes with yellowish brown tops. The guard hairs vary from almost black to yellow and have shorter or longer light bands which give the coat a motley, spotted appearance. A mutation found in 1979 in south-eastern Finland is totally white with coloured eyes and black nose. The inheritance of the type was studied on Helve's research farm in 1982 and 1983. The colour factor responsible for this type was proved to be a dominant gene. More investigations, however, are needed to determine whether homozygous individuals also exist. The colour type was called white raccoon dog and the genetic factor was indicated by the symbol W (heterozygous genotype Ww). The ferret has previously occurred in two colours : the standard ferret, which is a double-coloured type with dark (dark brown or black) guard hairs and light (white or yellow) underfur, and an albino ferret which is yellowish white red eyes. In agreement with gene symbols for albino type of other species the letter c has been assigned to this recessive colour type (genotype cc). A new mutation, found on a farm in Scotland and which later turned up on several farms in Scandinavia, is pastel ferret with much lighter brown guard hair than the standard ferret. The letter b has been suggested as the gene symbol for this recessive colour

2

Nutrition and Metabolism

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NUTRITIVE VALUE OF ENZYMATICALLY PRE-HYDROLYSED SOYBEAN MEAL FOR MINK

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Soybean meal (SBM) is recognized to have lower nutritive value than meat for mink, partly due at least to inferior digestibility. Therefore, experiments were conducted to ascertain whether SBM could be improved by pre-hydrolysis using proteolytic enzymes, namely pancreatin, papain and pepsin. The hydrolyses were carried out at 5% concentration in buffered solutions for 5 hrs at 37° C. After drying, hydrolysed SBMs were incorporated in mink diets and the latter were compared to untreated SBM and conventional diets. In the first experiment, SBM treated with pancreatin was used at 3 levels : 5%, 10% and 15% (wet matter basis) ; in the second experiment conducted the following year, SBM treated with papain or pepsin was used at only at dietary level, namely 10% (wet matter basis). Both experiments used 15 male kits per treatment and lasted approx. 20 wks (July to pelting). Best growth was always obtained using a conventional diet and worst growth with a diet containing 15% SBM. Comparing untreated SBM vs treated SBMs, the growth effect was minimal, although in many cases enzyme treatment was favorable. There was no difference in dietary DM intake resulting from enzyme treatment, but kits fed the conventional diet ate less and kits fed the 15% SBM diet ate more than the others. Pelt quality was largely unaffected by the treatments employed. Using rats, DM digestibility and PER values were measured for untreated SBM and for SBM treated with papain or pepsin : in both instances, the values were unaffected by enzymatic treatments. Even though laboratory tests had shown that enzymatic hydrolysis of SBM led to 60-70% solubilization of protein N, the situation reported above did not show a beneficial effect due to the enzyme when ascertained by mink live performances or by digestibility results. (Financial support for these experiments was obtained from "Conseil des Recherches de Services Agricoles du Québec (CRESAQ)".

PROTEIN DIGESTIBILITY AND WATER AND NITROGEN BALANCE STUDIES IN MINK USING DIFFERENT PROTEIN LEVELS

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Protein constitutes the most expensive part of mink food. Lowering the protein content would therefore be justified on condition that nutritional requirements are satisfied. Growth trials have shown that it is possible to produce good quality mink with a reduced protein content. In this paper, we studied how varying the protein content in the food influenced protein digestibility and water and nitrogen balance in minks. Healthy adult, male minks were divided into test groups of five and housed individually in metabolism cages. During the 4-day sampling period, water and food ingested as well as faeces and urine were quantified and stored for later analysis. The high-protein, normal low-protein, and protein-free diets used contained 53, 35, 19 and 0% protein, respectively, of the metabolizable energy (ME). With protein digestibilities of 81.5, 84.5 and 81.0% there were no significant differences between the diets containing protein. However, there was a tendency towards higher protein digestibility at the 35% ME level compared to the 53% ME level. Similar results have been shown in earlier studies. In decreasing order from high to 0-protein levels, nitrogen balance was + 0.1 g, + 0.8 g, + 0.7 g and - 0.4 g N/mink/day ; plasma protein concentrations were 71 g, 81 g, 75 g, and 52 g/1 ; and plasma urea concentrations were 11 mmol, 11 mmol, 8 mmol and 5 mmol1/1. The total water intake per g of ingested dry matter was positively correlated with the nitrogen content of the food. The amount of urine and urea excretion diminished in parallel with decreasing dietary protein.

BIOLOGICAL CONSERVATION OF RAW MATERIALS USED FOR FUR ANIMAL FEEDING

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Thanks to biotechnology, new solutions are now available in the area of conservation of raw materials for fur animal feeding. Biological conservation challenges two traditional processes because its goal is fundamental: abolition of dependence on energy for food freezing and all the risks (overdosing, corrosion, toxicity) inherent in the use of mineral acids. Biological silage allows storage without risk at ambient temperature during a given period (several days to several months). The used ABC conservator contains homofermentative lactic bacteria selected from Lactobacilli and Streptococci strains which, by lactic acidification and bacterial competition, maintain the silage in a very good bacteriological and nutritional condition. These technical applications have been realized in 1982 and 1983 in France, Finland and Ireland.

ENERGY METABOLISM IN MINK DURING THE GROWTH PERIOD

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Energy metabolism during the growth period (July to November) in mink has been elucidated by means of a slaughter technique. Mink kit consumption of metabolizable energy (ME) to cover maintenance (ME_m) has been studied under Danish farm conditions. In this context, ME_m was defined as energy consumption for basal metabolism, thermoregulation and muscle activity. The trial included 30 male Pastel kits fed ad lib. and killed between July 3rd and November 13th. The consumption of ME for deposition from July 3rd up to slaughter was calculated on the basis of carcass protein and fat contents, assuming two different ratios of utilization (K_g) for the ME used for protein and fat deposition (50 and 90% ; 45 and 80%, respectively). The calculated consumption of ME for deposition in animals killed after the first two weeks of the experimental period amounted to 32 or 36% of the ME supplied ; in mink killed at the conclusion of the experiment it amounted to 22 or 24%, depending on the K_g values used. ME_m was taken as the ME residue. Average daily consumption in relation to length of the period was calculated from July 3rd to slaughter of the individual animals. ME_m in relation to length of the period was expressed as a power function ($y = ax^b$) as was the live weight of the animals. On this basis, daily ME_m consumption at various times during the experimental period was calculated. ME_m consumption increased in July perhaps because the kits had not yet reached maximal physical activity at that time. After July, the level of ME consumption was practically constant when expressed in per kg live weight. Calculations based on metabolic body size ($kg^{0.75}$) did not lead to greater uniformity of the values. According to the method used, the following values for ME_m/day/kg live weight were recorded : beginning of July, 150 kcal rising to 170 kcal towards the end of July ; from August to the time of pelting, 170-175 kcal.

FATTY ACID COMPOSITION OF MINK FEED

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Fatty acid composition and total lipids were analyzed from feed samples taken from seven central feed kitchens during the summer period (June-July-August) and during the autumn period (September-October-November). Total lipids in feed dry matter were 18.4 ± 3.8% in 31 samples of summer feed and 21.1 ± 4.4% in 45 samples of autumn feed. The content of essential fatty acids (linoleic, linolenic and arachidonic) of all fatty acids were 17.0 ± 3.5% in summer feed and 17.7 ± 3.4% in autumn feed. The content of saturated and monounsaturated fatty acids in summer feed was 64.9 ± 6.0% and 69.1 ± 9.3% in autumn feed. The corresponding figures for polyunsaturated fatty were 32.3 ± 6.0 and 28.3 ± 8.7.

ENERGY ECONOMY OF FARMED RACCOON DOGS DURING WINTER

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The raccoon dog (Nyctereutes procyonoides) is a furbearer which has been intensively farmed in Finland for about 10 years. Since this species is a member of the family Canidae, it has been routinely housed under the same conditions as blue fox (Alopex lagopus). However, originally their climatic living habitats were clearly different. The aim of this study was to measure the metabolic rate and heat loss of winter-furred raccoon dogs in a climatic chamber and under natural rearing conditions. The metabolic rate was determined by measuring oxygen consumption vs. ambient temperature using an open air-flow system. To evaluate the thermal protection provided by the nest and the importance of the ventral surface as an avenue for conductive heat loss, the cooling rates of deceased raccoon dogs were determined when the animals were (1) lying on a table with or without a styrofoam mat and (2) inside a wooden nest. An AGA *Thermovision* 720 *infrared* system was used to evaluate differences in the heat loss of various body regions. The lower critical temperature (T_{1C}) of the raccoon dog was slightly over + 10°C. Below thermoneutrality the metabolic rate could be described with the equation y=14.8-0.28x. Representative infrared thermographs showed that the face, paws, abdomen and chest were the greatest heat loss routes. The styrofoam mat and nest decreased the heat loss by about 40 and 60%, respectively. The results support the idea that raccoon dogs should be offered some kind of protection, either a nest or at least a rest-shelf in the cage. This way the feeding costs could be reduced through the decreased amounts of energy needed for the maintenance of homeothermy.

MINK CREATININE EXCRETION

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Experimental studies on the creatinine excretion of the mink involving 40 adult males indicate 0.68 ± 0.37 mg/ml, 47.2 ± 7.8 mg/day and 25.6 ± 3.9 mg/day/kg body weight.

EFFECTS OF FEEDING ENZYME-TREATED SOYBEAN MEAL ON BLOOD AMINO ACIDS AND BRAIN NEUROTRANSMITTERS IN MINK (Mustela vison)

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During post-weaning growth and furring, 42 male Pastel kits were distributed into 4 groups. One group received a conventional diet made up of 4 : 1 of raw meat and commercial cereal mix, whereas the other groups were fed diets containing, on a wet-matter basis, 10% soybean meal, 10% soybean meal pre-hydrolysed with pepsin or 10% soybean meal pre-hydrolysed with papain. Dry matter, protein and energy contents were approximately the same in all diets. Weight gain over 20 weeks was significantly lower in soybean meal-fed groups compared to the one fed the conventional diet. Serum amino acids and brain biogenic amines were measured. When mink were fed pepsin-treated soybean meal, there was a significant increase in methionine, taurine, glycine and arginine contents compared to the groups fed the conventional or soybean diets. In the pepsin-treated group, the urea level was significantly lower than in the groups fed untreated or papain-treated soybean meal, suggesting that pepsin treatment decreases protein catabolism. In the papain-treated group, there was more tryptophan in the serum, suggesting more availability for the brain and for serotonin synthesis. In this respect, comparing papain and pepsin treatments, the serotonin content was significantly higher ($P < .01$) for the papain than for the pepsin group but in the same order of magnitude as for the conventional or soybean-meal groups. A greater utilization of serotonin in the pepsin group and a greater mobilization of serotonin in the papain group seem to dissociate these two treatments on the basis of neurotransmitter synthesis as well as of the availability of amino acids. On the other hand, whole brain noradrenaline content was significantly decreased ($P < .01$) with both pepsin and papain treatments compared to the conventional and untreated soybean-meal groups, suggesting a greater noradrenaline utilization. (This research was supported by NSERC and CRESAQ grants).

ADAPTATION OF EXOCRINE PANCREATIC SECRETION IN MINK TO DIET COMPOSITION

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The enzyme composition of exocrine pancreatic secretion in several animal species adapts to components in the diet (DESNUELLE et al., 1962 ; BEHRAN and KARE, 1969 ; CORRING and SAUCIER, 1972). The gastrointestinal tract of mink is very different from that of other monogastric animals (LAPLACE and ROUGEOT, 1976), and its diet is generally very rich in high quality protein. The aim of the present work was to establish whether exocrine pancreatic secretion in mink adapts to changes in diet composition. Thirty male dark minks, six months old, were used. They were divided into two equal groups, one reciving a high carbohydrate diet and the other a high lipid diet. All animals were sacrificed after thirty-two days of adaptation to each diet. Immediately after slaughter the pancreas was excised ; its apparent fatty tissue removed and fresh weight and protein content as well as trypsin, chymotrypsin, amylase and lipase activities were determined. Weight, protein content and trypsin, chymotrypsin and amylase activities were not significantly changed by either diet. On the other hand, lipase activity, whatever its mode of expression (total, per g of tissu or specific, i.e. per mg of protein), appeared to be significantly higher in mink fed the diet with the highest lipid content. The results obtained in our experimental conditions show that mink pancreatic lipase adapts to dietary fat content. In this species, pancreatic amylase does not seem to be sensitive to variations in dietary carbohydrate supply. This may in part explain why this carnivorous animal does not tolerate very well diets in which the carbohydrate content exceeds a level that we shall attempt to determine in the near future.

EVALUATION OF CAPELIN OIL AS AN ENERGY SOURCE IN MINK DIETS

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Fats are used extensively to supplement the diets of fur animals. In Norway, marine oils are available in large quantities. At present, the capelin (Mallotus villosus) is a major raw material of the Norwegian fish meal and oil industry. The present study aimed at evaluating capelin oil as a source of supplemental fat in mink diets. Three different batches of commercial capelin oil were investigated. The fatty acid compositions revealed the characteristic features of marine oil. The apparent fat digestibilities in mink ranged from 94.8 to 96.2%. Two experiments, involving a total of 480 animals, were carried out with dark mink kits during the growing/furring period. Capelin oil was used to replace lard in conventional wet-type control diets. The consumption of capelin oil amounted to 33-66 percent of dietary digestible fat. Animal performance throughout the experimental periods revealed no consistent effects of replacing lard with capelin oil. Thus final body size and fur quality were unaffected by dietary treatment. Mortality losses were considered as normal and did not appear to be associated with diets. Examination of carcasses at pelting disclosed no cases of yellowish discoloration of adipose tissues or other abnormalities. The fatty acid composition of livers and subcutaneous abdominal fat reflected to a certain extent the fatty acid profile of the supplemental fats. The feeding of capelin oil caused increased accumulation of typical marine fatty acids as C20:1, C20:5, C22:1, and C22:6.

ASCORBIC ACID SUPPLEMENTATION IN FEED RATIONS FOR MINK

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Two experiments were carried out in which the efficiency of ascorbic acid added to feed rations for mink was studied. Experiment 1 involved 400 females and 125 males (standard) and covered the period from February 10 to weaning of the young. The five groups included 80 females and 25 males each, and the animals received either 8 mg or 4 mg of vitamin C daily/per kg liveweight in combination with the same dose of vitamin E. Using the same level of vitamin application, experiment 2 involved 150 young males 10 to 26 weeks old. Combined supplements of vitamin C and E did not significantly increase the mean size of the litter, yet they caused a drop in the number of sterile females or females giving birth to dead kits. Similar differences were found in the mortality of the young from birth to weaning, showing the beneficial effect of vitamins C and E. Changes in the liveweight of young mink due to vitamin supplementation were not significant. Fortification of mink feeds with vitamin C affected its level in the blood serum.

EFFECTS OF FLUSHING MINK : PRELIMINARY RESULTS

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The effects of flushing mink were investigated in an experiment with three groups of 50 standard females (groups 1-3) and one group of 10 standard females (group 4). At the start of the experiment (January 24, 1983), average live weights were similar for all groups. All groups were fed the same diet and until February 16 were given the same daily amounts, calculated to keep the animals in energy balance. From then on, groups 2-4 were fed reduced amounts of feed which resulted in weight loss. Flushing, initiated on March 3 for group 2 and on March 10 for group 3, was carried out by feeding the animals ad lib. Group 4 females were flushed by doubling the amount of feed given on the day of mating (starting on March 7) and the following day, whereas the flushing of groups 1-3 ended immediately after the final mating of the individual. On April 15, five females per group were sacrificed and the number of corpora lutea and implanted foetuses counted. The number of corpora lutea tended to be higher in groups 2 and 3 than in groups 1 and 4, but the differences were not statistically significant. The reproductive results were good in all groups : 5.5, 6.5, 5.3, and 6.2 kits per mated female were born respectively in groups 1-4. Litter size was 5.9, 7.2, 5.7 and 6.2 kits, respectively, and it differed significantly between groups. The results of this experiment indicate that flushing had a positive effect on the reproduction of female mink fed according to the model used for group 2.

Poster

COMPARAISON OF 3 FEEDING SYSTEMS FOR MINK : CONVENTIONAL vs SEMI-COMPLETE vs PELLETS

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Two feeding trials were carried out to compare the effectiveness of 3 feeding systems for mink during post-weaning growth and furring. The conventional diet contained 20% ordinary cereal mix ; the semi-complete diet contained 37% cereal mix supplemented with animal meals ; of course, the pellets were complete by themselves. In 1982, each experimental group was made up of 90 males and 80 females ; in 1983 only males were used (100 per group). Diets were fed ad libitum from sometime in July until pelting in November. For this abstract, only results from the 1982 trial are presented. At pelting in both sexes, the heaviest kits were those fed the semi-complete diet (males : 2200 g, females : 1050 g), followed by those fed the conventional diet (males : 2150 g ; females : 1000 g), and lastly by those fed pellets (males : 1800 g ; females : 850 g). The intermediate results on body growth in the 1983 trial generally appeared to follow this same general trend. In 1982, the longest pelts were obtained when the kits had been fed the conventional diet (males, 71.4 cm ; females, 56.6 cm), but this was closely followed by the semi-complete group (males, 71.1 cm ; females, 55.3 cm). The pellet group yielded the shortest pelts (males, 68.8 cm ; females, 54.4 cm). In the same year, the percentage of Majestic plus Canada pelts was higher for pellets and semi-complete diets (pellets : 74% for males and 78% for females) (semi-complete : 68% for males and 73% for females). But the kits fed the conventional diet yielded pelts of lower quality (50% for males and 65% for females). (Financial support for these experiments was obtained from Agriculture Canada).

THERMOPHYSICAL PROPERTIES OF NEST CONSTRUCTIONS OF FARMED MUSTELIDS

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Experimental data and farm experience support the assumption that farmed mustelids, the mink and the polecat, cannot survive Finnish winters without external thermal protection. This study comprises a series of measurements in which the properties of commonly used nest constructions were evaluated for their thermophysiological qualities. Measurements on live polecats and on a model whose thermal conductance corresponded to that of a live animal revealed that a wooden nest shifted the lower critical temperature (T_{lc}) of polecat (the temperature below which the animal had to increase its heat production in order to maintain homeothermy) from 22° C, a value typical for an unprotected animal, to 7.5° C ; with a styrofoamcovered plastic nest box it was shifted to 2.5° C. The most effective thermal protection was achieved by bedding : 200 g of dry straw shifted the T_{lc} to a value of -41°C. Heat losses through walls and bottom were minimal while the main avenue for heat loss was the wire-mesh roof. As the exhaust air was saturated with water vapour, its moisture condensed when it touched the cold surface of the nest wall or bedding. Within ten days the moisture content on the straw reached 17%, considerably decreasing its insulating power. While ventilation effectively removed moisture it simultaneously removed heat. Each m^3 of air heated by 1°C removed 1298 J of heat. The air temperature inside the nest was about 10°C higher than that of the surrounding air. A total heat loss value of 4.5 W was estimated for a polecat couple in calm conditions, if there was no bedding inside the nest ; total heat loss was about 4.0 W when the nest contained bedding and a mild wind was blowing. These values were slightly less than half of the measured heat production of a polecat couple. Thus the cooling power of wind was also influenced by the quality and quantity of the bedding rather than by thermal insulation of the nest construction per se.

Poster

APPARENT AND TRUE DIGESTIBILITY OF PROTEIN AND AVAILABILITY OF AMINO ACIDS IN SOME DRY PROTEIN INGREDIENTS

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Digestibility of herring meal (HM), meat meal (MM), poultry by-product meal (PBM), potato protein (Protamyl), wheat glutein (WG) and Pekilo single-cell product was studied on mink. The method of total collection was used and six male black mink were fed each diet. Cooked wheat starch and soya oil were used as energy sources and the content of test ingredient varied from 38.5 to 62.8%, depending on its protein concentration. One group was fed protein-free diet. The apparent and true digestibilities of crude protein, the apparent and true availabilities of amino acids are given in the table :

	Digestibility of crude protein		Amino acid availability	
	Apparent	True	Apparent	True
HM	73.9	77.4	86.9 ± 4.9	91.4 ± 4.6
MM	77.9	83.3	86.0 ± 6.8	92.6 ± 6.1
PBM	50.4	56.2	66.7 ± 14.6	71.9 ± 14.4
Protamyl	80.9	88.9	87.5 ± 4.7	92.6 ± 3.7
WG	89.3	95.8	88.9 ± 6.7	97.3 ± 1.9
Pekilo	78.1	83.3	91.1 ± 3.3	96.0 ± 2.3

The availability of most amino acids in PBM was significantly less that of the other ingredients.

3

Reproduction

INTERACTION OF FEMALE AGE AND MATING PATTERN ON REPRODUCTION IN MINK.

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Using results from two years of investigations on mating patterns in mink, the effects of the female age and mating pattern on reproduction were studied. A total of 905 females was distributed over two mating systems and different dates of the onset of mating within each mating system. The two matings studied were 1 + 1 and 1 + 9. The proportion of females which accepted mating the first time they were tested, as well the duration of mating, increased during the mating period, indicating a steadily increasing maturity during this period. The high rate of acceptance on the first day tested (generally about 90% after the 12th of March) showed that mink females, once they have come into heat, remain in this stage during the mating period or until they mate. The females were divided in two age-classes : one-year old and two-year old or older. Significant interaction effects were found between different age-classes and mating patterns in regard to remating rate, gestation period and litter size at different kit-age stages. For one-year old females, the 1 + 9 mating system was better than the 1 + 1 system ; the difference amounted to 0.7 live-born kits per litter. For the older females, those mated according to the 1 + 1 system were superior to those mated by 1 + 9 (0.6 kits more per litter).

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ARTIFICIAL INSEMINATION OF FOXES (VULPES VULPES AND ALOPEX LAGOPUS)

4 YEARS OF PRATICAL USE IN NORWAY

Jan A. FOUGNER

Norwegian Fur Breeders Association, N-Oslo 5, Norway

The first attempt to breed foxes artificially started as early as 1933-34 (Starkow), and several trials were made in the years after. They all used intra-vaginal deposition of the sperm and were not very successful. AI in foxes was not in practical use anywhere before studies were started at the Veterinary College in Oslo in 1968/69 (Aamdal 1972). After having successfully collected semen by digital manipulation and achieved pregnancy by surgical insemination with frozen semen (Aamdal et al. 1972), the equipment and the technique for artificial intra-uterine deposition of semen in foxes was developed (Fougner et al 1973,. In 1979, these methods were resumed and a program started to use AI in practical fox-breeding in Norway ; a new technique for semen collection from silverfox was also developed. From 1980-1983 we have trained about 40 technicians to do field work (semen collection, semen dilution and evaluation and the AI with fresh diluted semen) in their areas. Last season (1983) 17 260 vixens (both blue-and silverfox types) were inseminated with fresh diluted semen in Norway. Of these, 12 366 bluefox vixens were inseminated 1 or 2 times (7581 and 4785, respectively) with silverfox semen, giving an overall average of 72.9% pregnancies and 3.18 hybrid puppies per inseminated female at weaning. A total of 760 vixens of bluefox-types were inseminated with semen from male bluefox types, giving an overall average of 75.4% pregnant and 3.91 puppies per ins. at weaning. (The overall average of 64 541 mated bluefox vixens in Norway in 1983 was 5.05 pups weaned). The overall average of 1777 silverfox types inseminated gave 70.5% pregnancies and 1.90 pups per ins. at weaning (the average of 19 540 mated female silvers was 2.64 pups weaned). The reported loss of whelps by 15 057 inseminated foxes (both silvers and blues) was 34%. The mortality among whelps from both inseminated and mated vixens (2203) was reported to be 25.3%. There was no significant difference in whelp loss between silvers and blues. This article presents and discusses the results from 4 years of AI field-trials in foxes with diluted semen and also demonstrates the results one can expect when both technicians and farmers are accustomed to AI in foxes. The accurate timing of insemination for fertilization is of the greatest importance. In Norway many farmers are now using the method of measuring electrical resistance in the vagina and achieve significantly better pregnancy rates than those who are not using this method in connection with AI. Results from smaller field trials using frozen semen in bluefox vixens (1981) and a split sample field trial comparing IVT and EDTA diluters for fresh and stored fresh semen (1983) are also presented.

PRESERVATION OF SILVER FOX SEMEN

Andrzej Frindt, M. Brzozowski and T. Kaleta

Instytut Hodowli Zwierzat i Technologii Produkcji Zwierzecej SGGW-AR, 05-840 Brwinow ul. Przejazd 4, Poland.

The present study was performed to compare the efficiency of lactose-yolk extender (20 ml 11% lactose + 5 ml egg yolk) to that of citrate-yolk extender (11-20 ml 2.9% sodium citrate + 5 ml egg yolk) on fox semen preservation. 35 ejaculates of high quality were collected by electroejaculation from 16 one-year old silver fox males. Characteristics of semen were : volume, 1.3 - 1.9 ml; average density, 100 x 10 ml ; pH, 6.2 ; colour, whitish ; consistency, watery ; smell, specific. Each ejaculate was divided in two parts which were diluted with one of the two extenders. The diluted semen was stored at + 4°C. Motility was observed 24, 48, 72, 96 and 120 hours after diluting ; 3 ejaculates were deepfrozen at - 196°C (8% glycerol was added to the extenders). The results obtained with both extenders were similar : in half of the 32 diluted ejaculates the rate of motile spermatozoa was over 30% ; only one of the frozen ejaculates exhibited a high value. As regards deepfeezing, further studies are needed.

LIGHT AND SEXUAL CYCLE IN MINK

Rafael Garcia-Mata

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Observations and records were made in a mink farm near Mar del Plata, Argentina (Latitude 38.5°S), where additional lighting has been regularly used since 1973. They represent useful information on the effect of artificial lighting on improving management practice. Artificial lighting has been used since 1978 to advance sexual maturity of young males in order to make it correspond to the best moments of female receptivity. That practice was considered as beneficial in mink breeding and is consistent with physiological knowledge about gonads growth process in males during 30-40 days prior to beginning of breeding season. Data presented here concern the effect of additional light during mating season on performance improvment of pubertal females in comparison with results of two-year old females. Many studies were done on altering photoperiod during mating season and its effect on reducing length of gestation in mink females. The purpose of this practice, is to improve the average litter size. Mean duration of pregnancy was reduced to 44-45 days, i.e close to the theoretical physiological minimum. Average duration of embryonic diapause was shortened on the whole mink farm to 5-6 days. In the future, the problem is to reduce mean length of gestation to 40-42 days with further improvement of average litter sizes.

EFFECT OF ENVIRONMENTAL FACTORS ON MINK FERTILITY

Stanislas Jarosz and Boguslav Barabasz

Department of Fur Animal Husbandry, Agricultural University in Krakow, Al. Mickiewicza 24/28, Poland.

Two-year studies were conducted on two mink farms, an experimental farm located in an industrial region and another in an agricultural region. During the first year of study, 140 1-year-old mink of standard strain on each farm were monitored. During the second year of the experiment the animals were transferred from one farm to the other with a view to eliminating the genetic factor, and 56 2-year-old mink as well as 140 1-year-old mink on each farm were observed. Feeding on both farms was identical in respect to the composition and nutritive value of the rations. The mating system and accomodations were also standardized. The basic difference between farms was the environmental pollution. Average dust sedimentation rate on the industrial-area farm was significantly higher in both years than on the agricultural-area farm, exceeding the norm accepted for the human population. The metal dust fall in the industrial area was also significantly higher than that in the agricultural region. The higher levels of heavy metals in the industrial environment were confirmed by the significantly higher levels of Pb in liver, kidney and hair of 2-year-old mink. The average conception rate, litter size and mortality rate (to weaning) in industrial and agricultural areas were as follows, respectively : in the first year 72.2 and 86.6%, 4.85 and 4.64 kits, 30.08 and 19.7% ; in the second year (transferred stock) 74.32% and 70.32%, 5.20 and 4.83 kits, 24.1 and 20.2%. Fertility and fecundity results were conditioned by both environmental and hereditary factors. Kit mortality was considerably higher in the industrial region. The final productivity results were not affected by industrial pollution.

THE INFLUENCE OF PHOTOPERIODIC CONDITIONS ON FOLLICULOGENESIS AND SEX HORMONE LEVELS IN STANDARD AND SAPPHIRE MINK

D.V. Klotchkov, R.G. Gulevich and A.A. Kim

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

The influence of two light regimes on mink was studied. These regimes were the following : (1) continuous illumination from 20.6 till 20.7 and 8-hour daylight from 21.7 till 10.10 (group 1), (2) 8-hour daylight from 21.7 till 10.10 (group 2). The control animals were exposed to natural photoperiod. Eight to 10 females from each group were sacrificed in March. The number of follicles in different stages of development was counted in serial sections of one ovary ; estradiol and progesterone in blood were estimated by radioimmunoassay method. The level of estradiol, the number of primordial, growing, ripening and atretic (at the early stage) follicles were higher in Standard than in Sapphire mink. The number of Graafian follicles in Standard mink was 4.7 and in Sapphire mink 6.4 (P 0.05). Under the influence of artificial light conditions in Standard mink of group 1, the number of primordial, growing and atretic (at the early stage) follicles decreased. In Sapphire mink of group 1, there was a tendency to increase the number of ripening follicles, and a statistically significant increase of atretic follicles (at the early stage) in comparison with the controls. In Standard mink of group 2, the numbers of antral and atretic follicles decreased ; folliculogenesis of Sapphire mink of group 2 was not different from that the controls. The level of estradiol in Standard mink of both experimental groups had a tendency to decrease and that of progesterone to increase as compared to the controls. On the contrary, in Sapphire mink of both groups the level of estradiol was higher and that of progesterone lower than in the controls.

HORMONAL CONCENTRATIONS IN THE BLUE FOX (Alopex lagopus) DURING PREGNANCY AND PARTURITION.

Ordin Møller*, Michelle Mcndain-Monval**, Adrian Smith and R. Scholler**

*Norwegian College of Veterinary Medecine, Postbox 8146 Dep., Oslo 1, Norway. - **Fondation de Recherches en Hormonologie, 67-77 boulevard Pasteur, 94260 Fresnes, France.

The purpose of the present paper was to determine the pattern of changes in concentrations of progesterone, oestradiol, androgens, LH and prolactin during pregnancy, and particularly their day-to-day changes around parturition. Progesterone : in all vixens mean levels increased rapidly after the LH peak and reached 57.7 $\pm$ 18.4 ng/ml (n=8) when they went off heat, i.e. 4-6 days after the LH peak. By day 10, the mean progesterone concentration was 67.3 $\pm$ 15.7 ng/ml. From day 10 to 25, levels remained high (73.0 $\pm$ 20.6 ng/ml). A maximal value (93.6 $\pm$ 19.8 ng/ml) was observed between days 16 and 25. After day 25, progesterone levels declined gradually to indetectable levels when parturition occurred. Oestradiol levels were low throughout pregnancy (19.8 $\pm$ 10.7 pg/ml). However, in two vixens an oestradiol rise was observed around days 30 - 34, in which oestradiol values reached 69.3 and 53.0 pg/ml. Androstenedione and testosterone concentrations decreased immediately after the preovulatory LH peak and remained low throughout pregnancy. At parturition the levels of both hormones were below 100 pg/ml, and they decreased even further after parturition. Luteinizing hormone (LH). plasma LH remained relatively constant throughout pregnancy. Basal levels averaged 0.7 ng/ml ; range : 0.4 - 3.3 ng/ml. Prolactin. within 2 weeks after the LH peak, plasma prolactin increased gradually from a basal level of about 4.0 ng/ml to 12.4 $\pm$ 2.9 ng/ml two days before parturition. One day before parturition the levels were found to be 32.7 $\pm$19.7 ng/ml, and the prolactin concentrations remained rather high during the first 10 days after parturition ; range : 7 - 40 ng/ml.

THE ROLE OF LH AND PROLACTIN DURING THE OESTROUS CYCLE OF THE BLUE FOX AND THE SILVER FOX

Michelle Mondain-Monval*, Ordin Møller**, Adrian Smith** and R. Scholler *

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The sequence of endocrine events which terminate anoestrus, initiate the follicular phase and ovulation, and particularly the role of luteinizing hormone (LH) and prolactin (PRL), in the development of proestrus and oestrus were determined in two varieties of foxes. The pattern of hormonal changes was characterized by an increase of LH, androstenedione (A), testosterone (T) and oestradiol (E_2) levels before the preovulatory LH surge, the steroids reaching a well-defined peak value coinciding with the preovulatory LH surge and with the beginning of the progesterone (P) rise. The electrical resistance of the vaginal mucus increased during the last 2-3 days of proestrus, reaching a maximum 2 days after the preovulatory E peak and the LH peak. This maximum corresponded with the onset of sexual receptivity which occurred 2 to 5 days after the LH peak, suggesting that the interval between LH peak and ovulation was about 1 to 3 days. In the blue fox, the concentration of LH began to increase 3 weeks before the preovulatory LH surge (0.86 $\pm$ 0.16 to 3.96 $\pm$ 1.71 ng/ml, $\bar{x} \pm SD$), as did those of A (137 $\pm$ 104 to 370 $\pm$ 268 pg/ml) and T (80 $\pm$ 20 to 154 $\pm$ 105 pg/ml). E_2 levels began to increase 6-7 days before oestrus. Furthermore several rises of LH (up to 38 ng/ml) were detected during this proestrous period. This progressive rise in LH secretion might be a stimulus for thecal androgen biosynthesis resulting in increasing E_2 levels and in the preovulatory E_2 surge. This rise in E_2 triggered the LH surge which induced ovulation. Furthermore at oestrus, the LH surge, while stimulating P secretion depressed plasma oestrogen levels. PRL levels remained low during proestrus (1.7 to 4.5 ng/ml) and no consistent pattern could be established at oestrus. A similar pattern of hormonal secretion was observed in the silver fox. Nevertheless the length of proestrus, as determined by measurement of LH, steroids and electrical resistance, was shorter and levels of LH and PRL were lower than in the blue fox. Proestrous rises of LH were infrequent and steroid levels began to increase 2 to 10 days before the preovulatory LH surge.

PITUARY LH RESPONSIVENESS TO SYNTHETIC LH-RH AT VARIOUS STAGES OF THE REPRODUCTIVE CYCLE OF THE FEMALE RED FOX

Michelle Mondain-Monval* - Maryse Bonnin** - Marie-Claude Audy** - R. Canivenc** and R. Scholler*

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The ability of the pituitary to release LH in response to synthetic LH-RH was determined at various stages of the reproductive cycle (anoestrus, oestrus, post-partum and lactation) of the red fox (Vulpes vulpes L.). Two groups of animals were used : 1) females in captivity for a year, 2) females recently captured before or after parturition. In the first group, pituitary responsiveness to a single i.v. injection of LH-RH, which was low during the luteal phase, increased progressively with advancing anoestrus. The highest LH values were found during proestrus. In the second group, pituitary responsiveness to a single injection of LH-RH was reduced by 52% in lactating foxes compared to non-lactating foxes treated 3-10 days or 60 days after parturition. In the non-lactating foxes the response observed in May was similar to that observed later during anoestrus (November). In all experiments, the time from LH-RH injection to the maximal LH value measured in plasma was 15 to 20 min. Plasma LH values returned to preinjection levels within 120-150 min. Five injections of LH-RH at 60-min intervals in anoestrous, cyclic and post-partum foxes resulted in a progressive decrease in pituitary responsiveness : after the first injection the responses were typical of those previously obtained in different reproductive states, but after the following injections they were greatly reduced in all cases.

LUTEOTROPHIC CONTROL OF THE MINK CORPUS LUTEUM DURING THE POSTIMPLANTATION PHASE OF GESTATION

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Studies were undertaken to determine the relative significance of the hypophyseal factors prolactin (PRL) and luteinizing hormone (LH) in the control and maintenance of the mink corpus luteum following embryo implantation. Pastel and Pearl variety mink were treated daily with 2 mg bromocriptine (BC) or 2 mg BC in ethanol and 0.5 mg PRL for 7 days. Two groups received bolus injections of 1 or 2 antiserum against ovine LH twice on alternate days. One group received 4 injections of an antibody against gonadotrophin-releasing hormone (GnRH) on alternate days. A control group was injected with the ethanol vehicle. Progesterone levels were measured in blood samples taken on alternate days beginning prior to the first treatment and continuing for a further 10 days. BC treatment reduced progesterone levels within 4 days of the first injection. This reduction persisted through the 10 days of the experiment and could be reversed by concomitant treatment with PRL. Antiserum against LH induced a transitory decline in serum progesterone followed by recovery to pretreatment levels. Repeated treatment with antiserum against GnRH reduced serum progesterone levels to one-fourth of pretreatment values with an initial decline appearing within two days of the first injection. The second series of experiments tested the efficacy of PRL and LH in the induction of progesterone output from luteal cells from mink postimplantation gestation in vitro. PRL, LH and the combination of PRL and LH were incubated with collagen-dispersed luteal cells in the presence or absence of canine high-density lipoproteins (HDL) or low-density lipoproteins (LDL) a putative source of cholesterol for progesterone synthesis. PRL but not LH stimulated progesterone output. Both HDL and LDL alone stimulated progesterone accumulation in incubation media in a dose-dependent fashion with LDL 10-fold more potent. PRL in combination with LDL enhanced progesterone synthesis in luteal cell incubates and LH in high doses in combination with LDL was also effective in augmentation of progesterone accumulation. Neither LH nor PRL acted in synergy with HDL in increasing steroidogenesis. From the results of these two experiments it is concluded that the postimplantation CL of the mink requires both PRL and LH as luteotrophic agents. Mink luteal cells utilize plasma lipoproteins as substrate for progesterone synthesis. PRL alone can stimulate steroidogenesis in vitro. PRL at low doses and LH at high doses interact with LDL to increase progesterone synthesis.

USE OF THE DOPAMINE ANTAGONIST PIMOZIDE TO SHORTEN GESTATION IN MINK

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The dopamine antagonist pimozide was tested to determine the course of release of prolactin (PRL) in female mink, to determine whether sustained PRL release and activation of the corpus luteum of the period of delayed implantation could be achieved and to determine whether precocious embryo implantation could be induced. Except where noted below, a dose of 0.1 mg was dissolved in 0.1 M acetic acid (pH 3.8) and injected subcutaneously. The results indicate that pimozide induced PRL release within 1 h of injection to levels which were double those observed in vehicle-treated control mink. The elevation peaked at 2 h and persisted through 72 h after injection. In a second experiment, mink were treated with 3 doses of 0.1 mg pimozide on alternate days beginning on the sixth day after mating (March 18, 20 and 22). Blood samples were taken on the fourth day through April 19. PRL was elevated relative to vehicle-treated controls through March 26, at which time levels fell slightly. A lower rate of increase was observed in vehicle-treated controls, and mean PRL values converged in both groups on March 30. Peripheral progesterone levels were to increase within 4 days (March 22) after the initial injection in pimozine-treated mink, but not until 18 days (April 6) in vehicle-treated control mink. In another experiment, 4 injections of pimozide elevated progesterone within 2 days of the first injection and abbreviated the period of delayed implantation by 10 days. In field trials, 3 injections shortened gestation by an average of 10 days in one trials and 5 days in a second trial. Two doses of pimozide reduced gestation by a mean of 4 days. One injection of pimozide in solution or 3 injections of pimozide suspended in saline had no effect on the length of pregnancy relative to vehicle-treated control mink. The results demonstrate that the dopamine antogonist pimozide will induce sustained release of PRL in ranch mink. This PRL secretion activates the quiescent corpus luteum of the delay phase of gestation and initiates the large scale progesterone secretion associated with embryo implantation. Pimozide acts to abbreviate the length of the preimplantation phase of pregnancy thereby reducing overall gestation length.

SEASONAL VARIATIONS IN REPRODUCTIVE FUNCTION

IN THE MALE BLUE FOX

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Seasonal variations in a range of testicular parameters and plasma hormone concentrations were studied in relation to environmental factors (day-length and temperature). Measurements were made of testis weight and volume, and analysis of cell content into haploid, diploid and tetraploid populations was performed by means of DNA flow cytometry. The FSH binding capacity of the testis was investigated, and blood samples were analyzed for plasma concentrations of LH, prolactin, androstenedione, testosterone, oestradiol-17 β, cortisol and thyroxine. An increase in testicular activity was observed already 4-5 months before the breeding season during the decline phase of day-length and temperature. The increase in testis weight was due primarily to an increase in the germ cell population, culminating in a peak of haploid cells coincident with the onset of the breeding season. A dramatic increase in FSH binding was observed during the two-month period before the onset of the season. Plasma LH concentrations during the autumn months were clearly lower than those found during the rest of the year, but there were large differences between individuals sampled at the same time of year. Prolactin levels were elevated 1-2 months after the season was over. Androstenedione and testosterone concentrations reached their highest values during the season. Plasma oestradiol-17 β levels were at their highest from November to April and declined as testosterone levels fell at the end of the season. Plasma cortisol concentrations were highest during the winter months. There did not appear to be clear seasonal changes in plasma concentrations of thyroxine.

INCREASING THE REPRODUCTION

OF NUTRIA DOES IN A GROUP-MATING SYSTEM

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The reproductive distribution of does under dry conditions in a closed-management system has been studied at Sárszentmihály State Farm. Parturition peaks can be seen in does kept in a group of 9-10 females + 1 male. Peaks recurred according to gestation time and length of the rutting cycle. After grouping, most of the does were in rut and conceveid. Half of the animals were born within a week after the first births and then one or two parturition peaks were seen every 28 days. 97-100% of the births took place within the first 60 days. A second birth period started on days 125-130 after the first births. This second period seemed to be protracted without a demarcation between it and the third period. According to estimations of the average reproductive number, 10-20% of the does did not reproduce, that is there were one or two sterile does in each group. The does were pregnant for 70-120 days before the expected time of the first litter. Sterile does were detected with great certainity at this time of pregnancy by the size of the abdomen and dugs or by palpation. The sterile does were discarded so that only productive ones had to be fed. If there were one or two more does in the initial group after sorting out, remaining ten does were all fertile and reproduction rate was incresead by 10-20%.

CIRCADIAN RHYTHMS OF PHOTOSENSITIVITY AND SEASONAL REPRODUCTION CYCLES IN THE SILVER FOX (Vulpes fulvus Desm.)

Ludmila Trut

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

The hereditary reorganization of the strict seasonal reproduction pattern, i.e. the development of the capacity to mate outside the breeding season, is one of the main correlated responses to prolonged selection of silver foxes for domestic behavior (tameability). During the experiments, three groups of females were kept under different photoperiodic conditions. The total duration of light per day in all the groups was the same (10 hrs). This duration corresponded approximately to the natural daylength of the fox mating season (February). The time schedule (beginning and end of light exposure) was different during the diurnal cycles in different fox groups. The results indicate that diurnal changes of photosensitivity are involved in the photoperiodic control of the seasonal sexual activity of females foxes. Gonadal response to the experimental photoperiodic conditions was different in the two fox populations, one farmbred (nonselected for behaviour) and the other domesticated (selected for tameability). These results may explain the mechanisms of evolutionary reorganization of reproduction from the highly stabilized seasonal pattern towards di - or polyestricity. This reorganization, which is associated with the domestication of many animal species as well as with the foxes we selected, may be based on changes in circadian rhythms of photosensitivity. The role of diurnal cycles of photosensitivity, not only in the regulation of seasonal breeding, but also in the photostimulation of litter size is discussed.

SPERM-AGGLUTINATING ANTIBODIES IN FEMALE FOXES

Maija Valtonen

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It is a common belief among fur farmers that breeding blue fox females (Alopex lagopus) with silver fox males (Vulpes vulpes) reduces female fertility in the next breeding season. As it is possible to induce infertility in experimental females by injected homologous male reproductive tract antigens, we tried to determine whether interspecies mating produced sperm antibodies in fox females and whether it had an antifertility effect. The sperm-agglutination assay was used to determine the presence of sperm antibodies in the serum of 35 fox females. Of the 11 foxes (9 blue and 2 silver) mated with males of the same species, only 2 had a weak sperm-agglutinating antibody titer of 1:4. Of the 22 blue fox females bred with silver fox males, 10 had sperm antibody titers ranging from 1:4 to 1:64. The antibody titers of the 2 silver fox females bred with blue fox males were 1:4 and 1:4 and 1 :256. Head-to-head type of sperm agglutination was predominant but head-to-tail agglutination was also seen. When the titers of sperm antibody were reassayed before the next breeding season 6 to 9 months later, the titers were only slightly lower. Although anti-sperm antibody activity was detected in 54% of crossbred females and the titers remained essentially unchanged until the next breeding season, no correlation between circulating sperm agglutinins and infertility could be found.

Poster

INTERACTION BETWEEN PHOTOPERIOD AND AMBIENT TEMPERATURE ON PLASMA PROLACTIN AND PROGESTERONE LEVEL IN THE PREGNANT MINK

Yassine Chabi, Lise Martinet and Régine Monnerie

Station de Physiologie Animale - Institut National de la Recherche Agronomique, 78350 JOUY-EN-JOSAS.

Mink exhibit a short embryonic diapause which is related to the increasing daylength. Later is the mating period, shorter is the pregnancy. The delayed implantation period is due to a low prolactin (PRL) secretion which prevents the activation of the corpora lutea and progesterone (P) secretion which begins 7 to 10 days prior implantation. In the present work we have tried to determine if ambient temperature can interact with length of the photoperiod to regulate the onset of the luteal function. Seventy two one year old females were bred twice on consecutive days early in March, then kept in 3 rooms under 15 h light : 9 h dark (group 1), 11 h light : 13 h dark (group 2) or 8 h light : 16 h dark (group 3). When the ambient temperature ranged between 13 and 15°C the plasma PRL and P concentrations never increased or increased very slowly and with a large delay in group 2 and group 3 females as compared to group 1 females. Under a temperature ranging between 20 and 23°C the plasma PRL and P increase was delayed or inhibited only in group 3 females. So the inhibiting effect of short days on PRL and P secretion seems to partly depend on the ambient temperature. It is well established that PRL secretion is temperature dependent ; however the length of pregnancy in the mink under natural conditions has never been shown to be related to temperature. But under out door condition the mean ambient temperature in March is lower than 15°C.

ANDROGENIC INDUCTION OF SEXUAL BEHAVIOUR IN CASTRATED MINK AT THREE DIFFERENT PERIODS OF THE YEAR

Claudie Chagvardieff*, Lise Martinet*, Daniel Allain*.

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

Intact and castratred mink bearing silastic capsules filled with testosterone (T) were tested for sexual behaviour. The stimulus females were intact, ovariectomized (OV^-) or ovariectomized and implanted with estradiol silastic capsules (OV^-+E). Behavioral test were carried out in March, June or October. Four events were recorded : buzzing, neck griping, mounting and copulation. In March the four events were displayed by both control and experimental males introduced into the cage of intact or OV^-+E females. Buzzing and neck griping only was observed when the males were in the presence of OV^- females. In June, during the period of testicular quiescence, buzzing and neck griping were still displayed by intact males introduced to intact or OV^- females. Mounting was also observed in the case of introduction to OV^-+E females. In October after a long period of testis inactivity, the only behaviour recorded was buzzing in front of the OV^-+E females. On the other hand experimental androgenized males displayed buzzing and neck griping when introduced into the cage of intact or OV^- females. Mounting in June and mounting and copulation in October were recorded when experimental males were paired to OV^-+E females. In conclusion it seems that sexual behaviour can be initiated by testosterone treatment in castrated male mink whatever the period of the year.

Letters to the Editor.

4th INTERNATIONAL SCIENTIFIC CONGRESS
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May 21, 1984

Mr. Gunnar Jørgensen
Fur Animal Division
48H Roskildevej
DK-3400 Hilleroed
DENMARK

Dear Friend Gunnar:

This letter acknowledges yours of May 2 concerning the 4th International Scientific Congress in Fur Animal Production. We are pleased that the organization has accepted the joint Canadian-American invitation to convene in North America four years from now.

Working with the Canadians, we tentatively are thinking of having the formal speaking program at Guelph, Ontario, the site of important mink and fox research, and field trips within the nearby area and then down into the midwestern United States. We suggest that, since we will be seeing you over here in August, we discuss further details at that time. Tony Rietveld will be on hand at the meeting in Washington State. In fact, Tony also will address the short course.

At your convenience, please send along the biographical information which we requested.

kl

cc: Dale Schmeltzer
Anthony Rietveld

Cordially,

Bruce W. Smith
Administrative Officer

Dr. Cyril E. Adams, mink scientist, dies

Dr. Cyril E. Adams, a brilliant British scientist who made many significant contributions to the advancement of mink farming, has died of cancer at Cambridge, England. One of Adams's final published reports appeared on pages 20 and 22 of the May, 1984 issue of FUR RANCHER.

Intestinal cancer and the resultant treatments Adams underwent were both painful and at times harsh. But the scientist, who was on the staff of the Animal Research Institute at Cambridge, never slowed down in either his interest or performance.

ADAMS

Adams was the author of many scientific books and papers on a variety of animal species. In 1982, he edited the significant "Mammaliam Egg Transfer" for CRC Press.

The researcher had addressed a number of the annual York conferences sponsored by the Fur Breeders Association of the United Kingdom. The writers visited him on a number of occasions at his base in England.

In 1982, Adams was invited to address the annual short course of the National Board of Fur Farm Organizations at Fort Wayne, Ind., but was forced to decline because of his medical treatment regimens.

Mink was not Adams's primary research assignment, but he devoted a great deal of time and thought to the fur-bearer and the people who raise it. By the summer of 1983, his studies had advanced so much that he was able to inseminate mink surgically with deep-frozen sperm. —

Anthony A. Rietvield
& Bruce W. Smith ■

FUR RANCHER

Leadership for Fur Farmers

VOL. 64 JULY, 1984 NO. 7

Mr. Jørgensen 01/20/84

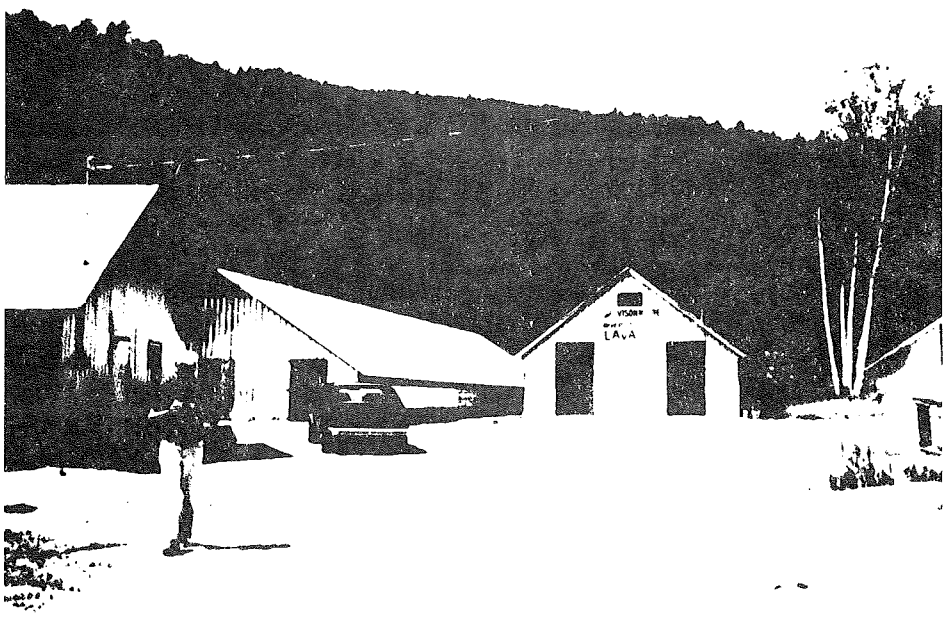
For your information:

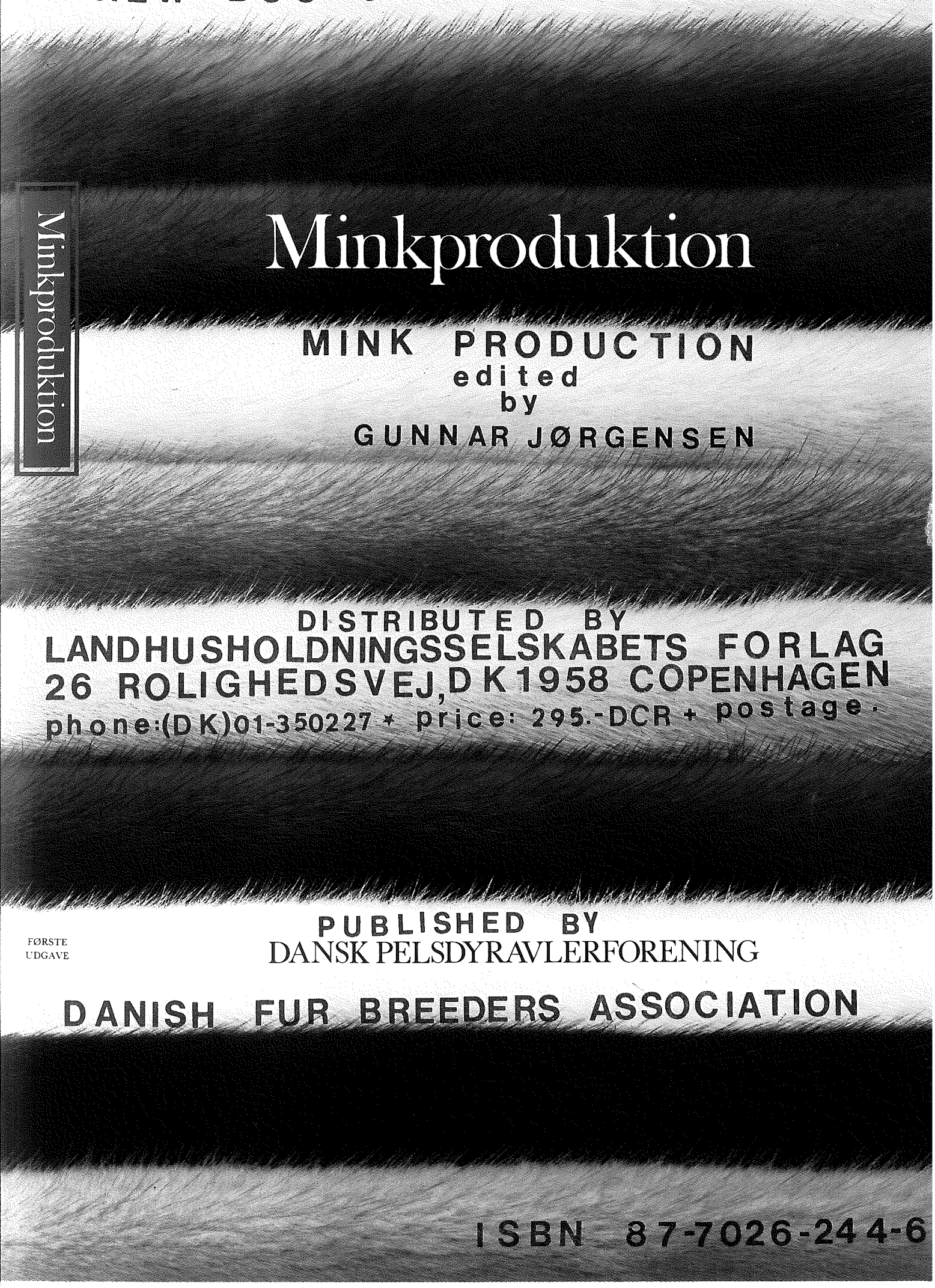
This is a view of the experimental mink unit I have at Laval University and which is located on a private ranch not very far from Québec City. Left is the experimental kitchen; center is the furring shed; right is the breeding shed.

Incidentally, if you know of someone (including you of course) who would like to take a sabbatical at my place, he or her would be most welcomed. Even though Laval University uses French as working language, this is not an impediment for someone who speaks English only.

Best regards.

René Belzile, Ph.D.
Professor





FØRSTE
UDGAVE

ISBN 87-7026-244-6

MINKPRODUKTION.

(Mink Production)

Mink Production is written mainly for mink farmers. It can be used as a handbook and it also contains basic information. It is the results of several authors' contribution edited by Gunnar Jørgensen. The book deals with the following main topics: Progress in mink production; the fur farmers' organization; establishment of a mink farm; reproduction; anatomy and physiology of the pelt; genetics and colour types of mink; selection of breeding stock; management; nutrition; feed production; quality control of mink feed; pathology and hygiene; pelting, skin preparation and storing; advertisement and marketing.

The chapters on reproduction, anatomy and physiology of the pelt, genetics and colour types of mink and nutrition contain a great deal of basic knowledge and recent results from research work. Informative figures and comprehensive tables illustrate the text, thus making it clear despite its advanced contents. Part of the chapter on reproduction deals with practical aspects on mating. Management of mink throughout the year is thoroughly described giving useful advice regarding the day to day work in the farm. Pelting, skin preparation and storing are described step by step and advice is given to achieve the best possible result.

The pathology and hygiene chapter describes illnesses of viral, bacteriological, mucological and parasitological origin and also intoxications, nutritional and reproductive disorders and deficiency syndroms. Main symptoms of most common diseases are given in key tables where reference is given to the further text, thus making it valuable as reference text. Also cleaning and disinfection are handled and advice is given in comprehensive tables.

By the sections on establishment of a mink farm, the fur breeders' organization, the advertisement and marketing of the products other important subjects are dealt with and the service provided by the fur farmers' organization is accounted for.

This is a book containing very much information given in a way that is easy to apprehend. It describes mink farming as the very interesting occupation it is and besides giving valuable advice to active farmers it serves an important purpose for education of recently established mink farmers and possible future farmers. By the good editorial work and the excellent lay out, this is a book that is inspiring to read and where information is easy to find. The head-words in the margin and the head-word register add to the impression that this is a book of great pedagogic value giving a review of most important items in Danish mink farming.

Anne-Helene Tauson

396 pages, 49 tables and 231 figures of which many are pictures in colour .

In DANH.

Г. И. ДИКОВ,
И. С. ДЕМЕНТЬЕВ

СПРАВОЧНИК

по гельминтозам сельскохозяйственных животных (диагностика и профилактика)

ЧАСТЬ II

MANUAL ON THE HELMINTHIASES OF FARM ANIMALS. PART II. (HELMINTHS OF BIRDS, RABBITS AND FUR ANIMALS, SANITATION AND HYGIENE ON ANIMAL FARMS AND INDUSTRIAL COMPLEXES, AND PREVENTION OF INFECTION).

G.I. Tikov, I.S., Dement'ev, Helm. Lab. Kazakh Res. Vet. Inst., Alma-Ata, USSR.

The first chapter of this manual is given to diagnostic techniques of Helminth infections and the 2nd chapter outlines general methods of control. The following chapters present the most important helminths of chickens and turkeys, ducks and geese, rabbits, and of various fur animals (foxes, mink, sable, coypu, muskrat), with brief notes on the agent responsible, biology, epizootiology, diagnosis, clinical picture, prevention and treatment. A table is appended which sets out the drugs, dosages and treatment periods for the principal Helminth infections in different animals, including cattle, sheep, horses, pigs, various poultry, rabbits, dogs and other carnivores. The book relates to work done in Kazakhstan (USSR).

Publ: Alma-Ata, USSR; "Kainar", 1982.
160 pp, Ill.
In RUSS.
CAB-abstract.

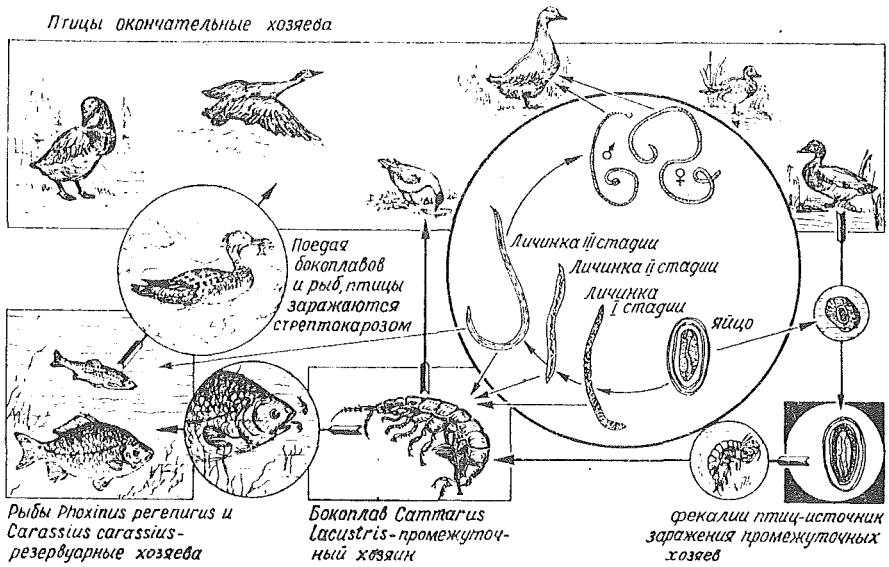


Рис. 23. Цикл развития стрептокары (по Б. Л. Гаркави, 1949)

УДК 619:616. 995. 1:636 (574)

Диков Г. И., Дементьев И. С.
Д 45 Справочник по гельминтозам сельскохозяйственных животных (диагностика и профилактика). Часть II (гельминтозы птиц, кроликов и пушных зверей, сангигиена на животноводческих комплексах и фермах и предупреждение инвазии). Алма-Ата: «Кайнар», 1982, 160 с., с илл.

В книге обобщены новейшие данные и результаты научных исследований лаборатории гельминтологии КазНИВИ по наиболее важным гельминтозам птиц, кроликов и пушных зверей, а также вопросы сангигиены на животноводческих комплексах и фермах, организации мер по предупреждению инвазии.

Подробно излагаются наиболее эффективные методы диагностики, описываются общие и специальные меры профилактики гельминтозов. Приводятся сведения по основным видам возбудителей, морфологии, биологическим циклам, клинике заболеваний, диагностике и профилактике их в Казахстане.

Книга рассчитана на широкий круг ветеринарных специалистов, а также студентов сельскохозяйственных вузов и техникумов.

48.7(2К)+45.2 (2К)я2

Д $\frac{40903—081}{403(07)—82}$ .101—81. 3805020000

Геннадий Иванович Диков,
Игорь Самуилович Дементьев

СПРАВОЧНИК ПО ГЕЛЬМИНТОЗАМ СЕЛЬСКОХОЗЯЙСТВЕННЫХ ЖИВОТНЫХ (ДИАГНОСТИКА И ПРОФИЛАКТИКА)

Часть II

(гельминтозы птиц, кроликов и пушных зверей, сангигиена на животноводческих комплексах и фермах и предупреждение инвазии)

Редактор Б. Е. Поротников. Художник У. Есполов.
Художественный редактор А. Есмаханов. Технический редактор Т. В. Суранова. Корректор Г. К. Бурмистрова

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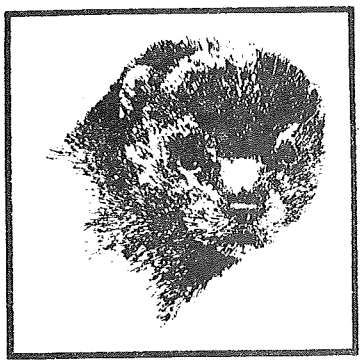

The National Board does not have copies of any of the reports cited herein for distribution. Professional and scientific journals can be located in any major library; libraries of land-grant universities and colleges also can be consulted.

RESEARCH REFERENCES ON MINK & FOXES

Published by the
NATIONAL BOARD OF FUR FARM ORGANIZATIONS, INC.
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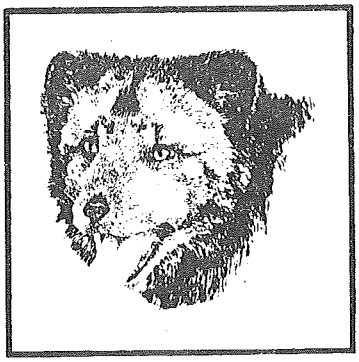
Brookfield, Wisconsin 53005



Compiled by Bruce W. Smith
& Kathleen A. Leedy

Supplement No. 6, Compiled 1984 by the
National Board of Fur Farm Organizations

Sources of some of the publications referred to herein:

Blue Book of Fur Farming, 7535 Office Ridge Circle, Eden Prairie, Minn. 55344

Fur Rancher, 7535 Office Ridge Circle, Eden Prairie, Minn. 55344

Mink Farmers Research Foundation, PO Box 941, Racine, Wis. 53406

National Board of Fur Farm Organizations, Suite 120, 450 N. Sunny Slope Rd., Brookfield, Wis. 53005

Scientifur, 48 H Roskildevej, DK-3400 Hilleroed, Denmark (in English)

We offer the following publications which should interest you:

"Mink, Fox & Fitch: Farm to Consumer" $5 postpaid to U. S. and Canada
"Mink & Fox Farming Today" $10 postpaid to U. S. and Canada
"The Science of Mink & Fox Farming" $12 postpaid to U. S. and Canada

To other destinations, add postage for six ounces.

"Research References on Mink & Foxes," 1979 edition $1 postpaid (U. S., Canada)
"Research References on Mink & Foxes," 1981 edition, $1.25 postpaid (U. S., Canada)
"Research References on Mink & Foxes," 1982 edition, $1.25 postpaid (U. S., Canada)
"Research References on Mink & Foxes," 1983 edition, $1.25 postpaid (U. S., Canada)

To other destinations, add postage for two ounces each.

"Mink Farming in the United States," a one-page explanatory flyer, single copy free if you send a self-addressed envelope with postage for one ounce.

"Nature's Jewels, A History of Mink Farming in the United States," by Bruce W. Smith a comprehensive, indexed, illustrated book. $11.58 delivered in U. S. and Canada; elsewhere, add appropriate postage for eight ounces.

For current information on mink and fox farming and sources of breeding stock, we suggest Fur Rancher magazine, 7535 Office Ridge Circle, Eden Prairie, MN 55344. Per year (13 issues), $14 U. S., $15 Canada, $18 elsewhere.

For information on the marketing of mink and fox pelts, we suggest Fur Age Weekly, 127 W. 30th St., New York, N. Y. 10001. $27 per year.

Technical reports from around the world appear in English in Scientifur, 48 H Roskildevej, DK-3400 Hilleroed, Denmark. Write for subscription price.