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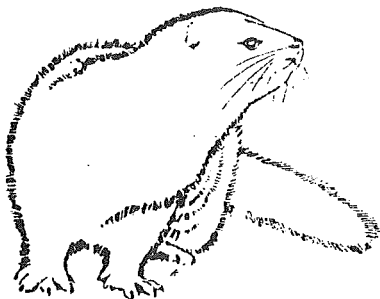
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NOTES

SCIENTIFUR, VOL. 10, No. 1, 1986.

Things develop. Also in the world of fur animal production everything -except of the prices just now - increase. The research work and the basical science regarding fur animal production has, if we count on the number of reports abstracted in SCIENTIFUR, increased extremely during the latest years.

As the editor of SCIENTIFUR my worries does not go for the risk of less material for publication, but only to which degree the many important results from the research will be utilized. This concern is not only based on the still limited number of readers of SCIENTIFUR, but only of the fact that a great number of these reports are written in "difficult" languages.

Of the 285 reports, representing 2383 pages, abstracted in SCIENTIFUR in 1985, 34% were written in English, 22% in Scandinavian or other West European languages, and 44% written in Russian or other Eastern European languages.

Looking closer on table 1, I think that the readers will agree that under the most positive circumstances only 50% of the scientific reports are available for the actual users, at least in the Scandinavian and English speaking countries.

Table 1. The number, language, and volume of reports regarding fur animal production presented in SCIENTIFUR 1985.

Type of information	Language of the report	Number	
		of reports	of pages
Original reports	English	17	60
Abstracts	English	98	861
	Scandinavian	47	406
	Russian	80	417
	Other Europ., East	43	300
	Other Europ., West	16	397
	Asian, Far East	1	2
Total, abstracts		285	2383 aver. 8.4
Titles	English	62	231
	Scandinavian	59	219
	Russian	43	250
	Other Europ., East	16	61
	Other Europ., West	65	407
	Asia/Far East	4	32
Total, titles		249	1200 aver. 4,8
Total information given 1985 *		551	3643 aver. 6.6

* 4 books of total 739 pp not included.

If you also include reports only given by titles the conclusion is that about 2000 pages of reports regarding research in fur animal production will not be available for 50% of the actual users.

Based on my knowledge to the Scandinavian money spent on research in fur animal production each page of reports - in average - represents an investment of at least 1,500 US\$. This tell us that scientific knowledge regarding fur animal production to a value of at least 3 mill US\$ is only utilized by 50% of the potential users in 1985. How it should be without the information given during SCIENTIFUR is hard to think about.

The background for my writing these facts is that I can hardly understand that the breeder organizations will accept that there internationally is spent about 6 mill US\$ per year for research regarding fur animal production of which only 50% can be utilized because of the language barrier.

Why not offer about 10% of this amount in cooperation for ensuring utilization of 100% of the research money spent?

I have to ask you because of our negative experiences from translating the Danish book MINK PRODUCTION into English. This matter have learnt us that nothing in the direction of translation service can be sat up by SCIENTIFUR without international guaranty for use of the service.

I don't need an expensive calculator for convincing myself where some of the investments have to be spent - but it is up to you to evaluate how far you will compensate some of the price reductions during better utilization of the knowledge present.

HAPPY NEW YEAR. We have still more than 2000 copies of MINK PRODUCTION for sale!



Sorry Professor, we didn't finish our experiments in time!

Stress Effects on circulating eosinophil Leukocytes, breeding Performance, and reproductive Success of Ranch Mink

Leif Lau Jeppesen and Knud Erik Heller, Institute of Population Biology, Copenhagen University, Universitetsparken 15, DK 2100 Copenhagen, Denmark

Summary

Male and female ranch mink were exposed to immobility stress treatment once a day for a period of two months starting before mating and ending just before delivery. Level of circulating eosinophil leukocytes varied throughout the period being highest in males during breeding and highest in females during pregnancy, but irrespective of time it was increased by the stress treatment, and it may serve, therefore, as a measure of the imposed stress. Mating behaviour was not affected by the stress treatment. Reproductive success was slightly impaired by the stress.

Introduction

Immobilization as an experimental stressor leads to marked physiological and behavioural changes in juvenile ranch mink. Repeated exposure to immobility stress is followed by increases in circulating eosinophil leukocyte levels and by decreases in motor activity and behavioural responsiveness in a novel stimulus situation (Heller and Jeppesen, 1985).

The number of circulating eosinophils in juvenile mink is approximately doubled after stress repetition, and significant increments are still apparent 3 days after termination of the stress, whereas the behavioural changes disappear within 2 days after stress termination.

The purpose of the present experiment was to determine effects of repeated sessions of immobility stress on eosinophil levels and behaviour in adult mink.

If repeated stress induces elevations of eosinophil levels in adult animals to the same degree as in juveniles, eosinophil determination may be incorporated in practical methods for assessing prolonged stress in ranch mink at all

ages. The decreases in behavioural responsiveness in a novel stimulus situation observed in juvenile mink may reflect increases in fear motivation (Heller and Jeppesen, 1985), and if this interpretation is correct, repeated immobilizations could be expected to affect other and more specific types of behaviour. For adult animals, behaviour related to breeding is of particular biological and commercial importance, and therefore we chose to test effects of repeated immobility stress on selected elements of the breeding behaviour and on subsequent reproductive success.

Materials and methods

The animals of this study were 64 female and 16 male pastel mink born in May 1984 and raised under conventional Danish farm conditions at Natl. Inst. of Animal Science, Dept. of Fur Bearing Animals, DK-3400 Hillerød, Denmark.

At the age of 8 months, all animals were separated and housed singly in standard wire cages (30×45×90 cm) for a minimum of five weeks prior to experimental treatment. Each of the 16 males were placed alternating with 4 females in adjoining cages. The animals were equally divided into an undisturbed control group and an experimental group assigned for immobility stress treatment (males: $n = 8$; females: $n = 32$).

Individual one h immobilizations in mink traps were performed once a day from 2/2 to 11/4 1985. Two times during this period, 7/3-8/3 and 21/3-22/3, all females were given access to the adjoining males and elements of the sexual behaviour were observed. Females not accepting mating attempts from their adjoining male were paired with other males of

the same experimental group, but behavioural recordings were not performed in these cases.

Reproductive success was calculated for all females and related to experimental treatment.

Fifty mm³ bloodsamples were collected one day prior to the beginning of experimental treatment (1/2), intervening the two male/female confrontations (14/3), two months after the beginning of treatment for the males (2/4), and at the end of treatment (11/4), three weeks before expected deliveries. The samples were taken at the same time of day during a 2 h period immediately before stress treatments. Individual eosinophil leukocyte levels were determined according to the method described by Zarrow et al. (1964).

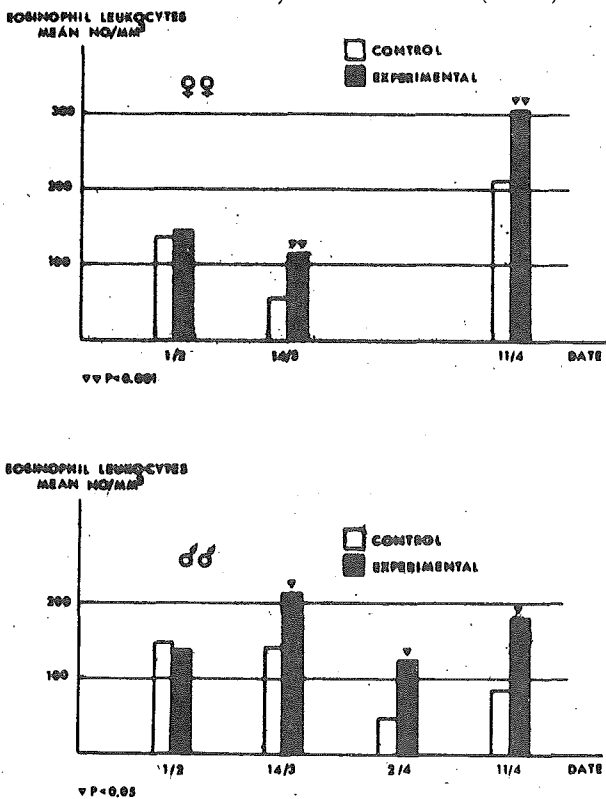


Fig. 1. Effects of immobility stress on mean circulating eosinophil leukocyte levels in female and male mink.

Results

The effects of repeated immobility stress on mean circulating eosinophil leukocyte levels are shown for both sexes in Fig. 1. Mann-Whitney U-tests, two-tailed, (Siegel, 1956) revealed that (1) immobility stress increased eosinophil levels in both females ($p < 0.001$) and males ($p < 0.05$) at all bloodsampling dates; (2) control as well as stress values were significantly changed during the period for both sexes: females reaching lowest control levels ($p < 0.001$) between the two male/female confrontations on 14/3 and highest control and stress levels ($p < 0.001$) at the end of the period on 11/4; males reaching highest stress levels ($p < 0.02$) between the two male/female confrontations on 14/3 and lowest control levels ($p < 0.05$) on 2/4 and 11/4; and (3) there were no significant sex differences in eosinophil levels one day prior to the beginning of stress treatment on 1/2, but the males reached higher control and stress levels ($p < 0.001$) between the two male/female confrontations on 14/3 and lower levels ($p < 0.001$) at the end of treatment on 11/4. Table 1 shows repeated stress effects on elements of the sexual behaviour during the two male/female confrontations on 7/3-8/3 and 21/3-22/3. Statistic evaluations of the data revealed no significant differences between control and experimental animals in any of the two confrontations.

The reproductive success of control versus experimental animals is shown in Table II. There were no significant differences between the two groups with respect to number of litters delivered or number of pups per litter, but there was a higher infant mortality in the experimental group as evidenced by significant fewer pups per litter at weaning ($p < 0.01$, Median test, two-tailed (Siegel, 1956)) and significant more deaths among pups in the experimental group ($p < 0.02$, X²-test, twotailed).

Table 1. Effects of immobility stress on breeding behaviour in mink. C: Control. E: Experimental.

	1. confrontation		2. confrontation	
	C	E	C	E
Number of pairs observed	32	32	32	32
Number of pairs with intromission	25	24	23	22
Mean latency to intromission (min)	14.2	14.4	17.8	15.0
Mean duration of intromission (min)	37.0	42.2	68.6	66.1

Table 2. Effects of immobility stress on reproductive success in mink.

C: Control. E: Experimental. $^{\$}p < 0.01$ Median test. $^{+}p < 0.02$ X^2 test.

	C	E
Number of females observed	32	32
Number of litters delivered	26	31
Average litter size at delivery	6.2	5.5
Average litter size at weaning (6 weeks)	5.1	3.8 $^{\$}$
Number of litters with dead pups	12	20
Number of dead pups	28	52+
Infant mortality (%)	17.2	30.2

Discussion

The present study demonstrates that repeated immobility stress has the same facilitatory effects on circulating eosinophil levels in adult mink as in juvenile animals (Heller and Jeppesen, 1985). This finding supports the suggestion proposed in the above cited study that eosinophil determination might be incorporated as an useful procedure for assessing stress in mink. It must be emphasized, however, that the present results give no information about the stability of the eosinophil stress response in adult animals. In juveniles, stress induced increments in eosinophil levels are still apparent 3 days after termination of repeated stress. It must also be noted that the relationships between stress and eosinophil levels found here are based on experiments using immobility stress as the stressful experience, and that we do not know whether other stressors more relevant to modern fur animal production have similar effects on circulating eosinophils in adult mink. In juveniles, social stress affects circulating eosinophil levels in the same direction as repeated immobility stress (Jeppesen and Heller, 1985), but a similar effect of social stress has not been established for adult animals. The present finding of increased eosinophil levels in response to experimental stress contradicts the earlier consideration that stress in animals is generally reflected by decreased levels of eosinophils (Christian, 1963; Barnett, 1964). Differences in the eosinophil response to stress depending on temporal characteristics of the stress could, however, account for this discrepancy. In our previous study on juvenile mink (Heller and Jeppesen, 1985), we found pronounced de-

creases in circulating eosinophils in response to acute stress, but marked changes in the opposite direction in response to repeated stress. The acute drop in eosinophil levels could reflect a migration of eosinophils from blood into tissues, and the increases following repeated stress could be indicative of stress induced mobilization of new eosinophils from the bone marrow. Whatever the underlying mechanism may be, the changes in circulating eosinophils in response to stress clearly depend on the duration and perhaps the severity of the experienced stress, and this, of course, explains the different results obtained by using different experimental procedures. Provided the eosinophil levels revealed here do reflect actual levels of experienced stress, several additional points could be made from the present data.

Thus, it appears that male mink experience more stress than females during the breeding period (14/3 measures). This could tentatively be explained by more physical exhaustion of males in courtship and copulation with four females, although other interpretations, of course, may be relevant.

Following the same line of argumentation, female mink appear most stressed during pregnancy (11/4 measures). This could be explained by the increased level of estrogen during pregnancy, in that estrogen is known to stimulate physiological responses to stress (Broverman et al., 1974). The relatively low levels of eosinophils in females during the breeding period (14/3 measures) indicate low stress levels in this period. High stress levels decrease behavioural responsiveness in a novel stimulus situation (Heller, 1985; Heller and Jeppesen, 1985), and this would tend to increase females propensity to avoid males and thereby impair successful copulation. Low stress levels during the breeding period, on the other hand, may be regarded as a biological adaptation developed to improve mating by reducing fear in the females. Relatively low levels of eosinophils have also been found in female mink during the breeding period by Gilbert and Bailey (1969) using differential leukocyte counts. These authors, however, interpreted low eosinophil levels as indicative of high stress levels; an interpretation which might be false in the light of the results obtained in the present study. Comparing eosinophil levels in visually isolated and non-visually isolated females, Gilbert and Bailey (1969)

found lowest eosinophil levels in visually isolated females during anoestrus, but highest levels in these females during oestrus in the breeding period. Visual isolation, therefore, seem to reduce experienced stress during anoestrus, but increase stress during breeding. An effect which could reflect increased sociality in females during breeding as indicated by the apparent low stress levels among females during breeding in the present study.

Despite the pronounced effects of repeated immobility stress on circulating eosinophils in both males and females, breeding performance was left unaffected by the experimental treatment. It is possible that relatively low stress levels in the females during the breeding period, as discussed above, could account for this lack of stress effects on behaviour; or, in more general terms, that the biological priority of sexual behaviour in mink is so high that even prolonged stress can not disturb the behavioural performance.

Irrespective of the lack of stress effects on behavioural performance during the breeding period, repeated stress had effects on the ultimate reproductive success. There were no differences between control and experimental females with respect to the number of pups delivered, but infant mortality was significantly higher in the experimental group. This could be explained by stress induced changes in physiological conditions for embryo development, or changes in maternal performance including lactation and nursing behaviour. However, the gross effects of daily immobilizations during breeding and pregnancy on the reproductive success were only slight, and this may indicate a high degree of adaptation capacity to stressful experiences in ranch mink. Subsequent examinations of the surviving offspring support this suggestion. There were no differences between offspring from the control and experimental groups in juvenile tests of circulating eosinophil levels and behavioural responsiveness neither in control nor experimental stress situations. This is in marked contrast to the repeatedly observed effects of prenatal stress on subsequent physiological and behavioural responses of rodents in control and stress situations (Joffe, 1978).

Acknowledgement

The authors thank the Natl. Inst. of Animal Science, Dept. of Fur Bearing Animals, DK-3400 Hillerød, Denmark for facilities and technical assistance.

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ROLE OF PROLACTIN IN THE PHOTOPERIODIC CONTROL OF MOULTING IN THE MINK (*MUSTELA VISON*).

L. Martinet, D. Allain, C. Weiner.

Beginning at the summer solstice adult female mink were maintained in long- or short-day photoperiods and treated with bromocriptine or prolactin. In control females kept under natural lighting conditions the moult coincided with the seasonal decrease in prolactin and resulted in the growth of a dense winter coat which was completed by the end of November. Long days, which showed the decrease in plasma prolactin relative to animals in the natural photoperiod, induced a more or less complete moult followed by growth of a thin summer coat. On the contrary we observed an accelerated decrease in plasma prolactin concentrations followed by an early and brief moult in females kept under long days but treated with bromocriptine and in females under short days. The growth of a dense winter coat was completed by the end of September in all the females of the short-day group and in six of eleven females treated with bromocriptine. In the other five females, moult was followed by the growth of a summer coat. These results may suggest that the decline of prolactin after the summer solstice is responsible for the onset of the autumn moult, but the early, abbreviated moult and the growth of a winter coat observed in females kept under short days and treated with prolactin do not seem to support this hypothesis. However, the huge non-physiological levels of prolactin measured in the plasma of these females and the appearance of abnormal white underhairs might suggest that the hormonal balance in this group was completely disturbed by the treatment. The physiological role of prolactin in the seasonal moulting cycle in mink is discussed.

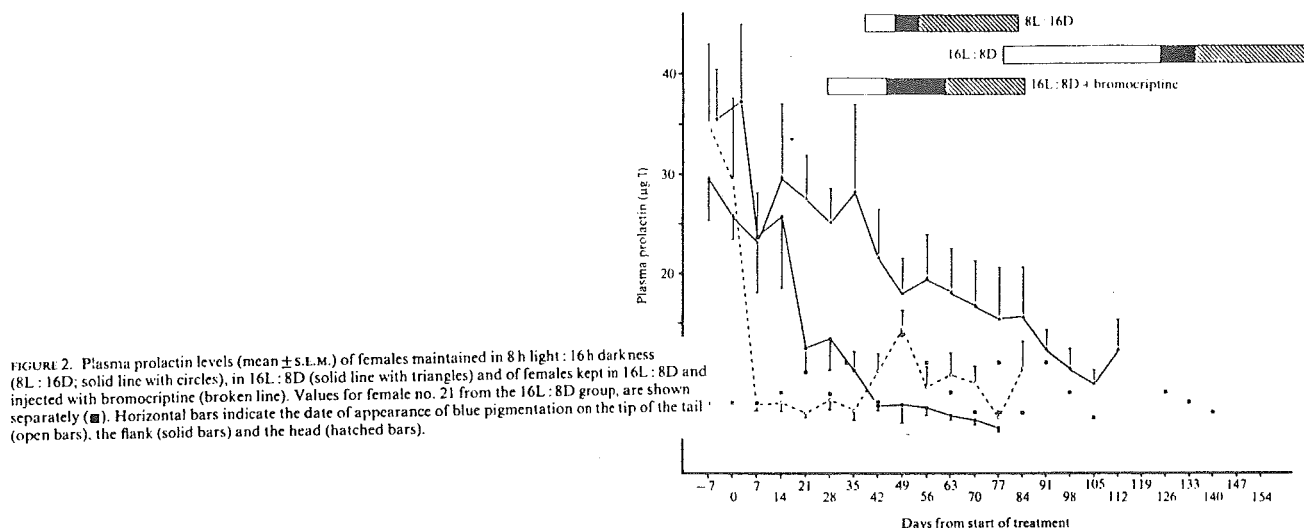


FIGURE 2. Plasma prolactin levels (mean \pm S.E.M.) of females maintained in 8 h light : 16 h darkness (8L : 16D; solid line with circles), in 16L : 8D (solid line with triangles) and of females kept in 16L : 8D and injected with bromocriptine (broken line). Values for female no. 21 from the 16L : 8D group, are shown separately (●). Horizontal bars indicate the date of appearance of blue pigmentation on the tip of the tail (open bars), the flank (solid bars) and the head (hatched bars).

J. Endocr. 103, 9-15, 1984.
2 tables, 2 figs., 20 references.

Authors' abstract.

CARBONIC ANHYDRASE ACTIVITY OF INTACT ERYTHROCYTES FROM SEVEN MAMMALS.

Susanna J. Dodgson, Robert E. Forster II.

Carbonic anhydrase activity of intact erythrocytes from seven mammalian species was determined at 25°C, pH 7.4, by mass spectrometry using the ^{18}O -exchange technique. The seven species were *Cavia porcellus*, *Mustela putorius furo*, *Felis domesticus*, *Canis familiaris*, *Homo sapiens*, *Equus caballus*, and *Bos taurus*. Carbonic anhydrase activities determined as a function of hemoglobin concentration (std k_{cat}) for intact erythrocytes at pH 7.4 were not significantly different from those determined for lysed erythrocytes at pH 7.20 for each species. The carbonic anhydrase activity of intact erythrocytes was not changed by a concentration of acetazolamide that inhibited it 85% in lysate (10^{-7}M) in the 4–10 min needed for the assay. However, ethoxzolamide, another carbonic anhydrase inhibitor, produced the same fractional inhibition of enzyme activity in erythrocyte suspensions as in lysate in 1–2 min. Thus the inhibition constant, K_i , was approximately the same in both intact and lysed cells from each species, and it was possible to measure the apparent molar enzyme concentration inside the erythrocytes from the concentration of bound inhibitor. Intracellular enzyme concentrations were greater in those species with larger cells, but the specific activity of the carbonic anhydrase per molecule was less so that the overall enzyme activity, std K_{cat} , was not related to mean cell volume. The effective permeability of the cells to the self-exchange of bicarbonate ion, $P_{\text{HCO}_3^-}$ averaged $2 \times 10^{-4} \text{ cm}\cdot\text{s}^{-1}$ and did not vary among the species.

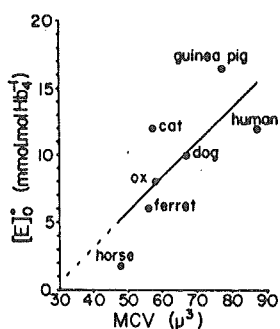


FIG. 5. Apparent enzyme concentration in intact erythrocytes $[E]_0^{\circ}$ against mean cell volume of erythrocytes (MCV) for 7 species.

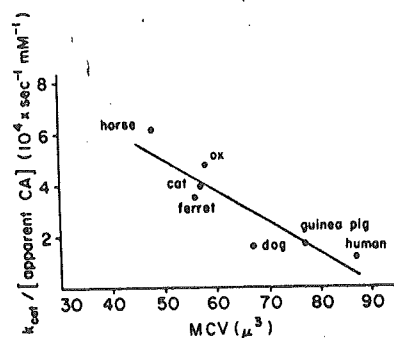


FIG. 6. Plot of carbonic anhydrase activity, $(k_{\text{cat}})/(\text{apparent enzyme concentration})$ in $\text{s}^{-1}\cdot\text{mM}^{-1}$, against mean corpuscular hemoglobin concentration (MCV) in μm^3 . This ratio was calculated by dividing std k_{cat} (column 8, Table 1) by $[E]_0^{\circ}$ (column 7, Table 2) and multiplying by 64,000 g/mol (approx mol wt of hemoglobin, Ref. 1). Units of ratio are $\text{s}^{-1}\cdot\text{mM}^{-1}$. Regression line has the equation, $k_{\text{cat}}/[E]_0^{\circ} = -1,200(\text{MCV}) + 111,700$ ($r = 0.89$).

J. Appl. Physiol.: Respirat. Environ. Exercise Physiol. 55,4, 1292–1298, 1983.

2 tables, 6 figs., 33 references.

Authors' summary.

**IMMUNOTOXICOLOGIC EFFECTS OF POLYCHLORINATED BIPHENYLS
ON THE CELL-MEDIATED AND HUMORAL IMMUNE SYSTEMS.**

Michael R. Bleavins, Richard J. Aulerich.

Numerous alterations of the immune system have been described following exposure to PCBs. High concentrations of or chronic exposure to PCBs has been found to cause lymphopenia, lymphoid cell hypoplasia, bone marrow hypocellularity, and thymic involution. The immunotoxicity of this class of halogenated aromatic hydrocarbons appears to involve an alteration of host defenses, in addition to any direct toxic effects on cell survivability. The cell-mediated aspects of immunity are especially sensitive to PCB insult. Since normal host immunocompetence involves an ongoing cooperation between T-cell subpopulations, macrophages, and accessory cells (Dean et al. 1979) the impact of damage to this interrelated network can be greater than the direct toxic effects. The regulatory function of T-helper and T-suppressor lymphocytes can be impaired by exposure to PCBs. An alteration of the cooperative and regulatory actions of the T-cells, B-cells, and macrophages is likely to be the underlying source of PCB-related immunosuppression. A decrease in the hypersensitivity reaction, T-cell activation by plant lectins, and ability to resist protozoan parasites has also been observed in animals exposed to PCBs. Humoral immunity, as measured by serum gamma globulin concentrations and ability to respond to antigenic challenge, was depressed when PCB intoxication preceded testing. An increase susceptibility to endotoxin and disease organisms further indicated a depression of this portion of the immune system.

Residue Reviews, vol. 90, 57-67, 1983.
62 references.

Authors' summary.

DESCRIPTION OF THE PERMANENT DENTITION OF RANCH MINK.

Richard J. Aulerich, Daris R. Swindler.

The permanent dentition of 16 known-age skulls from ranch-raised mink (*Mustela vison*) was examined and the morphological features of the teeth described and compared with other related species.

Quarterly Bulletin of the Michigan Agric. Expt. Stn., 50, 3, 269-275, 1968.
2 figs., 10 references.

Authors' abstract.

THE DENTITION OF THE MINK (*MUSTELA VISON*).

Richard J. Aulerich, Daris R. Swindler.

Sixty-five specimens of mink (*Mustela vison*), ranging in age from fetuses to adults, were examined and the morphologic features of the dentition were described. The dental formula for the deciduous teeth is: DI 3/3; DC, 1/1; DP, 3/3- 28. Deciduous teeth erupt between the 16th and 49 day after birth. The range in eruption of the permanent teeth is from 44 to 71 days. Calcification of the permanent teeth commences at about the time of birth and all permanent teeth show evidence of calcification by 30 days post-partum. The paracone is the first maxillary cusp to form and the protoconid is the first to develop in the mandible.

Journ. of Mammalogy, 49, 3, 488-494, 1968.
2 figs., 3 tables, 17 references.

Authors' abstract.

**ENVIRONMENTAL SURVEY OF WILD MINK (*MUSTELA VISON*) AND
OTTER (*LUTRA CANADENSIS*) FROM THE NORTHEASTERN UNITED STATES
AND EXPERIMENTAL PATHOLOGY OF SUBACUTE AND CHRONIC
METHYLMERCURIALISM IN OTTER.**

Dennis Joseph O'Connor.

A survey of wild mink and otter, and a study of methylmercurialism in otter were performed. The survey determined ages, investigated general health, and assayed liver mercury concentrations of wild animals. The experimental study investigated the clinical, morphologic, and toxicologic pathology of methylmercury poisoning in otter.

Trapper-harvested carcasses (176 mink, 331 otter) were collected and 42 animals (34 mink; 8 otter) were examined microscopically. The most frequent observations were pulmonary nematodiasis (64% of the animals examined) and inflammatory lesions in the brain (44% of the mink). A total of 412 animals (128 mink; 284 otter) were aged by tooth cementum annulations. Sixty-four and 41% of the mink and otter, respectively, were less than 1-year-old.

Liver samples (34 mink; 30 otter) analyzed for methylmercury had mean levels of 0.95 (SE 0.22) and 0.72 (SE 0.12) mg mercury for male and female mink. Mean levels for male and female otter were 2.14 (SE 0.34) and 1.16 (SE 0.16) mg mercury, respectively.

In the experimental study otter were exposed to mercury in diets containing 0, (Group 9 control; 2 otter), 2 (Group 1; 3 otter), 4 (Group 2; 3 otter), and 8 (Group 3; 3 otter) mg mercury as methylmercury per kg diet. Feeding of the 2, 4, and 8 mg mercury/kg diets resulted in exposures of 0.1, 0.17, and 0.38 mg mercury/kg body weight/day, respectively. All exposed animals developed signs of intoxication. Onset of signs was inversely proportional to exposure level and survival for Groups 1, 2, and 3 were 184, 117, and 54 days, respectively. Clinical signs included anorexia, ataxia, depression visual impairments, convulsions, and coma. Total mercury exposure and terminal levels of mercury were similar among treated groups.

Central nervous system lesions were similar in all poisoned otter despite differences in dietary levels of exposure and included neuronal necrosis and astrocytosis in the cerebral cortex, necrosis of cerebellar granular cells, perivascular cuffing, leptomenigitis, vacuolation, and demyelination. The spinal cord of several otter had mild demyelinating changes. No lesions occurred in peripheral nerves.

Dissertation Abstracts International, B, 45, 8, 2381, 1985.
Only abstract received.

**SEASONAL FLUCTUATIONS IN PLASMA PROTEIN FRACTION
LEVELS OF CHINCHILLAS (*CHINCHILLA LANIGER*, M.).**

Joanna Gromadzka-Ostrowska, Barbara Zalewska.

1. Seasonal changes in blood plasma protein fractions in chinchilla females and males were found.
2. Plasma albumin levels in both sexes vary according to season, generally low in winter and spring and high in summer and autumn.

3. The levels of α_1 -globulin and γ -globulin increase markedly in spring (1.5 times higher than in winter and autumn).
4. In chinchilla females, the levels of α_2 -globulin and β_2 -globulin varied biphasically, being higher in winter and summer.
5. In males, clear seasonal trends in the levels of both fractions were not observed.
6. The β_1 -globulin fraction levels vary throughout the year. In females as well as males, globulin decreases during winter to minimal values in late spring, and then increases again during the summer to remain at the same level till autumn.

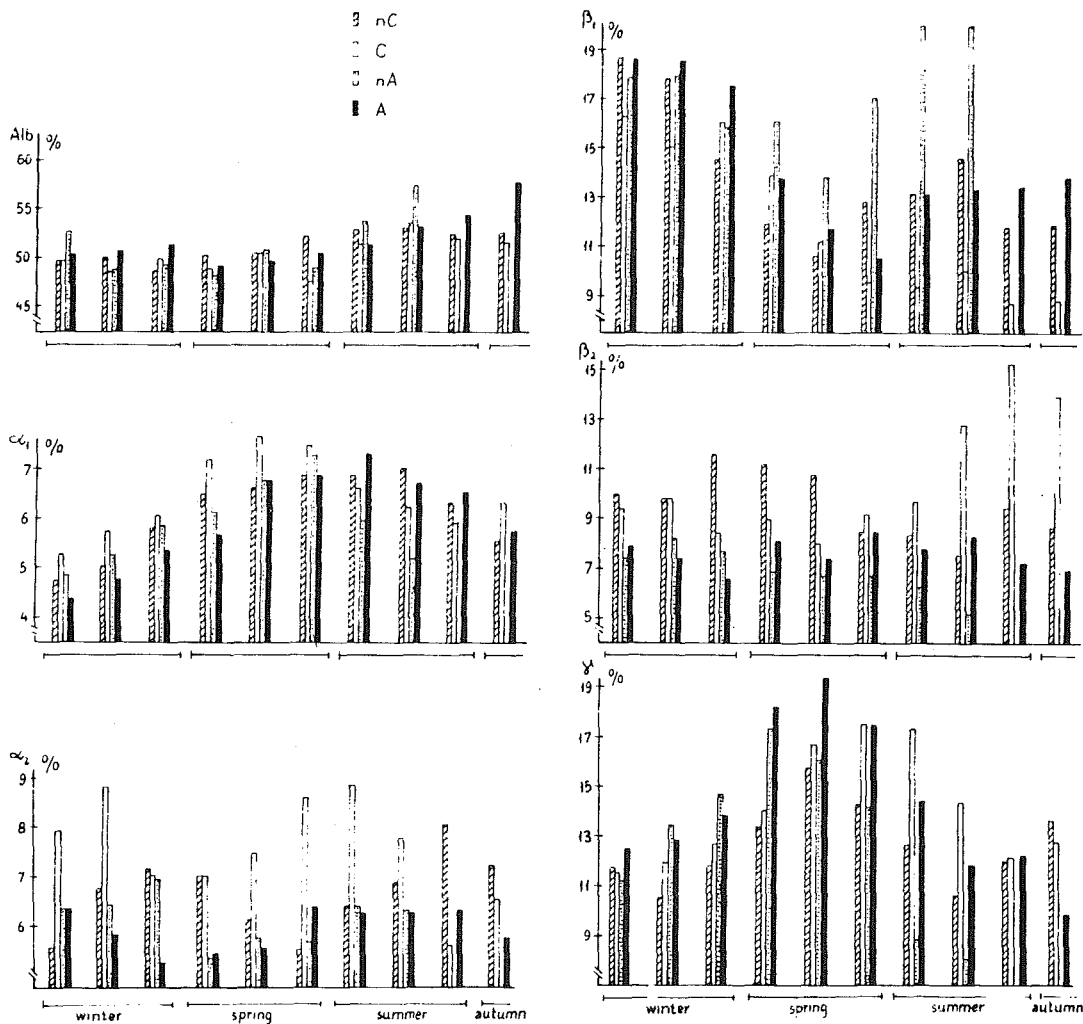


Fig. 1. Seasonal trends in plasma protein fraction levels in four physiological chinchilla classes. Each bar represents a moving average for a 3-month period. C, pregnant females; nC, nonpregnant females; A, sexually active males; nA, sexually inactive males.

Comp. Biochem. Physiol, 80A, 2, 215-224, 1985.
3 tables, 7 figs., 25 references.

Authors' abstract.



AGE AND PHYSIOLOGICAL STATUS INFLUENCE ON PLASMA PROTEIN FRACTION LEVELS IN CHINCHILLAS (*CHINCHILLA LANIGER*, M.).

Krystyna Jakubów, Joanna Gromadzka-Ostrowska, Barbara Zalewska.

1. Changes in blood plasma protein fraction levels during growth and development and in different physiological chinchilla females and males classes were investigated.
2. The most evident changes during growth and development in albumin β_2 - and γ -globulin levels were found.
3. In sexually active chinchillas (sexually active males, pregnant and lactating females) decrease of albumin levels and increase of α_2 - and γ -globulin levels were observed.

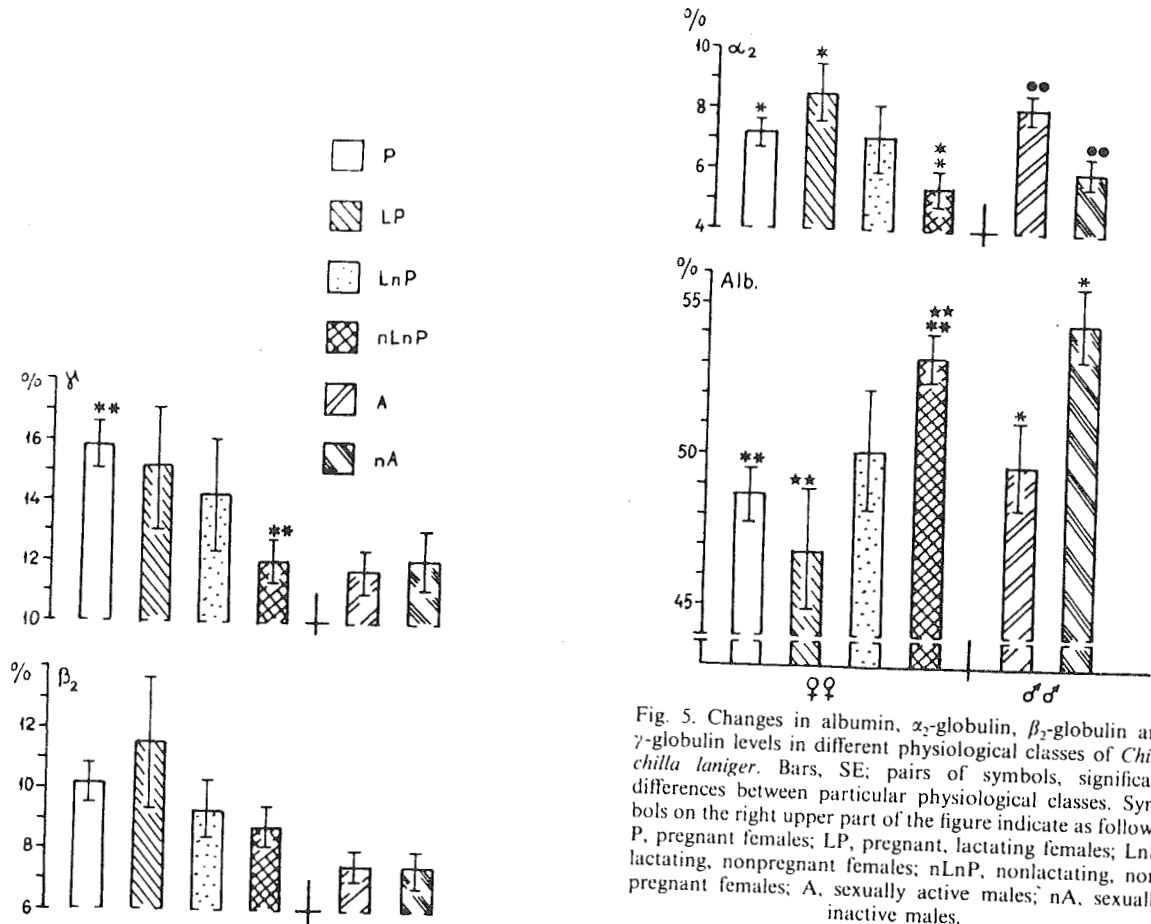


Fig. 5. Changes in albumin, α_2 -globulin, β_2 -globulin and γ -globulin levels in different physiological classes of *Chinchilla laniger*. Bars, SE; pairs of symbols, significant differences between particular physiological classes. Symbols on the right upper part of the figure indicate as follows: P, pregnant females; LP, pregnant, lactating females; LnP, lactating, nonpregnant females; nLnP, nonlactating, nonpregnant females; A, sexually active males; nA, sexually inactive males.

Comp. Biochem. Physiol. 80A, 4, 599-607, 1985.
3 tables, 5 figs., 31 references.

Authors' summary.



EFFECT OF NEONATAL GONADECTOMY AND ADMINISTRATION OF TESTOSTERONE ON COITAL MASCULINIZATION IN THE FERRET.

M.J. Baum, M.S. Erskine.

Male ferrets castrated in postnatal day 5 displayed significantly lower levels of neck gripping, mounting, and pelvic thrusting behavior than groups of males castrated on postnatal days 20 or 35 when tested in adulthood after treatment with testosterone (T). Administering a high dosage of T via sc Silastic capsules to ovariectomized female ferrets over postnatal days 5-20 caused a significant enhancement of all three parameters of masculine coital behavior and ossification of clitorides, in comparison with control females that received no exogenous hormone neonatally. A lower dosage of T given to other ovariectomized females over the same neonatal period caused only slight coital masculinization even though the plasma concentrations of T achieved in females with this particular implant were somewhat higher than the levels normally present in gonadally intact male ferrets at any time between postnatal days 5 and 40. Administration of high and low dosage of T to ovariectomized females over days 20-35 failed to cause any coital or genital masculinization. The results suggest that T acts in the male ferret brain between postnatal days 5 and 20 to cause coital masculinization. The sensitivity of the male brain to T during this period may, however, normally be enhanced by the action of T or some other hormone before day 5.

Endocrinology, 115, 6, 2440-2444, 1984.

3 tables, 2 figs., 15 references.

Authors' summary.

RESPONSE TO COLD IN THE BLUE FOX AND RACCOON DOGS AS EVALUATED BY METABOLISM, HEART RATE AND MUSCULAR SHIVERING: A RE-EVALUATION.

Hannu Korhonen, Mikko Harri, Esa Hohtola.

1. Oxygen consumption ($\text{ml kg}^{-0,75}/\text{min}$) in relation to ambient air temperature at or below the lower critical temperature (T_{1c}) of the winter-furred raccoon dog ($+10^\circ\text{C}$) and the blue fox (-6°C) is described by the equations $y=14.8-0.28x$ and $y=7.5-0.20x$, respectively.
2. Muscular shivering activity (integrated EMG) of both species increased below thermoneutrality parallel with increasing oxygen uptake and heart rate.
3. Seasonal changes in measured metabolic parameters were evident for both species.
4. The results suggest that the overall body insulation or the metabolic response to cold are not essentially worse in the raccoon dog as compared with the blue fox.
5. It is concluded that earlier speculations of surprisingly wide thermoneutral zone and very low T_{1c} of the Arctic fox are not evident for the blue fox.

Comp. Biochem. Physiol., 82A, 4, 959-964, 1985.

3 figs., 34 references.

Authors' abstract.

GROWTH AND FUR PARAMETER VARIATIONS OF FARMED RACCOON DOGS.

H. Korhonen, M. Harri.

Growth, body composition and hair coat parameter variations were evaluated in farmed raccoon dogs (*Nyctereutes procyonoides*) reared in a conventional two animals-in-cage-system. Daily rate of body weight gain (BWG) of litters very significantly ($p < 0.001$) correlated with their time of birth ($r=0.879$); the later in spring they were born the faster they gained weight. Final body weight (FBW) of the whelps was to be predicted from their body weight (BW) in early August ($r=0.689$). There was no significant correlation between litter size and FBW, BWG or daily rate of BWG. Social competition for food produced great variation in FBW of the animals; the difference between the heavier and lighter raccoon dogs within a cage averaged 1.2 kg ($p < 0.001$). Except in FBW and obesity index, there was no significant differences in other parameters between these social groups. Social status within a cage explained only 3.6% of the pelt quality variation while it could explain 52% of the BW variation. Litter explained 36% of the pelt quality, whereas it could explain 4.9% of the BW variation only. Social status and litter did not show any significant two-way interactions. Pelt weight very significantly ($p < 0.001$) correlated with pelt quality ($r=0.48$) and mass ($r=0.55$). Also mass very positively ($p < 0.001$) correlated with pelt quality ($r=0.82$), indicating that the subjectively estimated pelt quality, in fact, can be derived directly from its weight. We conclude that differences in growth parameters and fur characteristics are mainly produced by social and hereditary factors, respectively.

Arch. Tierernähr., Berlin, 35, 10, 761-772, 1985.

6 tables, 4 figs.,

Authors' summary.

ORGAN SCALING IN THE RACCOON DOG, NYCTEREUTES PROCYONOIDES GRAY 1834, AS MONITORED BY INFLUENCES OF INTERNAL AND EXTERNAL FACTORS.

Hannu Korhonen, Mikko Harri.

1. Animals fed a high energy ration had bigger body weight, and bigger heart, brain and genitals than animals fed a normal diet, but they had substantially smaller liver, kidneys, adrenals and thyroid glands than the otherwise smaller animals. Restricted feeding did not necessarily produce smaller organ sizes than normal.

2. Yearly variation in organ sizes was astonishingly large whereas the sex differences were rather rare.

3. For organs like liver, kidneys and thyroid glands the conclusion from the results was independent of the method of expressing the organ mass. The organ sizes seemed to be influenced by many coexisting factors like yearly differences, sex and age of animals, feed and farm.

Comp. Biochem. Physiol., 82A, 4, 907-914, 1985.

4 tables, 1 fig., 4 references.

Authors' abstract.



THERMOREGULATION AND ENERGY ECONOMY OF POLECAT.

(Hillerin lämmönsäätely ja energiatalous).

Hannu Korhonen, Mikko Harri.

In this review we discuss seasonal changes in the life-history of polecats (*Mustela putorius*) in an attempt to explain its southern distribution in Finland. It has been stated that polecats are sensitive to cold. However, our detailed thermophysiological measurements revealed that its metabolic response to cold is comparable to that of the mink (*Mustela vison*), and that both these species are less sensitive to cold than are stoats (*Mustela erminea*) or weasels (*Mustela nivalis*). All these species require a warm nest in winter. A nest with dry bedding shifts the lower critical temperature from + 24°C, at typical value for an unprotected polecat, to as low as -41°C. During winter no extra heat production is needed if the animals stay inside the nest. In fact, polecats, spend 95% of their time inside the nest.

The body weight of male polecats varies seasonally and reaches its maximum in February and minimum in July. This is a regulated process and it is independent of the abundance of food. Thus weight gain in autumn is coupled with a simultaneous increase in energy intake. During spring mating, males reduce food intake and their body weight declines. Females maintain a constant body weight throughout the year, which is an indication of the involvement of the sex hormones in body weight regulation. High locomotor activity in summer and spring is coupled with a simultaneous reduction in food intake. However, the weight loss can be explained by reduced food intake rather than by increased energy expenditure.

Generally polecats are rather lazy, even in summer when they move more than in winter. In winter, the rest inside the nest is interrupted only by eating and defecation. Due to their short intestine, the animals have to defecate about every 3 h. We suggest that the polecat has a more southern distribution than the mink because of its lesser efficiency in predation, rather than because of its thermophysiological or behavioural properties.

Luonnon Tutkija, 89, 122-129, 1985.

Only summary received.

Authors' summary.

In FINN. Summary in ENGL.

THE NUTRIA, AN INTERESTING PROPOSITION.

(La nutria, una interessante proposta).

Stefano Sereni.

The nutrient requirements of nutria, choice of feeds and toxic plants are discussed.

Coniglicoltura, 22, 6, 49-51, 1985.

4 figs.

CAB-abstract.

In ITAL.

HUSBANDRY CONDITIONS AND HYGIENE REQUIREMENTS IN COYPU FARMING.
(Haltungsbedingungen und Hygienevorsorge in der Sumpfbiberzucht).

B. Röder.

Diseases in farm raised nutria (*Myocastor coypus*) often depend on hygienic fatalities in the different housing systems of the farms.

The principle ways of accomodation for nutria are briefly described with reference to the specific hygienic problems.

Tierärztliche Praxis, 13,2, 227-233, 1985.

10 pictures.

Author's summary.

In GERM. Summary in ENGL.



The Arctic Marble Mutation is allelic to the White Face, Platinum and Georgian White mutations in foxes (*Vulpes vulpes*)

Norodd Nes, Department of Animal Husbandry and Genetics,
The Norwegian College of Veterinary Medicine, Oslo, Norway.

Jan A. Fougner, The Norwegian Fur Breeders Association, Oslo, Norway.

Summary

The Arctic marble mutation for coat colour in foxes is earlier found to be inherited as an incompletely dominant character. In the present breeding experiments the Arctic marble gene has behaved as an allele to the Platinum gene. Thus it seems to belong to the known allelic series called the Whiteface series, which hereby comprise five alleles: w = the wild type allele in Silverfox, red fox etc. W = Whiteface, W^P = Platinum, W^G = Georgian white and finally W^M = The Marble gene. The previously used gene symbol M is consequently exchanged for W^M .

Introduction

Belyaev et al. (1975) studied the genetics of the w locus in foxes (*Vulpes vulpes*) and discovered that the gene for Georgian white was a mutation in this locus and therefore belonged to the allelic series called the White face series. It was the fourth allele discovered in this series, which comprised the genes w , W , W^P and W^G . w = the wild type allele in silver fox, red fox etc., W = White face (= Hovbrenderplatinum), W^P = Platinum (= Monso-platinum) and W^G = Georgian white.

The four dominant mutations in the White face series are presented in figures 1-5. The first gene in this allelic series is recessive, while the other three are incompletely dominant with homozygous lethal effect. (Mohr & Tuff 1937, Cole & Shackelford 1943, Johansson 1947, Belyaev et al. 1975). Homozygous White face, WW and homozygous Platinum, $W^P W^P$ as well as the combined genotype, WW^P die nearly always before birth. The homozygous lethal effect of the Georgian white gene, however, is under certain conditions less complete than that of the White face factor and the Platinum factor. It is reported that large litter size in Georgian white females and long daylight during pregnancy promote embryonic viability in homozygotes for this mutation and some $W^G W^G$ cubs and likewise WW^G and $W^P W^G$ cubs are born alive (Belyaev et al., 1975). The Marble gene (colour types Arctic marble in silver fox and Sun glow in red fox) is also incompletely dominant, but has no lethal effect in homozygous condition (Nes. 1978).

In the publication »Genetic factors for colour types in ranch bred foxes«, the authors (Nes et al. 1983) added the following reservation concerning the gene symbol for Arctic marble: »The colour type Arctic Marble resembles very much Georgian white. Up to now a test of allelism has not been carried out. However, if allelism should exist, the gene symbol M must be changed to W^M «. The present investigation was therefore carried out to clarify these genetic problems.

Materials and methods

As Georgian white foxes were not available in the Scandinavian countries, the test of allelism was conducted on the basis of one of the other allelic mutations in the White Face series, namely the Platinum.

The breeding experiments were planned on basis of the following hypothesis:

The Marble gene and the Platinum gene are alleles.

The breeding experiments were carried out at the Heggem Fur Farm (Heggem Pels), Osmarka, Norway. Firstly, animals that carried both the Marble gene and the Platinum gene were produced as follows:

Platinum female x Sun glow male, carrier for Standard silver.

This mating resulted in 5 cubs:

2 Sun glow platinum (The males 6200E and 6201E)
1 Arctic marble, 1 Gold platinum and 1 Silver fox.

As it appears from Fig. 6, the Sun glow platinum males are very light. They are lighter than Sun glow and may easily be mistaken as Sun glow white, which is homozygous for the Marble gene. On the basis of their lightness and their parentage we concluded that they represented the combined genotype $W^M W^P$, if allelism existed.

Half of the sperms produced by the Sun glow platinum males ($W^M W^P$) will contain the Marble gene W^M , and the other half, the Platinum gene W^P . In the offspring sired by these male foxes, 50% will receive the W^M allele showing the colour pattern of the Arctic marble and Sun glow, while the other 50% receive the W^P allele exhibiting the colour pattern of the Platinum fox. These typical colour patterns with their characteristic white markings have a

dominant mode of inheritance and are expressed ir- respectively, the colour being black, »ash blond« or red. The cubs are therefore easily distinguished (see Figure 7). On this background we tested the hypothesis of allelism by mating the Sun glow platinum with Silver fox and Blue fox females respectively. These were called experi- ment A and B, and the results are presented in table 1 and 2.

Table 1. Experiment A: The Sun glow platinum males 6200E and 6201E ($Bb W^M W^P$) mated with Standard silver fox females ($bb ww$). The cubs were examined 2-3 weeks old.

Matings	No. of litters	No. of cubs	No. of cubs per colour type	
6200E male x Silver fox female	1	4	1 Sun glow 1 Arctic marble	1 Gold platinum 1 Platinum
6201E male x Silver fox female	1	4	2 Sun glow 1 Arctic marble	1 Platinum
Total: Observed	2	8	5 with Marble factor	3 with Platinum factor
Expected			4	4

Table 2. Experiment B: Sun glow platinum males (6200E and 6201E) mated with Blue fox females. The cubs were examined 2-3 weeks old.

Matings	No. of litters	No. of cubs	No. of cubs per colour type	
			Marble blue foxes W^M_-	Platinum blue foxes W^P_-
6200E male x Blue fox females	9	53	23	30
6201E male x Blue fox females	15	70	37	33
Total: Observed	24	123	60	63
Expected			61,5	61,5

$\chi^2 = 0.07$ 1 d.f. $0.70 < P < 0.80$



Fig. 1. Silver fox ($bb ww$).

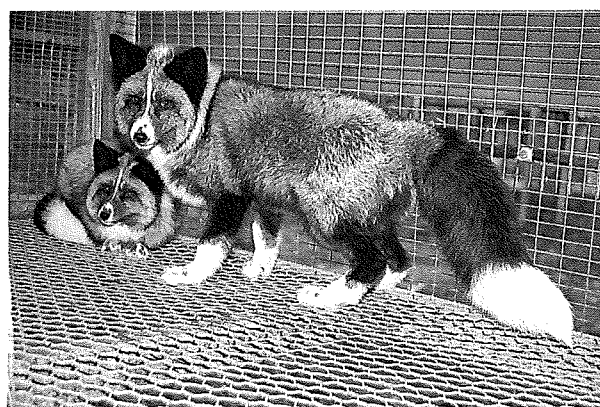


Fig. 2. White face ($bb Ww$).

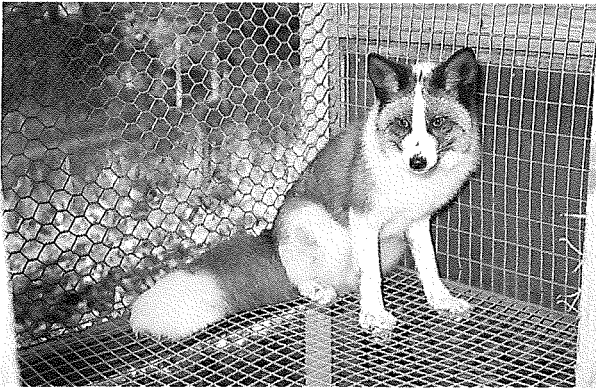


Fig. 3. Platinum ($bb W^Pw$).



Fig. 4. Georgian white ($bb W^Gw$). (From Belyaev et al. in *J. Hered.* 1975).

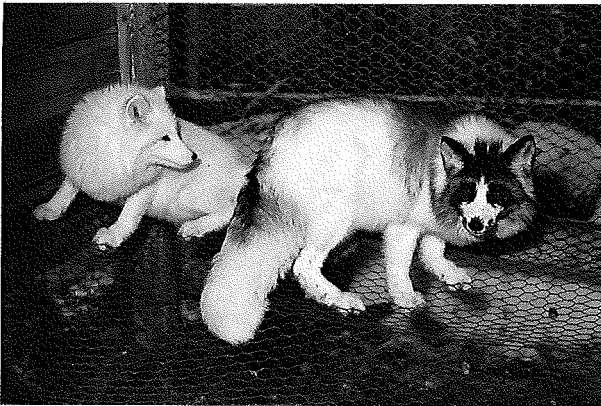


Fig. 5. Arctic marble ($bb W^Ww$) to right and Arctic marble white ($bb W^M W^M$).

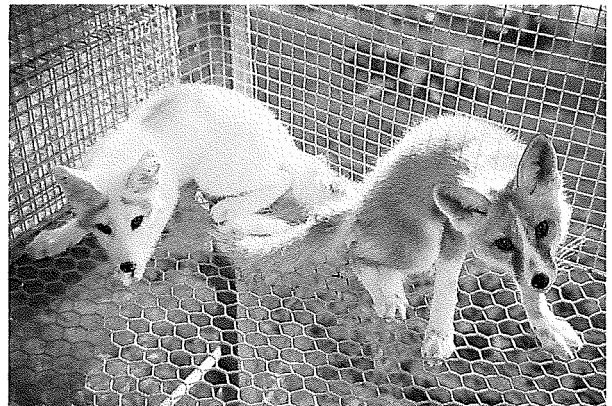


Fig. 6. Sun glow platinum ($Bb W^M W^P$), male 6200E – to left and Gold platinum ($Bb W^Pw$) – both carriers for Standard silver, b .

Parents: Platinum and Sun glow.

In a litter of five: 2 Sun glow platinum, 1 Gold platinum, 1 Arctic marble and 1 Silver fox. (See text and table 1).

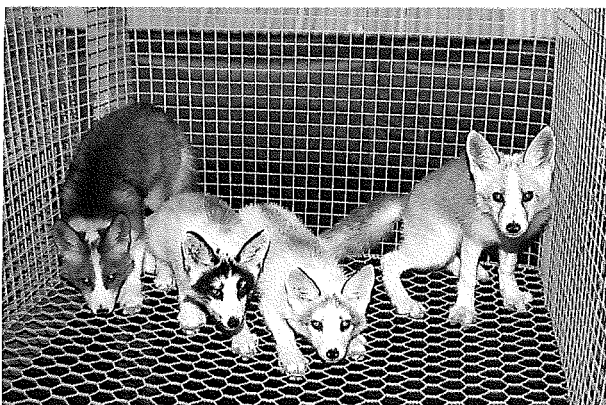


Fig. 7. Litter of four: From the left, Platinum, Arctic marble, Sun glow (light) and Gold platinum.

Parents: Sun glow platinum (Fig. 6) and Silver fox.

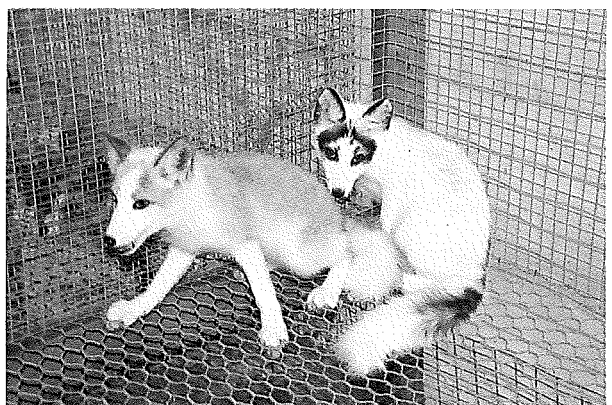


Fig. 8. Platinum blue fox (light) and Marble blue fox, to the right.

Father: Sun glow platinum (Fig. 6).

Mother: Blue fox (light). Darker Blue foxes produce darker cubs. See text and table 2.

Discussion and conclusion

In the breeding experiment A, Sun glow platinum males ($Bb W^M W^P$) were mated with Standard silver fox females ($bb ww$) which resulted in 8 cubs only. The material supports, however, the hypothesis that the Marble gene W^M is allelic to the Platinum gene W^P . All cubs were heterozygous for either the Marble gene or the Platinum gene.

Five of them carried the Marble gene and the other three carried the Platinum gene. The observed 5:3 ratio differs only slightly from the expected 4:4 ratio. This implies that the Sun glow platinum males produced W^M and W^P carrying sperms in equal numbers, as expected if the Marble gene and the Platinum gene are allelic.

As these males were carriers of the Standard silver gene b , they were expected to produce 4 types of sperms, namely BW^M , BW^P , bW^M and bW^P , in equal numbers. The matings conducted were therefore expected to give four colour types, namely Arctic marble ($bb W^Mw$), Sun glow carrier for Standard silver ($Bb W^Mw$), Platinum ($bb W^Pw$) and Gold platinum carrier for Standard silver ($Bb W^Pw$) in the proportion 2:2:2:2. The observed proportions of 8 cubs were 2:3:2:1.

If the Marble factor and the Platinum factor had not been allelic genes, the Sun glow platinum males were expected to produce 8 types of sperms which would have resulted in 8 different colour types. In addition to the four colour types observed in the experiment A one should have expected also types Sun glow platinum, Marble platinum, Gold fox and Silver fox with non allelic genes. The fact that none of these four latter colour types were observed in the experiment A, supports our hypothesis of allelism.

In the breeding experiment B, the interspecific crossing Sun glow platinum males x Blue fox females, the matings resulted in two colour types only, Marble blue fox and Platinum blue fox (Fig. 8). The lightness of these interspecific hybrids corresponds to a great extent to the lightness of their blue fox mothers. Of a total of 123 cubs listed in table 2, 60 were found to be Marble blue foxes and

63 were Platinum blue foxes. The theoretical expectation was 61.5 of each colour type. When summarizing the results from the experiments A and B, the following was observed from a total of 131 cubs: 65 of the cubs carried the W^M gene and 66 the W^P gene. These results show very good agreement between observed and expected numerical ratios ($\chi^2 = 0.0076$, 1 d.f., $0.90 < P < 0.95$). We can therefore conclude that the breeding experiments give very good support to the hypothesis that the Marble factor and the Platinum factor are alleles.

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- Nes, N., Lohi, O., Olausson, A. and Toftegaard Hansen, H.* 1983. The genetic factors for colour types in ranch bred foxes. *Acta Agriculturae Scandinavica* 33, 273-280. *Scientificur*, Vol. 10, No. 1, 1986.

BE FOXY!



The Committee for Breeding in the Scandinavian Association of Agricultural Scientists, Fur Animal Division has discussed the gene symbol for arctic marble. On the basis of the results in this investigation, and considering the reservation made by the authors of »Genetic factors for colour types in ranch bred foxes« (Nes et al., *Acta Agr. Scand.* (33,277), the Committee for Breeding suggests that **in the Scandinavian system the letter W^M will from now on be used as the gene symbol for marble factor** instead of the letter M. This suggestion has also been confirmed by the Board of Fur Animal Division.

Scandinavian Association of Agricultural Scientists Fur Animal Division Committee for Breeding

GENETIC ASPECTS OF PHYLOGENY OF ARCTIC FOX BREEDS.

S.N. Kashtanov, A.M. Mashurov.

The Arctic fox species (*Alopex lagopus* L.) studied by us is a typical inhabitant of the Arctic latitudes with characteristics that are typical to this species alone: higher fertility in the progeny and unique physiological peculiarities related to existence in the zone of low temperatures. Three fox species are found on the territory of our country; one continental and two island subspecies. Seven more subspecies are identified outside the territory of the Soviet Union. The subspecies are distinctly differentiated by color, fur structure, size, and weight as well as cranio-logical measurements.

No doubt, the breeds were genetically more different before the interbred crosses as they originated from different subspecies. Different types were used at different farms. Therefore, the contribution of the different breeds in different individual stocks is variable.

Beginning from 1979, we have studied seven Arctic fox populations reared in cages in the Moscow district, including five groups of the foggy and two of the silvery breeds with a total of 2641 animals. The foxes were maintained almost under similar conditions at all the farms and the feeding norms corresponded to that recommended with a slight deviation traditional to the farms.

Our results lead to the conclusion that the genetic distance reflects the extent of intrabreed and interbred differences of the fox populations and the nature of changes in the allele concentrations corresponding to the directions of breeding in different stocks.

The present example has distinctly demonstrated that the marker genes in the form of alleles of the five loci changing the biochemical parameters of blood provide a good insight into the history of stock formation and their present position. Knowledge of phylogeny of the breeds and stocks obtained with the help of the marker alleles can be used in planning breeding work with the view to developing animals of desired types.

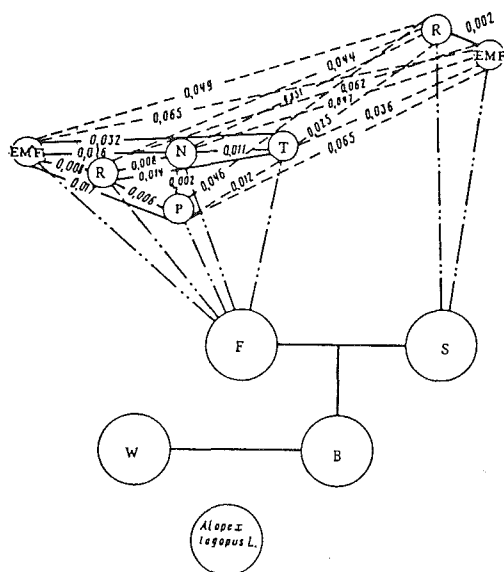


Fig. 1. Genetic distances between the stocks of foggy and silvery breeds of foxes. White (W) and blue (B) colored mutations of foggy (F) and silvery (S) breeds, solid line - genetic distance between the populations of the same breed, dashed line - between stocks of different breeds, dot-dashed line - fox farms rearing different breeds. The letters in the small circles are initials of the farm names. Numerals indicate the genetic distance between the fox stocks from these fur farms.

**ALTERED GENE FREQUENCY AT THE Ld LOCUS ON MINK FARMS
AFFECTED BY ALEUTIAN DISEASE.**

**СДВИГ ЧАСТОТ АЛЛЕЛЕЙ Ld-ЛОКУСА В СТАДАХ НОРОК.
ПОРАЖЕННЫХ АЛЕУТСКОЙ БОЛЕЗНЬЮ**

D.K. Belyaev, O.K. Baranov, T.I. Kochlashvili, M.A. Savina.

An ideas on organization of the Ld-system of low density lipoprotein in the domestic mink as on a "closed" immunogenetic system with two co-dominant allele Ld1 and Ld2 was confirmed.

Significant differences in frequencies of genes and genotypes of the Ld-system between state farm "populations" unaffected with Aleutian disease and those which were centres of this epizootic were established. The results confirm the assumption made earlier on subvitality of the Ld² gene.

Tsitologiya i Genetika, 19, 2, 132-137, 1985.

1 table, 1 fig., 11 references.

Authors' summary.

In RUSS. Summary in ENGL.

IMMUNOGENETICS OF IMMUNOGLOBULINS OF THE AMERICAN MINK.

II. HYBRIDOLOGICAL ANALYSIS OF IgG ALLOTYPES (L1A, H2, H3, H4, H6, and 5) AND GENERAL DISCUSSION OF THE RESULTS.

D.K. Belyaev, I.I. Fomicheva, O.K. Baranov.

The article presents the data of hybridological analysis of six IgG allotypes of the American mink. In full agreement with the results of a population-genetic analysis presented previously, neither linked inheritance nor allelic interrelationships of the allotypes mentioned was established. The distribution of the allotypes L1A and H6 among the F₁ progeny is in good agreement with that expected for monogenic Mendelian traits. In contrast to this, for the allotypes H2, H3, H4, and 5 there is a substantial deviation from the expected segregation in F₁ on account of a large excess of offspring in whom these genetic markers are not expressed. A latent expression of the allotypes H2, H3, H4, and 5 in the blood serum is suggested, as a result of which part of the individuals possessing the genes coding these allotypes cannot be detected in the mink populations.

Our previous communication contained data on the identification of six IgG allotypes of the American mink and their population distribution. In contrast to the other mammalian species studied, the allotypes of the heavy chains in the mink are evidently distributed in the population independently from one another, and not in the form of linked combinations (allogroups). These data contradicted the ideas that have developed on the organization of the genes of the heavy chains of Ig; therefore, the results of a hybridological analysis, which are outlined in the present publication, took on special significance.

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0038-5409/84/2003. Plenum Publ. Corp.

3 tables, 15 references.

Authors' summary.

MINK OF A NEW, COMPOSITE COLOUR.

V.I. Bubnov, N.I. Trofimov.

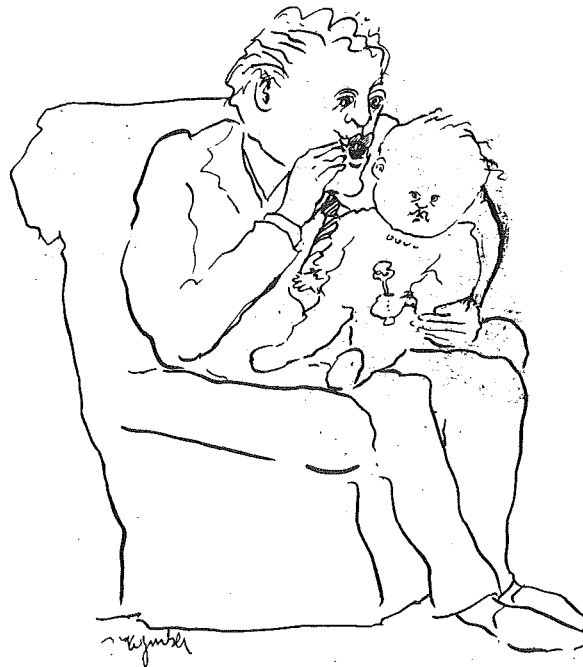
Silver Orchid Pastel mink were obtained during inter se breeding of Orchid mink ($k^o k B b P p$) which had been obtained by mating Ampalo Silver animals ($kk B B p p$) with Orchid Pastel animals ($k^o k^o b b P P$), and by mating Orchid Silver females ($k^o k^o B b p p$) or Orchid Pastel females with Silver Orchid Pastel males, or by inter se mating of Orchid Pastel animals. The Silver Orchid Pastel type is due to an interaction of 3 recessive genes k^o , b and p , and the genotypes is either $k^o k^o b b p p$, and there is no difference between the homozygous and the heterozygous animals in the intensity of colouring or eye colour, and both types are basically blue-grey with brown eyes.

Krolikovodstvo i Zverovodstvo, 4, 16, 1984.

2 tables.

CAB-abstract.

In RUSS.



"Synfuels...microchips...genetic engineering...
Synfuels...microchips...genetic engineering...."

Original Report

Description of The Cytoplasmic Droplet on Mink Spermatozoa¹

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Summary

Transmission and scanning electron microscopy photographs of cytoplasmic droplets on spermatozoa taken from the caput, corpus and cauda epididymis, and the vas deferens of mink were used to characterize these droplets. The droplets, which form at the base of the head, connecting-piece, and anterior-portion of the middle-piece of spermatozoa, consist of a granular amorphous matrix containing numerous curved tubules and vacuoles. The contents of the droplet are encompassed within a distinct membrane, although, the surface may have an irregular appearance due to protrusions of the components. The size of the droplet decreases significantly as it descends the mitochondrial sheath and assumes a more eccentric position on the posterior portion of the middle-piece of the spermatozoon. These morphological alterations are accompanied by degenerative changes in the droplet membrane prior to its normal disposition from the tail of the spermatozoon.

Introduction

The presence of cytoplasmic (kinoplasmic or protoplasmic) droplets on the tail of mammalian spermatozoa was first described by *Ritzius* in 1909 (*Bloom and Nicander, 1961*). Numerous accounts concerning these droplets have since been reported for many mammalian species. Mink farmers have frequently expressed concern regarding the fertility of males showing the presence of cytoplasmic droplets on spermatozoa observed during routine »sperm checking« procedures.

Recent studies by *Krause (1984)* have shown that ejaculates from mink with up to nine per-

cent of the spermatozoa containing cytoplasmic droplets had no discernible adverse effects on the fertilizing capacity of the semen. The cytoplasmic droplets on mink spermatozoa have, however, not been studied in detail and were only briefly mentioned by *Kim et al. (1978)* in their description of the ultrastructure of mink spermatozoa. This study was, thus, conducted to characterize the cytoplasmic droplet on mink spermatozoa and describe its ultrastructure.

Materials and methods

Eleven, sexually mature, natural dark or pastel, male mink (*Mustela vison*) from the Michigan State University Experimental Fur Farm were used in the study. These mink were housed in individual cages in open-sided sheds and exposed to natural environmental conditions, including photoperiod. Feed (see *Krause, 1984*) and water were provided *ad libitum*. During the breeding season (March), the mink were anesthetized with 0.2-0.3 ml Vetalar®² and unilaterally castrated. Samples of spermatozoa from the caput, corpus and cauda epididymides, and vas deferens were collected on pre-warmed (39°C) glass microscope slides and diluted with 0.05 ml of physiological saline.

A smear, made from a subsample of the spermatozoa collected from each mink, was stained with a live-dead stain (*Lasley and Bogart, 1944*) for screening the sample for the presence of cytoplasmic droplets using a light microscope. The remainder of the sample from the collections that contained cytoplasmic droplets, was placed into vials containing

1. This research was supported by the Mink Farmers' Research Foundation, Thiensville, WI and published with the approval of the director of the Michigan Agricultural Experiment Station as Journal Article No. 11856.

2. 100 mg/ml Ketamine HCl; Parke-Davis, Morris Plains, NJ 07950.

0.25 ml of five percent glutaraldehyde and processed for transmission electron microscopy (TEM) according to *Hooper et al.* (1979) and scanning electron microscopy (SEM) as described by Krause (1984).

Results and discussion

In most species, formation of the cytoplasmic droplet is associated with the Sertoli cells. During spermatogenesis, the majority of the cytoplasm from the spermatids moves to the posterior portion of the head around the base

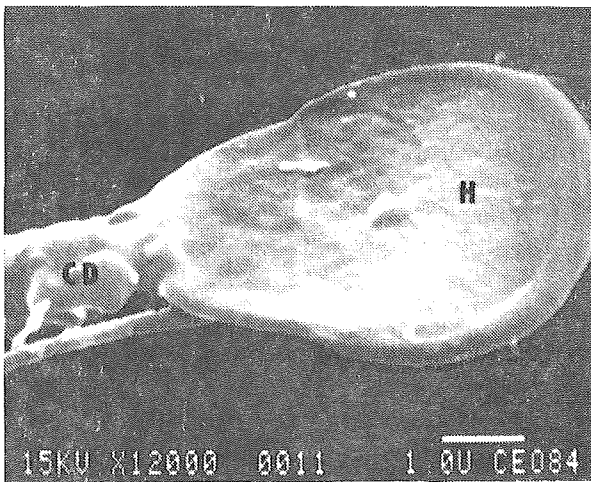


Figure 1. Head (H) and anterior middle-piece of spermatozoon from the caput epididymis of mink with the cytoplasmic droplet (CD) surrounding the connecting-piece and anterior portion of the middle-piece (SEM, 19,500X).

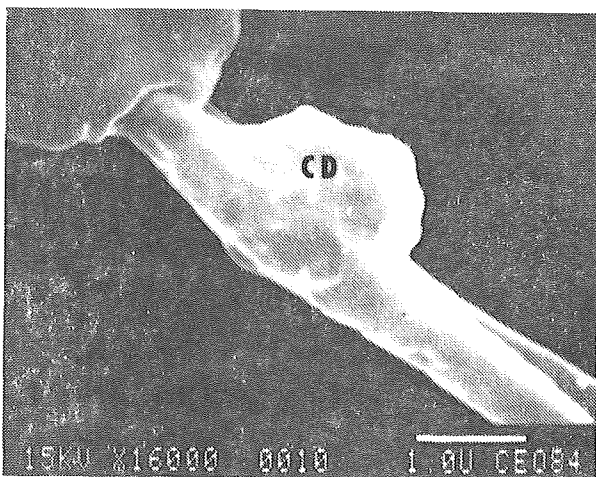


Figure 2. Mink spermatozoon from the caput epididymis showing the cytoplasmic droplet (CD) detached from the head (H). Note the globular appearance of the droplet (SEM, 28,800X).

of the flagellum. As the head develops, the spermatids are forced closer to the lumen of the seminiferous tubules until they finally become free spermatozoa. This developmental process creates slender stalks between the residual cytoplasm which is held in the epithelium and the cytoplasm that is connected to the neck region. When these slender stalks break, the cytoplasm forms a droplet around the neck of the spermatozoa (*Fawcett and Phillips, 1969*). The granules and tubules, which comprise a portion of the cytoplasmic droplet, are components from the Golgi's apparatus and the endoplasmic reticulum (*Bloom and Nicander, 1961; Greeson and Zlotnik, 1945*).

When first formed, the droplets are located on the posterior region of the head, where they surround the neck and border the anterior portion of the middle-piece of the spermatozoa. They descend the mitochondrial sheath during passage of the spermatozoa through the epididymis. The droplets are normally cast off from the tail of the spermatozoa by the time they are ejaculated but occasionally some may be present on ejaculated spermatozoa.

Since spermatozoa do not attain full maturity until they reach the cauda epididymis, the position of the droplets on the spermatozoa may serve as an indicator of maturity (*Bedford, 1963*). Ejaculates that contain a large percentage of spermatozoa in which cytoplasmic droplets are on the anterior portion are usually indicative of a spermatogenic disorder (*Bloom and Nicander, 1961*).

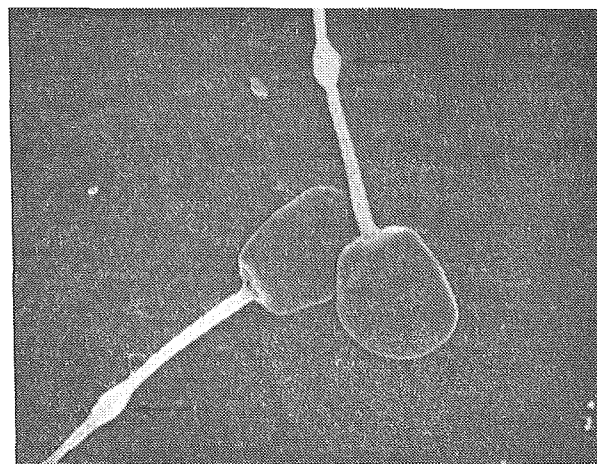


Figure 3. Mink spermatozoa from the distal portion of the vas deferens displaying cytoplasmic droplets on the posterior portion of the middle-piece (SEM, 3,100X).

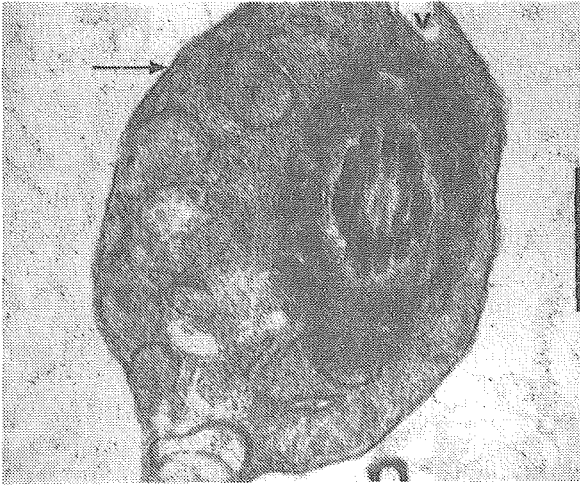


Figure 4. Cross section of a cytoplasmic droplet surrounding the middle-piece of a mink spermatozoon. Note the distinct membrane (M) surrounding the droplet and numerous tubules (T) and vacuoles (V) on the periphery of the droplet.



Figure 5. Lateral section of a cytoplasmic droplet located on the middle-piece of a mink spermatozoon (TEM, uranyl acetate stain, 30,000X).

Light microscopic examination of the live-dead stained smears of spermatozoa collected for this study revealed the presence of cytoplasmic droplets on spermatozoa from both the natural dark and pastel mink. SEM photographs of spermatozoa from the caput epididymides of the mink showed cytoplasmic droplets surrounding the base of the head, the connecting-piece and/or the anterior portion of the middle-piece (see Figures 1 and 2), whereas, droplets on spermatozoa taken from the cauda epididymides and vas deferens were located, almost exclusively, on the posterior portion of the middle-piece (Figure 3).

Cytoplasmic droplets on spermatozoa from the caput epididymides were significantly ($p < 0.01$) larger than those from the cauda portion of the epididymides. Droplets on spermatozoa from the caput epididymides averaged 2.26μ in width, while the mean dimensions of those from the cauda portion were 1.98 by 1.20μ , respectively. Nearly 50 percent of the spermatozoa from the cauda epididymides contained cytoplasmic droplets.

TEM photographs (Figures 4 and 5) portrayed the cytoplasmic droplet on mink spermatozoa as consisting of a membrane-bound sac containing tubules and vacuoles within a granular amorphous matrix. The protrusions of structures contained within the membrane give the surface of the droplet an irregular appearance. The tubules that are dispersed throughout the droplet consist of a variety of curved shapes and the internal structure of the droplet appears to have no pattern relative to the orientation of its components as shown in Figures 4 and 5. In the rat, Bloom and Nicander (1961) reported that the tubules and vacuoles were generally restricted to the periphery of the droplet. The droplets from the cauda epididymis of the ram and bull, as described by Bloom and Nicander (1961), appear to contain smaller vacuoles and a less granular matrix than those of the mink.

As the cytoplasmic droplets descended the middle-piece of mink spermatozoa, the membranes began to degenerate and the droplets occupied a more eccentric position to one side

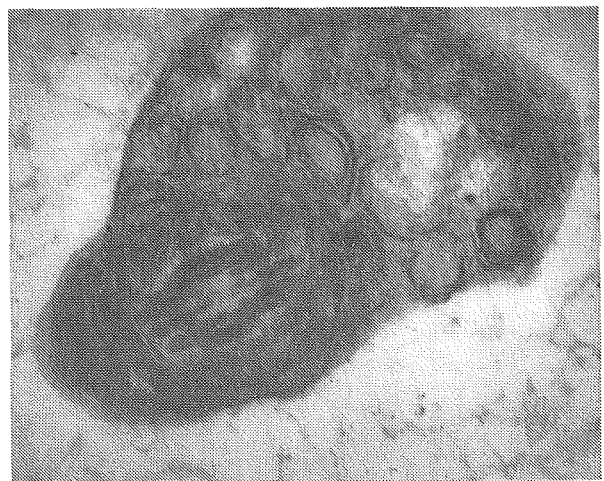


Figure 6. Cytoplasmic droplet located on the posterior portion of the middle-piece of mink spermatozoon. Note degeneration of the membrane surrounding the droplet and the eccentric position of the droplet on the spermatozoon (TEM, uranyl acetate stain, 45,000X).

of the middle-piece (Figure 6). The degeneration of the membrane may weaken the attachment of the droplets to the spermatozoa leading to their eventual detachment from the spermatozoa.

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The Possibility of Use Suacron (Adrenergetic B-Blocker) as an Mating Efficiency Improving Factor

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Summary

Various disorders may occur in farm animals, particularly in the mating period. B-blockers turned out to be an effective measure in this case. The authors examined 42 arctic foxes in this end: males with low sexual activity or revealed trouble with intromission.

Suacron (B-blocker prepartate from German Federal Republic) was injected and dose 0,5 mg was used. The advantageous effect on the mating efficiency was observed, particularly in the case of foxes which had trouble with intromission.

Introduction

The adrenolytic class of drugs administration to the stressed animals has an effect on fitness the circulatory system to the high psychophysical exertions, improves heart work under conditions of decreased oxygen supply and reduces tension and fear. Thus, adrenolytic B-blockers are used in the animal production (1, 3, 4, 5, 10, 11). Suacron is a drug belonging to this class, produced by Praemix Wirksstoff (GFR). The experiments of *Bartsch et al* (1978) showed that Suacron is useful as preventive drug in cases of death resulting from sudden heart attack in pigs (2). *Heptner's* investigations concerning Suacron in the stress treatment in horses showed its usefulness, particularly with older animals (6). Our experiments revealed that Suacron is a good anti-stress measure in the racing horses (8, 12). We also used this drug in cases of carriage-adaptive stress in calves (7).

The aim of this study was enhancement of mating efficiency in males arctic fox during mating period by increasing of the circular system sufficiency, prolongation of males sex-

ual activity and partially decreasing of the sympatic nervous system effect.

Table 1. Matings of males blue foxes with low sexual activity before and after Suacron administration.

No. of male	Number of matings before administration	Number of matings after administration
L 1953	2	2
L 1405	3	—
T 2217	2	4
H 145	3	3
L 523	3	—
L 1447	3	—
T 705	3	3
T 493	1	2
T 1267	4	2
T 1841	2	3
T 657	3	4
T 847	2	—
L 523	4	3
T 1971	1	2
N 699	1	4
N 1703	4	3
T 2643	3	2
H 175	3	4
N 613	3	2
T 643	1	3
T 1619	4	3
N 1295	2	2
T 2017	2	3
T 1085	1	2
L 453	1	2
T 677	1	2
T 1335	2	2
T 237	2	3
L 301	1	2
T 653	1	5
T 2613	—	2
T 419	—	2
Total	68	76

Material and method

The experiments were carried out in the farm RSP Duchnice during 1983. 42 males arctic foxes were examined 1-5 years of age. The dose of administered Suacron was 0,5 mg (1,0 ml). The drug was injected under the skin every day two hours before the mating for 18 days during the mating period.

The foxes were divided into two groups: $\frac{1}{32}$ animals revealed low activity and no mated, $\frac{2}{10}$ active foxes which had trouble with intromission.

All these animals were paired with vixens in heat every day.

Results and discussion

The results of males arctic fox mating efficiency are shown in Tables 1 and 2. Table 1 presents the list of blue foxes matings. Suacron was administered late in the mating period in this case of animals with low activity, the slight enhancement of activity was observed in this group. The most advantageous effect after injections was in males which mated one or two times. In the other case the effect was lesser.

Table 2 shows the list of matings concerning males sexually active but which had trouble with intromission. In this group Suacron was also administered late in the mating period. The effect on the mating efficiency was rather significant in this case.

In all animals used in these experiments the side-effects weren't observed.

Previous observations in pigs, with analogical use of Suacron suggested that it's valuable measure against tachycardia, taking place in the mating period very often.

Table 2. Matings of males blue foxes which have trouble with intromission before and after Suacron administration.

No. of male	Number of matings before administration	Number of matings after administration
T 143	—	4
T 183	—	2
T 399	—	1
T 503	—	1
T 541	—	—
T 545	—	1
T 2803	—	—
T 2089	—	—
T 1837	—	1
T 1699	1	2
Total	1	12

Conclusions

1. The advantageous effect of Suacron on the mating efficiency in arctic foxes was ascertained.
2. The drug administered was well tolerated and no side-effects were observed.
3. The effect of Suacron on the foxes maybe was resulted from enhancement of circular system sufficiency.

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Acknowledgement

We would thank Praemix Wirkstoff Grubh, Mannheim (GFR) for gratuitous delivery the drug for investigations.

The Effect of Suacron on Silver Fox Matings

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Summary

The males of silver fox reveal sometimes troubles which have with performance of mating behaviour. Our investigations comprised 19 foxes show that the use various doses of B-blocker in this case has advantageous effect on the number of matings as it was observed in arctic foxes.

Introduction

From the recent literature the effect of Suacron on treatment tachycardia in swine during the mating period is known (1, 3). Introductory investigations of Suacron administration in arctic foxes showed, that it's useful as regards males which had trouble with intromission (2). The aim of the further investigations was to verify this effect in silver foxes. The enhancement of dose was the additional factor only in comparison with the previous study (2).

Material and method

The experiments were carried out in the farm RSP Duchnice in 1983. The whole material (19 males) was divided into two groups. The

first consisted of 5 males, revealed low sexual activity, the second-of 14 males which had trouble with intromission. All males were 1-3 years old. In the first group drug was administered once in turn as follows 0,2 ml-0,1 mg; 0,6-0,3; 2,8-1,4; 5,4-2,7; 16,2-8,1 mg. per fox, under the skin. In the second group we administered the same dose of Suacron – 1,0 ml-0,5 mg under the skin for 14 days; every day two hours before the mating.

Results and discussion

The results obtained in this study show Tables 1 and 2. Table 1 concerned the first group, reveals enhancement of sexual activity. Two vixens were successfully mated to examined males. This fact took place 48 hours after the drug administration, and these females whelped. The side-effects were not observed in males, in spite of high drug doses.

Table 2 shows that in the second group the advantageous effect of Suacron was also significant in active but not mated males. In this case all females which were mated, whelped too.

These results confirm findings concerning the effect of Suacron in arctic foxes.

Table 1. Matings of males silver foxes with low sexual activity before and after Suacron administration.

No. of male	Dose		Number of matings before administr.	Number of matings after administr.
	ml	mg		
T 115	0,2	0,1	–	1
T 129	0,6	0,3	–	–
P 277	1,8	1,4	–	1
T 35	5,4	2,7	–	1
T 73	16,2	8,1	–	–

Table 2. Matings of males silver foxes with have trouble with intromission before and after Suacron administration.

No. of male	Dose		Number of matings before administr.	Number of matings after administr.
	ml	mg		
T 131	1,0	0,5	1	2
P 273			–	1
T 107			1	2
T 153			–	1
T 115			1	1
S 27			1	2
T 79			1	1
S 15			–	1
S 16			–	2
S 65			1	3
P 277			–	1
T 35			–	2
T 73			–	1
T 129			–	–
Total			6	20

Conclusions

1. The advantageous effect of Suacron on effectiveness of matings in silver foxes was ascertained.
2. Doses of this drug from 0,2 to 16,2 ml were well tolerated and no side-effects were observed.
3. There was no effect on females fertility also: all vixens mated to taking a cure males, whelped.
4. It would be desirable to explain the mechanism of Suacron action.

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Acknowledgement

We would thank Praemix Wirkstoff Grubh, Mannheim/ GFR/ for gratuitous delivery the drug for investigations.

Courtship and Mating Behaviour of the Domestic Fitch (*Mustela putorius furo*)

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Summary

Courtship behaviour of ten pairs of domestic fitch (*Mustela putorius furo*) was observed and the time taken for each behaviour phase was recorded. Courtship behaviour was long (33 to 56 minutes) and involved repetitive responses. It consisted of male activity directed towards the neck/ear region of the female, followed by a period of false mounting. This finally lead to intromission and locking. Apart from using locking as an indicator, it was difficult to determine with certainty whether intromission occurred. During some courtship sequences the male's penis became caught in the wire mesh floor of the furring cages. The sequence of events and possible seasonal effects on courtship behaviour were also described.

Introduction

The fitch (*Mustela putorius furo*) is a mustelid carnivore belonging to the same family as weasels, stoats and mink. The fitch has a well defined circadian rhythm of intense sexual activity for six months, alternating with a phase when the reproductive organs of both sexes are inactive (Rowlands, 1967). In New Zealand, wild fitch are in breeding condition between September and March (Fitzgerald, Johnson, King & Moors, 1984), and are bred on commercial fur farms between September and January (Giles & Wallace, 1983).

In the female fitch in oestrus the vulva becomes swollen and open with rigid walls (Rowlands, 1967). Copulation may vary in duration from 10 minutes to three hours (Rowlands, 1967). Ovulation is normally induced by courtship but on fur farms can be brought about by rough handling or from female-

female interactions. Therefore intromission is not essential for ovulation to occur. The female ovulates about 30 hours after copulation (Hammond & Chesterman, 1972). As the viability of the ova decreases 18 hours after ovulation, a double mating is often used to ensure fertilisation of the shed ova (Lagerkvist, 1984). There is no available evidence to suggest a correlation between fertility and duration of coitus (Rowlands, 1967). After ovulation the vulva softens and diminishes in size four to five days after mating. If vulval regression does not occur the female is remated (Lagerkvist, 1984). It is important to check that the males are mating effectively in order to avoid false pregnancies (Hammond & Chesterman, 1972).

At present the courtship behaviour of the fitch is poorly documented. The aim of this study was to record and describe the courtship behaviour of the domestic fitch.

Method

Subjects

Ten pairs of fitch were studied. All were one year old and in their first breeding season. At least five of the males observed were being mated for the first time.

Apparatus

Observations were recorded on data sheets and a stopwatch was used to time the behaviour. In addition, a video recording unit and camera were used to monitor courtship of three pairs. Mating took place in whelping and furring cages with wire mesh floors (Figure 1). Both cages were of similar design except that the whelping cages had an enclosed nesting box with solid walls and floor of ply-

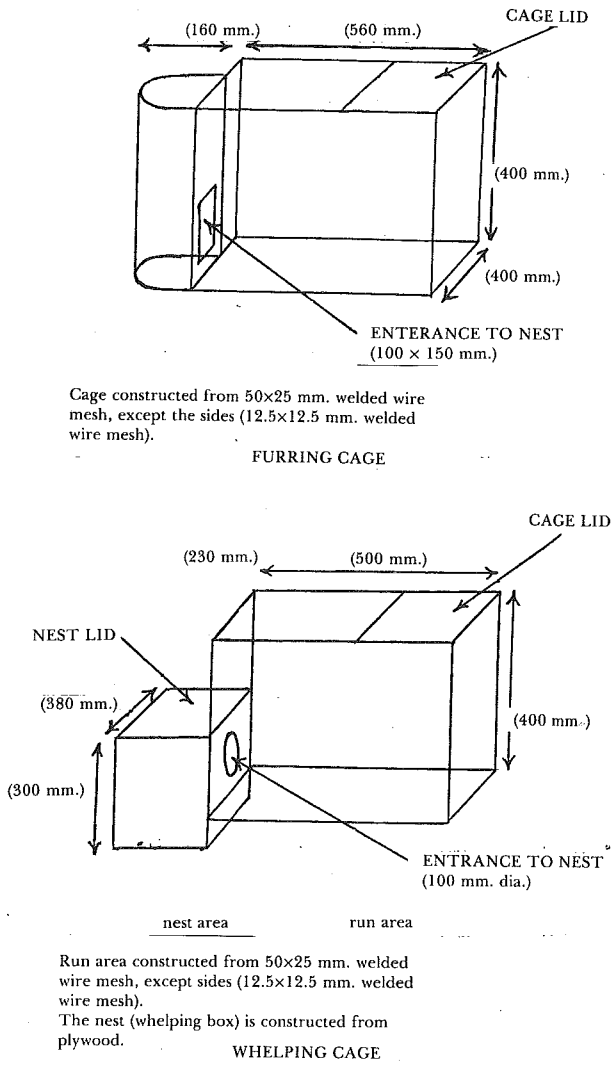


Figure 1. Diagram of furring and whelping cages

wood, whereas the nesting area in the furring cage was smaller and constructed from wire mesh.

Procedure

Five pairs were mated in furring cages, and five pairs in whelping cages. In the furring cages the females were taken to the males whereas in the whelping cages the males were taken to the females. Two pairs which failed to mate were separated at 45 minutes. Three separate observation periods were involved at different times during the mating season as follows:

- a) 2. October 1985 – video taped recordings of three matings in furring cages (between 1.00 and 4.00 p.m.).
- b) 23. October 1985 – Photographs and recorded observations of four pairs of fitch, two mated in whelping boxes and the re-

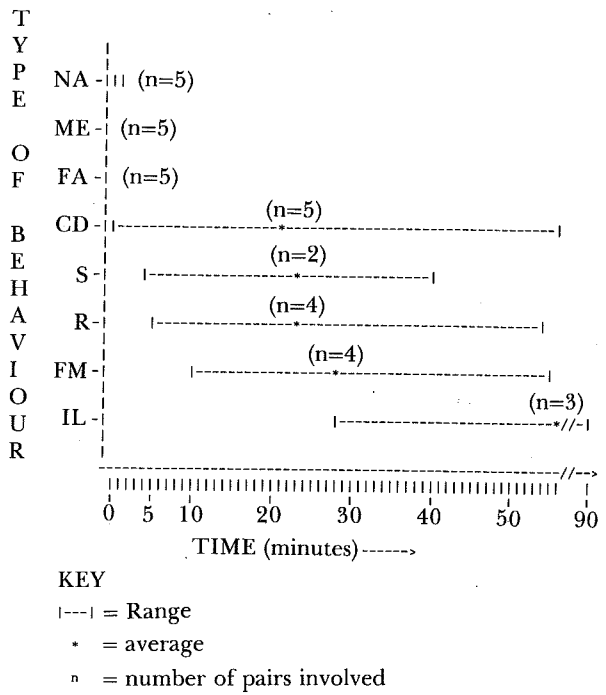


Figure 2. Type of behaviour and time taken during courtship in furring cage.

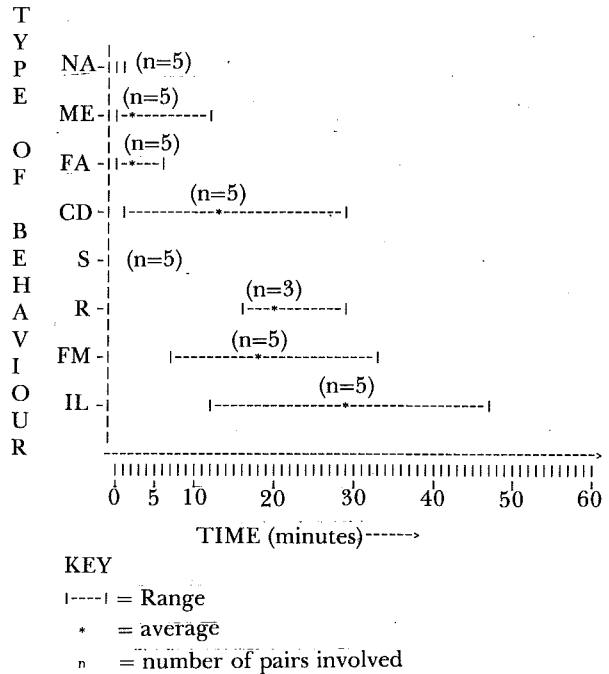


Figure 3. Type of behaviour and time taken during courtship in whelping cage.

mainder in furring cages (between 10.30 and 12.00 a.m.).

- c) 5. November 1985 – Recorded observations of three matings, all of which were in whelping boxes (between 1.00 and 2.00 p.m.).

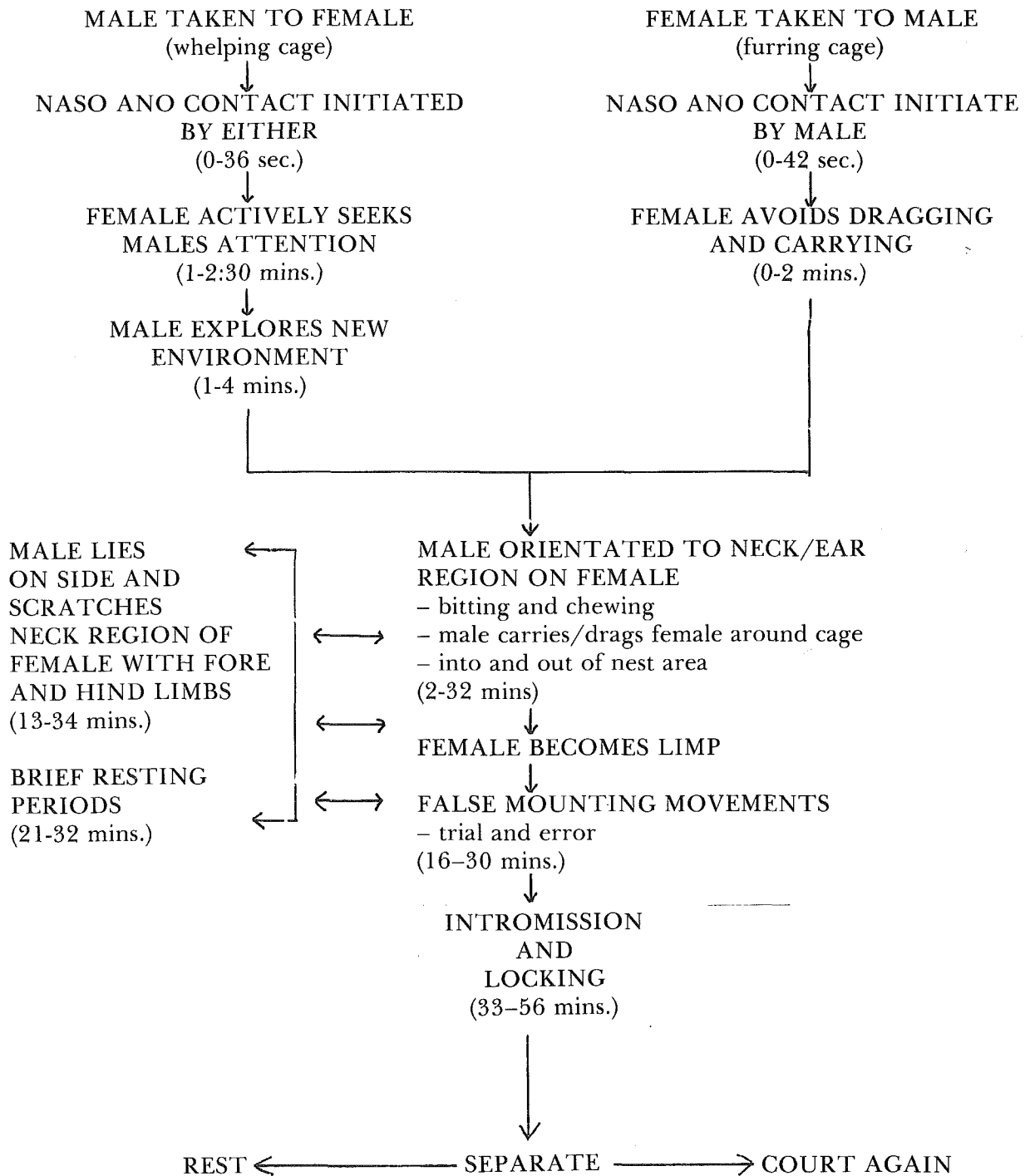


Figure 4: The pattern of behaviour and average range of time taken during courtship in whelping and furring cages.

Video recordings were made of three pairs, and still photographs were also taken.

The behaviours observed during courtship were defined as follows:

- a) NASO ANO (NA) – contact made with the nose of one and the perianal region of the other animal
- b) MALE EXPLORING (ME) – Male sniffing around cage
- c) FEMALE ACTIVE (FA) – Female jumping, sniffing and biting male in the head/neck region
- d) CARRYING AND DRAGGING (CD) – Male holding female in neck region with his mouth and carrying and dragging female around the cage
- e) SCRATCHING (S) – Male lying on side holding female and scratching neck with fore and hind limbs

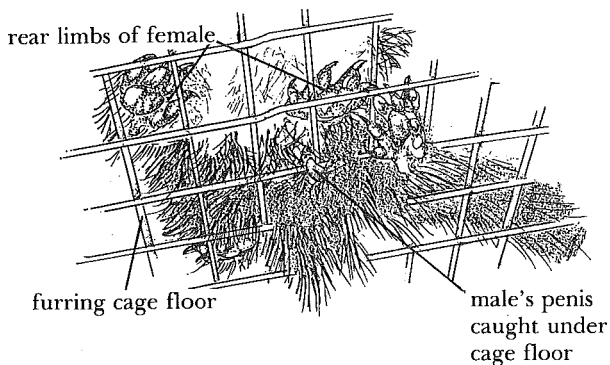
- f) RESTING (R) – Male and female inactive
 g) FALSE MOUNTING (FM) – Pelvic thrusts by male without intromission
 h) INTROMISSION AND LOCKING (IL) – Penis inserted in vagina, animals remain together in copulatory position, with occasional pelvic thrusts.

Results

In all five pairs mated in the furring cages (females to males) the males were observed to carry out naso ano contact and carrying and dragging behaviour, the female played a passive role (Figure 2). In the whelping cages (male to female) the female actively sought the attention of the male for up to seven minutes, whereas the male spent time initially exploring his new environment. Apart from NA, ME and FA the behaviours observed in the furring cages were performed for long periods of time, with averages ranging from 21 to 56 minutes (Figure 2).

In the whelping cages (Figure 3), each pair exhibited the full behaviour sequence of responses, with the exception of resting (in three pairs) and scratching. Less time was spent on CD, S, R, RM, and IL of the eight behaviours observed. There was a considerable increase in the length of time of intromission and locking in the furring cages compared with that observed in the whelping cages.

The patterns of behaviour together with the average range of time taken for each behaviour during courtship in the furring and whelping cages is summarised in Figure 4.



Key
 Male = darker animal
 Female = lighter animal

Figure 5: Diagram of ventral view of furring cage with a mating pair.

Note the different initial responses depending on whether the male was taken to the female or the female taken to the male.

In four out of the five matings in the furring cages the male's penis was observed to become caught in the floor of the cage (Figure 5). This was not observed in the whelping cages.

Discussion

The results confirmed the long and repetitive courtship behaviour as has been previously observed (Moody, Bowman & Lang, 1985; Hammond & Chesterman, 1972, 1976). Intromission seemed to be achieved by trial and error. Hammond and Chesterman (1976) suggested that the numerous attempts at intromission by some males resulted in them appearing clumsy. In this study intromission took on average 15 minutes, (range from 7 to 55 minutes), though the precise time of intromission was sometimes difficult to determine with certainty.

The longer periods of time for each behaviour in the furring cages compared to the whelping cages may have been because the observations for the furring cages were made earlier in the season. The whelping cage matings were observed later when some of the males had become more experienced. More prolonged mating (e.g. half to several hours) at the beginning of the season was noted by Hammond and Chesterman (1972). This contrasts with mink mating time, which tends to increase later in the season (Madsen, 1985).

When the female was taken to the male's cage, she showed less interest in the male than when the male was introduced to the female's cage. With the male transferred, the female initiated contact and gained the male's attention. Although it is usually recommended (e.g. Giles and Wallace, 1983) to take the female to the male's cage, on the limited data provided by this study there seemed no disadvantage in taking the male to the female's cage.

The biting behaviour by the male caused no lacerations or any bleeding in the female suggesting that the courtship is not as violent (Moody *et al.*, 1985) as it might appear. When the courtship behaviour appeared to involve the female in pain (e.g. ear biting) she reacted aggressively by snapping at the male accompanied by a high pitched 'bark', usually causing a brief withdrawal by the male.

The observed dragging/carrying behaviour of the male, also recorded by Rowlands, (1967) is clearly the major element of the courtship. Perhaps this behaviour is to exhaust the female, to allow easier mating and/or to manoeuvre the female in to the correct position for intromission.

Before intromission reoccured various elements of courtship are repeated (Figure 4). Once intromission occurs the animals stay in copulatory contact (e.g. locked). Rowlands (1967) commented that the male and female may be locked together for periods ranging from ten minutes to three hours. The range observed in the present study was 33 minutes to 56 minutes. Prolonged copulation may be a requirement to activate the induced ovulation mechanism (Moody *et al*, 1985).

During the false mounting behaviour it was noted that the male's penis was sometimes caught in the wire mesh of the cage floor. This was observed in four out of the five matings in the furring cages. No catching was observed in the whelping cages. The majority of matings in the whelping cages occurred in the nest, which had a solid floor. Although the furring cages also had a nest area, this seemed to be too small to allow successful mounting to occur.

Catching of the male's penis could have adverse consequences for a first year male and may well reduce the male's libido, as well as possible physical damage to the penis. A temporary wooden or plastic solid floor in the furring cage used for mating would be an effective precaution. This floor would help the male align the penis avoid the possibility of penis catching, provide better solid foot support for both animals and receive any exudates from the female which may act as sexual cues.

As only ten matings were observed in this study only tentative conclusions can be drawn from the results. More research is needed to clarify the importance, or otherwise, of taking the male to the female's cage. A larger scale study, including the recording of kitting rates, would be necessary to determine the optimum mating system for the use on commercial fitch farms.

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SCIENTIFUR, VOL. 10, NO. 1, 1986

**ASPECTS OF REPRODUCTION IN THE MALE BLUE FOX (ALOPEX LAGOPUS):
SEASONAL CHANGES IN A RANGE OF TESTICULAR PARAMETERS AND PLASMA
HORMONE CONCENTRATIONS.**

Adrian Smith.

The papers included are: Seasonal changes in spermatogenesis in the blue fox (*Alopex lagopus*), quantified by DNA flow cytometry and measurement of soluble Mn²⁺-dependent adenylate cyclase activity. (J. Reprod. Fert. 72, 1984, 455-461)* Soluble Mn²⁺-dependent adenylate cyclase activity in the testis of the blue fox (*Alopex lagopus*) (Arch. Androl. 12, 1984, 225-230) ** Physico-chemical properties of the soluble Mn²⁺-dependent adenylate cyclase of the blue fox testis (Arch. Androl. 1985 - In press). Hormonal regulation of reproduction in the male blue fox (*Alopex lagopus*). (J. Reprod. Fert. 1985. In press).

* Scientifur, vol. 9, no.3, 1985; ** Scientifur vol. 9, no.4, 1985.

Norwegian Coll. of Vet. Med., Res. Farm for Furbearing Animals, 1380 Heggedal, Norway. 75 p. 1984. Thesis.
Summary in ENGL. CAB-abstract.

**EXPERIMENTAL USE OF Gn-RH VET. "BERLIN-CHEMIE" FOR SINGLE MATING
OF MINK FEMALES.**

**(Versuche mit Gn-RH vet. "Berlin-Chemie" zur einmaligen Verpaarung
der Nerzfähen).**

H. Hattenhauer, A. Pötschulat.

Gn-RH was experimentally applied to groups of standard mink females (each group consisting of ten young and ten adult females) to find out, if reproduction performance of only once-mated females could be enhanced. Some experiments were related to doses to induce ovulation, with 5 µg, 10 µg or 20 µg being intramuscularly injected to each of the animals and mating timed eight days from Gn-RH application. Other experiments were conducted to define the action of PMSG premedication of females, two or three days prior to mating, with 10 µg/animal of Gn-RH being applied for stimulation of ovulation within one hour from mating. A third group of experiments was carried out to study the impact of early, medium, and late timing of oestrus on the reproduction performance of animals with stimulated ovulation. The deadlines tested were March 8th, and 17th. Application of 10 µg/animal proved to be most favourable dosage. Litter size per birth-giving female was increased over twice-mated controls and over other experimental females which had received 50 I.U. of HCG. PM SG pretreatment seemed to interfere with ovulation and reduced the result of reproduction. Effects on oestrus timing were not clearly recordable. Favourable effects on ovulation rates and litters sizes were recordable from the majority of experimental groups. However, the rate of empty females at all was increased in all groups of one single mating, no matter what biotechnological approach had been chosen.

Mh. Vet.-Med. 39, 524-527, 1984.

9 tables, 6 references.

In GERM. Summary in RUSS and ENGL.

Authors' summary.

USE OF PMSG AND HCG IN MINK BREEDING.

(Über die Anwendung von PMSG und HCG in der Nerzzucht).

H. Hattenhauer, H. Pingel, K. Elze.

Two groups of 20 standard female mink each received intramuscular injections of 30 I.U./animal of PMSG (Mareotropin^R), two days prior to the first or two days prior to the second mating in a first experiment conducted to stimulate ovulation. Two other groups received intramuscular injections of 50 I.U./animal of HCG (Gonadex^R), within one hour from the first or second mating, with Gonadex^R being applied in addition to Mareotropin^R. PMSG produced some synchronising effect only on the first rather on the second mating. The process of the second mating was more effectively synchronised by application of HCG after the first mating. Application of PMSG on whatever date increased litter sized per mother animal by something between 0.3 and 0.5 or 0.1 and 0.2 kits per female set. Additional application of HCG increased the litter size by 1.0 or 0.7 kit per mother animal only in one case. All figures are relative to controls. The same groups of animals were involved in a second experiment. Ovulation was first induced, using 50 I.U. of HCG, seven days prior to first mating, which was followed by second mating, one day later. An early mating date (March 5th and 6th) was compared to a minimum date (March 12th and 13th). The process of mating was found to have been affected in terms of synchronisation. Litter size per mother animal was not increased by HCG in one case, but increased by 0.5 kit in another. Litter size per female set was increased by HCG in both cases by 0.5 or 0.7 kits.

Mh. Vet.-Med., 39, 520-523, 1984.

10 tables, 5 references.

Authors' summary.

In GERM. Summary In RUSS and ENGL.

EFFECTS OF FLUSHING ON REPRODUCTIVE PERFORMANCE, OVULATION RATE, IMPLANTATION RATE AND PLASMA PROGESTERONE LEVELS IN MINK.

Anne-Helene Tauson.

In three experiments with a total of 585 standard mink females, four main flushing models were investigated in relation to unflushed control groups. Flushing by ad libitum feeding followed a period of restricted feeding and started either 18 or 4-5 days before the start of the mating season, 3 days after the matings had started, or was carried out individually when the females mated. Flushing of non-restricted versus restricted animals was also compared in one experiment. To evaluate the effects on ovulation and implantation rate and plasma progesterone levels a limited number of animals per treatment was sacrificed. Flushing, following a period of restricted feeding, improved reproductive performance in yearling females when commenced 4-5 days before the start of the mating season. Litter size increased, but the frequency of barren females was not clearly affected. In yearling females mated at least twice, a quadratic regression of litter size on weight change in the flushing period was found. In two experiments the date of first mating and number of mating per female were independent of flushing model. In the third experiment, females in the control group were more reluctant to mate, resulting in later date of first mating and fewer matings per female. Ovulation rate increa-

sed non-significantly as an effect of flushing, but implantation rate was not clearly affected. About one month after mating, plasma progesterone levels tended to be lower in animals that had been flushed for a period of several days than in control animals.

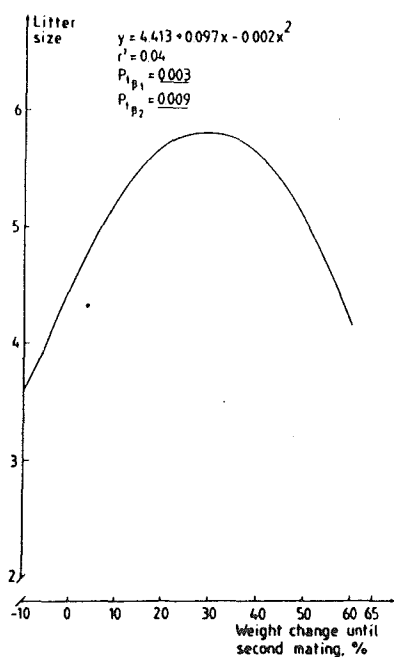


Fig. 5. Litter size of yearling females as a quadratic regression on weight change from start of flushing until second mating.

Acta Agric. Scand. 35, 295-309, 1985.
5 tables, 5 figs., 38 references.

Authors summary.

THE STUDY OF THE SEXUAL CYCLES AND THEIR SEASONAL FLUCTUATIONS IN FEMALE CHINCHILLAS (*CHINCHILLA LANIGER*).

(Badania nad cyklami płciowymi i ich sezonowa zmienność
u samic szynszyla malego (*Chinchilla laniger*)).

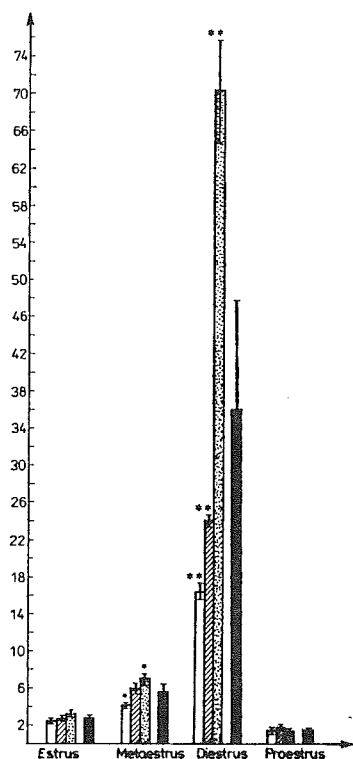
Elzbieta Szylarska-Góźdz, Joanna Gromadzka.

Sexual cycles in the *Chinchilla* females and their seasonal fluctuations have been investigated. Evidence for the occurrence of sexual cycles was based on changes in vaginal smears which were stained with 0.1% Toluidine Blue. The smears revealed estrual changes typical of other rodents in all types of epithelial cells, together with disappearance of leucocytes and mucus.

Seasonal variations in the length of *Chinchilla* sexual cycles were found. During the spring period (March-June) 5-6 regular, short (22-27 days) cycles were observed. During the summer-autumn period (July-December) sexual cycles were longer (33-36 days) and less frequent (3-4 in the season). During the autumn-winter period (November-February) there were only 1-2 long (70-90 days) cycles.

Seasonal significant variations were also determined in a number of cornified and nucleated epithelial cells and cells from the deep and inter-

mediate epithelial layers. The number of leucocytes and the amount of mucus did not show any seasonal fluctuations.



Rys. 2. Sezonowe zmiany długości trwania poszczególnych faz cyklu płciowego samic szynszyla małego ($\bar{x} \pm SE$). Oś rzędnych — liczba dni; oś odciętych — fazy cyklu płciowego. Kolumny białe — wiosna; kolumny zakreskowane — lato; kolumny kropkowane — jesień—zima; kolumny czarne — średnia. Różnice istotne statystycznie: * $p \leq 0,01$; ** $p \leq 0,001$.

Fig. 2. Seasonal changes in the sexual cycle phase length of *Chinchilla* ($\bar{x} \pm SE$). Ordinate — number of days; abscissa — phases of the sexual cycle. White columns — spring; striped columns — summer; dotted columns — autumn—winter; black columns — mean values. Statistically significant differences: * $p \leq 0,01$; ** $p \leq 0,001$.

Zwierzęta Laboratoryjne, 21, 1, 31–43, 1984.

3 tables, 3 figs., 22 references.

In POLH. Summary in ENGL.

Authors' abstract.

DIFFERING OPINIONS ON THE SEXUAL ACTIVITY AND FERTILITY OF MALE FOXES.

Двух мнений быть не может

L.V. Balash.

For 259 males which had each mated in their 1st breeding season with more than or equal to 8 females and for 116 males which had each mated with less than or equal to 4 females, the number of females mated averaged 10.2 and 3.2, respectively, in the 1st season, 9.0 and 6.2 in the 2nd, and 8.6 and 6.6 in the 3rd, the percentage of females whelping was 88.5 and 94.2 in the 1st season, 91.7 and 93.1 in the 2nd, and 91.5 and

89.6 in the 3rd, and the number of cubs per male averaged 47 and 16 in the 1st season, 43 and 30 in the 2nd, and 41 and 31 in the 3rd.

Krolikovodstvo i Zverovodstvo, 2, 14, 1984.

1 table.

CAB-abstract.

In RUSS.

THE REPRODUCTIVE CAPACITY OF MINKS WITH EXPERIMENTAL TOXOPLASMOSIS.

ВОСПРОИЗВОДИТЕЛЬНАЯ СПОСОБНОСТЬ НОРОК ПРИ ЭКСПЕРИМЕНТАЛЬНОМ ТОКСОПЛАЗМОЗЕ

E.I. Drozdova.

Minks affected with 60 cysts of a low virulent strain (No. 131) of *Toxoplasma* in the first half of pregnancy, developed clinical disease 3 to 6 days after infection, but appeared in normal health one month later. The CFT demonstrated seroconversion in all the animals, with antibody titres of 1:64 to 1:2048. 18 (60%) produced 7 stillborn and 65 live cubs, most of which (92.3%) died within 3 weeks of birth. In comparison, 14 of 15 minks in the uninfected control group produced 71 normal cubs. In the following season, the females from both groups were mated. 20 of 30 in the experimental group produced 128 cubs; 2 females lost all their cubs and 7 lost part of the litter. *Toxoplasma* cysts were found in the brain of 4 of 7 cubs of the 1st litters and these were infective to mice. No parasites were recovered from the brain of cubs of the 2nd litters.

Nauchnye Trudy Nauchno-Issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 27, 158-162, 1982.

1 table, 7 referendes.

CAB-abstract.

In RUSS.

THE REPRODUCTIVE FUNCTION OF MINK FEMALES.

ВОСПРОИЗВОДИТЕЛЬНАЯ ФУНКЦИЯ САМОК НОРОК

T.M. Chekalova.

Of 52 and 63 females that had been culled at 2 farms in spring, approx. 30 and 30% resp. were found to have no pathological changes of internal organs and genitalia, 42 and 2% were obese, and 28 and 68% had pathological changes. For the last 2 groups, the percentage that had not ovulated was 33 and 44.

Nutritional reasons accounted for 58% of anovulation, and disease for 42%.

Sbornik Nauchnyk Trudov. Moskovskaya Veterinarnaya Akademiya, 104-106, 1983.

3 references.

CAB-abstract.

Improvement of Black Mink Fecundity by using a Nutritional Supplement

O. Pilley, Jouveinal Canada 5450 Côte-des-Neiges Room 230 – Montreal, Que. H3T 1Y6, Canada – P. Allaueme, Lyraz Usine du Guet B.P. 111 – 29171 Douarnenez Cedex, France – D. Allain, CNRZ 78350 Jouy en Josas, France

Summary

This paper describes experiments realized in the INRA experimental farm and in two canadian farms in view to establish the action of the nutritional diet supplement LY 83 0928 on reproduction levels. Treated minks were fed 2% dry matter LY 83 0928 for 135 days from mating to weaning.

Treated minks had an average litter size after weaning of + 0.16, + 0.47 and + 0.33, respectively in the INRA farm and two canadian farms, compared to controled minks. Although statistical data processing showed these differences as not significant, there is a positive tendency and studies should be carried on to find out the mode of action with emphasis on hormonal physiology.

Introduction

Enzymatic fish protein hydrolysates are used in animal nutrition for their good digestibility (SEVE et al, 1978) and their beneficial effects on the intestinal flora (YULUCHI, 1982).

Such actions make these nutritional supplements particularly efficient during »Critical« storages of breeding (higher energetic needs, stress . . .).

In mink breeding, experience shows the reproduction period being the most sensitive time of the cycle. The reasons are multiple:

- High variability of the female fecundity depending on a variable gestation due to delayed implantation (Hansson, 1947), age (Einarsson, 1980) and species (Venge, 1973),
- Variability of puppies vitality due to their high growth rate (weight multiplied by 10 within the first three weeks) and a sometime high mortality rate (Howell, 1979).

The above observations lead us to study the effects of the nutritional supplement LY – 83 09 28 during reproduction lactation period.

Materials and methods

Composition of LY 83 0928

Chemical analysis

Protids	71% ± – 2%
Lipids	6% ± – 2%
Ashes	11% ± – 2%
Ph of a 10% solution	4 – 0,5

Molecular size of proteic fraction (by gel filtration)

20 000 d	27%
5 000 to 20 000 d	4%
700 to 5 000 d	28%-34%
700 d	38%

The experiments were conducted on the INRA experimental farm in 1983 and on 2 canadian farms in 1985. Fifty pastel female of different ages were used in the INRA experimental farm while respectively one hundred sixty and one hundred ninety four primiparous dark females were used in the canadian farm 1 and 2.

One month prior mating, the animals were randomly divided into two groups in each farm, all animals were fed the same moist ready mixed feed until end of June (weaning period) except that a supplementation of 2% in dry matter of LY 83 0928 was mixed to the feed of the experimental group.

In the INRA* experimental farm the animals were fed with a commercial diet. In the canadian farm 1*, the typical diet is 220 g per day composed of:

	Fish 30%
	Beef liver 15%
– Fresh meat 85%	Chicken 10%
	Beef 10%
	Beef paunch 15%
– Dry concentrate	15% Special for reproduction from February 1st to July 1st.

*Farm 1: Ferme de Vison Chateaugay Quebec.

In the canadian farm 2*, the daily diet consists of 200-220 g composed of:

	Fish 34%
	Duck guts 27%
	Beef paunch 7%
- Fresh meat 90%	Lung 7%
	Eggs 5%
	Blood 10%
- Dry concentrate	10%

*Farm 2: Ferme de vison Lahue Inc. Eastern Townships.

The results recorded were the length of pregnancy expressed in days from the last mating to the parturition and the number of puppies born alive and still alive at May 15.

Results

In all farms, LY 83 0928 was mixed without any problem to the dry concentrate before the final mix with meat and water.

Results are shown in Table 1.

The statistical data processing showed the groups were homogeneous, but that the differences were not significant. Anyway, there is definitely a positive tendency of an action of LY 83 0928 on average litter sizes, since the number of puppies alived at May 15 was respectively 8%, 17% and 8% larger in the INRA experimental farm and the canadian farms 1 and 2.

Moreover we can point out that by supplementation of 2% in dry matter of LY 83 0928, a significant shorter length of pregnancy was observed.

Discussion

By supplementation of 2% in dry matter of LY 83 0928, one month prior mating and until weaning period, to the fed of female minks, an improvement of whelping results (expressed as the number of puppies alive at weaning per mated female) was observed.

The whelping result in treated female was respectively 8%, 17% and 8% larger in the INRA experimental farm and canadian farm 1 and 2 than in the control group, although these differences between the groups did not differ significantly.

The mode of action of LY 83 0928 is still unknown. However, it was well established in mink that fecundity decreases when the length of pregnancy increases (Hansson, 1947; Enders, 1952) and that the length of pregnancy which depends on the variations in day-light ratio (Belayev et Al, 1963; Aulerich et Al, 1963) was mainly regulated by the variations in plasma prolactin levels (Papke et al, 1980; Martinet et al, 1981). So we can suggest that LY 83 0928 act on the physiology of pregnancy since a shorter length of pregnancy have been observed in treated females of the INRA experimental farm and the canadian farm 1 as compared to the control groups. We must now verify the effect of LY 83 0928 on the hormonal physiology of the pregnancy.

Meanwhile LY 83 0928 proved it may be considered as an effective way of improving the average fecundity for minks whose average litter size is under 4.5.

References

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Table 1. In treated females except in canadian farm 2.

Experiment	Data	Inra		Farm 1		Farm 2	
		Treated	Control	Treated	Control	Treated	Control
Number of females		25	25	80	80	97	97
Whelping rate %		64	64	81.3	80	90.7	83.5
Length of pregnancy*		48.4 ± 1.0	51.3 ± 1.7	45.7 ± 0.6	47.6 ± 0.6	49.6 ± 0.8	49.7 ± 0.8
Born alive/mated*		3.20 ± 0.68	2.40 ± 0.53	3.94 ± 0.32	3.61 ± 0.31	3.95 ± 0.23	3.49 ± 0.24
Treated versus control			+ 0.80		+ 0.33		+ 0.32
Alive May 15/mated*		2.28 ± 0.58	2.12 ± 0.50	3.30 ± 0.30	2.83 ± 0.29	3.76 ± 0.25	3.43 ± 0.24
Treated versus control			+ 0.16		+ 0.47		+ 0.33

*Mean ± SEM.

- and timing of nidation in mink (*Mustela vison*). *J. Reprod. Fert.*, 54, 133-136.
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Original Report

Effect of Feeding Diet supplemented with Brown Livex on the Quality of Fur in Polar Foxes

(Wpływ żywienia dawkami z dodatkiem livexu brązowego na jakość okrywy włosowej u lisów polarnych)

S. Jarosz, B. Barabasz, O. Szeleszczuk, Agricultural University in Kraków, Division of Fur Animal Breeding, Poland

Summary

Based on the results obtained referring to weight gains, body length of foxes estimates of exterior and grading of pelts, it can be said, that an optimal proportion of brown livex in diet fed to polar foxes during their growth and priming of winter coat should amount to about 30%. An increased amount of brown livex in diet (60%) had an adverse effect on production results, deteriorating particularly the structure of winter coat and consequently, the quality of pelts.

Introduction

Animal blood being an offal product in slaughter-houses is considered a valuable feed for carnivorous fur animals. Utilization of fresh blood for these purposes, however, is limited due to its fast deterioration and a relatively high water content. The physical and chemical methods of blood preservation, which have been known so far (*Bright et al.* 1977, *Uchman et al.* 1978, *Slawoń et al.* 1981, *Bieguszewski et al.* 1984) have not been widely applied in farm animal practice.

The technology of livex production from blood and whey worked up by *Zaleski and Tereskiewicz* (1984) seems to be very promising with respect to utilization of blood from slaughter-houses in fur animal feeding, particularly as it is very simple. It consist in mixing the stabilized animal blood with fresh whey in the 1:1 ratio, scalding and next subjecting to a process of partial dehydration (brown livex).

So far, no optimal ration of livex in feeding carnivorous fur animals has been found. Care should be taken, however, not to disturb aminoacid balance (defficiency of isoleucine) in

case of overdosing blood in feed ration, which might adversely affect the quality of fur animals (*Slawoń et al.* 1980).

The aim of this study was to investigate the effect of various proportions of brown livex in feed rations on the weight gains and quality of fur in polar foxes.

Material and methods

Experiment was carried out on a total of 300 young polar foxes divided into 3 groups of 100 animals (2 experimental and 1 control). Animals were fed diets supplemented with brown livex in the following proportions: group I-60%, group II-30%, group III (control) -10%. Experimental animals were investigated in various stages of growth and formation of their winter coat. In addition physiological indices, weight gains, exterior traits and after slaughter the quality of pelts were studied.

Results and discussion

The results of digestive studies are presented in Table 1. Both during the fast growth and during process of winter coat formation digestibility coefficients did not differ significantly between groups. However, a clear tendency can be noticed of a positive effect of dietary livex on protein digestibility which in experimental groups, depending on livex proportion in the diet (60 and 30%) was in two periods: 92.2%, 92.8% and 91.2%, 91.0% respectively, in contol group the values were 88.6 and 88.4%.

DIGESTIBILITY OF NUTRIENTS AND EXCRETION OF WATER AND SALTS IN FAECES FROM MINK FED DIFFERENT TYPES AND LEVELS OF FIBER.

(Fiberholdige stoffers indflydelse på næringsstoffernes fordøjelighed og minkens udskillelse af vand og salte i gødningen).

Steen Møller.

An introduction, the definition of fiber, its chemical composition and physical properties are reviewed.

The effect of three types of fiber on the digestibility of nutrients, and the loss of water and salts in faeces from mink was examined by the regression method.

A normal diet was supplemented with 3.6 or 9 per cent of dried granulated beechwood, dried sugar beet pulp or wheat bran, respectively.

Ten groups of five adult pastel males were fed each combination of type and level of fiber. The normal diet served as control.

The digestibilities of nutrients and minerals were calculated as well as the amount of water in the faeces.

The effect of fiber on the digestibilities was described by a regression analysis or by an analysis of variance.

Apparent digestibility of crude protein decreased when increasing amounts of granulated beechwood and sugar beet pulp were supplemented; wheat bran had no effect. The results indicate that true digestibility of N is decreasing as well.

The digestibility of crude fat declined when sugar beet pulp was supplemented.

The digestibility of sugar and starch was not altered by the fiber supplements, but the sugar and starch in wheat bran was digested.

The total amount of digestible energy was lowered by the supplementation of granulated beechwood and sugar beet pulp, while it was increased when wheat bran was supplemented.

The excretion of Na and K was correlated to the increasing amount of faeces. The molar concentration of Na + K is constant, when beechwood or sugar beet was supplemented. Wheat bran had little effect on these ions.

The digestibility of P was increased when sugar beet pulp or wheat bran was supplemented, while granulated beechwood had no effect.

All three fiber supplementations caused an immense increase in the water content of faeces and altered the proportion between water and dry matter.

One gram of fiber dry matter from beechwood or wheat bran retained five grams of water in the faeces, while 1 g of sugar beet fiber retained 9 g of water.

It is concluded that any of the three fiber supplementations could be used

in order to dilute a concentrated diet, and thus prolong the eating period. Because of its waterbinding capacity, sugar beet pulp had the greatest bulking effect.

Hovedopgave i Pelsdyrproduktion, KVL, 1985.

28 figs., 12 tables, 41 references. 59 pp.

In DANH.

Author's summary.

HEAT AFFECTS NUTRITIONAL CHARACTERISTICS OF SOYBEAN MEAL AND EXCRETION OF PROTEINASES IN MINK AND CHICKS.

Anders Skrede, Åshild Krogdahl.

Two soybean products were subjected to moist heat at 110 and 135°C for 10 and 30 min. to study the comparative effects on amino acid digestibility and trypsin excretion in mink and chicks. Unheated soybean flakes were poorly digested in both species and failed to support normal growth in chicks. Heating to 110°C greatly improved all nutritional characteristics, whereas heat treatment at 135 °C resulted in loss of lysine, arginine and cystine, and reduced digestibility of all amino acids. When evaluated from the relationship with chick growth, amino acid digestibility was superior to metabolizable energy as indicator of nutritional value. The trypsin activity of mink feces was about 20 times higher than that of chick excreta, increasing with excessive heat treatment. A surplus of fecal trypsin was found in mink fed unheated soybean flakes, while chick excreta contained an excess of proteinase inhibitors. Thus the pancreas of mink and chick appeared to respond differently to dietary proteins and inhibitors.

Nutrition Reports International, 32, 2, 479-489, 1985.

5 tables, 1 fig., 17 references.

Authors' abstract.

GREEN PROTEIN CONCENTRATE FOR POLAR FOXES AND MINK.

ПЗК в кормлении молодняка песцов и норок

L.V. Milovanov, D.N. Perel'dik, E.N. Kazakov, E.M. Glazov.

Green protein concentrate (GPC) was obtained from the juice of clover and grass mixture and contained digestible protein 33.4, fat 2.4 and carbohydrate 8.9 g/100 g, and metabolizable energy 209 kcal/100 g. Free amino acid content was lysine 2.3, methionine plus cystine 2.4, tryptophan 0.6, arginine 7.0, valine 5.1, histidine 1.6, isoleucine 3.9, leucine 8.2, threonine 5.0 and phenylalanine 2.6% of crude protein. Of the total fats, 28.9% were saturated, C10:0 to C22:0, and 52.1% monounsaturated, C18:2 to C20:4. In a feeding trial GPC was added to the summer and autumn rations of polar foxes and mink. The rations contained digestible protein 7.4 to 8.4 g/100 kcal metabolizable energy, and 20 to 25% of the animal protein was replaced by GPC. GPC in the diet gave bodyweight and pelt quality which were not much different from those given with the basal ration devoid of GPC. It was recommended that during June-August the GPC-supplemented rations for polar foxes and mink should contain digestible protein at 4.5 and 5.4 g/100 kcal metabolizable energy.

Krolikovodstvo i Zverovodstvo, 6, 12-14, 1984.

1 table.

In RUSS.

CCAB-abstract.

EXTRUSION OF GRAIN FEED IN THE PREVENTION OF MYCOTOXICOSIS IN MINK.

ЭКСТРУЗИЯ ЗЕРНА В ПРОФИЛАКТИКЕ МИКОТОКСИКОЗА НОРОК

I.V. Vyazovkina, P.I. Levchenko, A.N. Tarachenkov.

Toxinogenic strs. of *Aspergillus fumigatus* formed 34% of toxin-forming fungal isolates from 285 samples of different feedstuffs. A toxinogenic str. of *A. fumigatus* was grown on sterile grain and the grain subjected to a short heat treatment at 150 degC and 6 MPa in a press extruder. The toxicity of the substrate was considerably reduced. Mink fed on this treated grain were healthy and did not differ from the control animals that were given normal grain.

Krolikovodstvo i Zverovodstvo, 6, 40-41, 1984.

2 tables.

CAB-abstract.

In RUSS.

NUTRITIVE VALUE OF CHLORELLA FOR MINK.

ПИТАТЕЛЬНАЯ ЦЕННОСТЬ ХЛОРЕЛЛЫ ДЛЯ НОРОК

D.N. Pereldik.

Young mink ate a feed mixture containing enzyme-treated *Chlorella* at 20% DM. The enzyme was from a culture of a fungus (*Trichoderma lignorum*). On air DM basis, the enzyme-treated *Chlorella* contained organic matter 92.5, crude protein 48.9, crude fat 1.6, crude fiber 4.7, nitrogen-free extracts (NFE) 37.3%, gross energy 505 kcal/100 g; each 100 g air DM contained 36.9 g digestible protein, 25.5 g digestible NFE and 271 kcal metabolizable energy. The mink digested 75.5 and 68.3% of the protein and NFE, respectively.

nauchnye Trudy Nauchno-issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 27, 85-87, 1982.

2 tables.

CAB-abstract.

In RUSS.

PROTEIN LEVEL IN COMPLETE PELLETTED FEED MIXTURES FOR NUTRIA.

УРОВЕНЬ ПРОТЕИНА В КОМПЛЕКСНЫХ ГРАНУЛИРОВАННЫХ ДОМЕНКОРМАХ ДЛЯ НУТРИИ

V.F. Kladovshchikov, V.S. Aleksandrova, L.S. Verevkina.

Young nutria fed to appetite on a dry complete pelleted feed mixture containing 14 or 16% digestible protein and 10% crude fibre, and provided with water automatically grew rapidly and by 6 months of age produced pelts judged of good quality and with average score of 63%. Percent fertility of female nutria fed for 2 months and mated was 50 to 70 and average litter size was 3.1 whelps. Reduction of dietary digestible protein content from 16 to 14% DM had no effect on productivity, but increased the intake of pellets by 8 to 10%.

Nauchnye Trudy Nauchno-issledovatel'skogo Instituta Pushnogo Zverovodstva i Krolikovodstva, 27, 60-67, 1982.

6 tables, 5 references.

CAB-abstract.

In RUSS.

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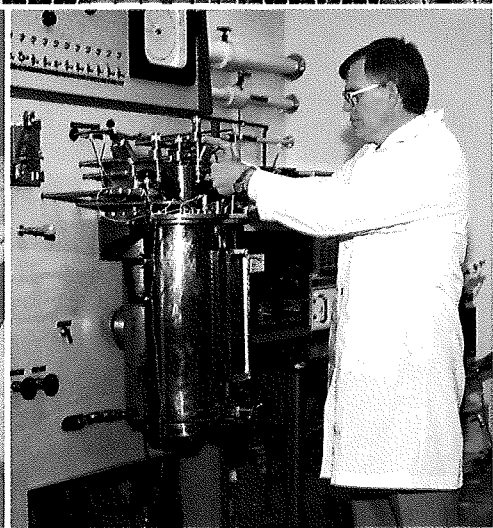
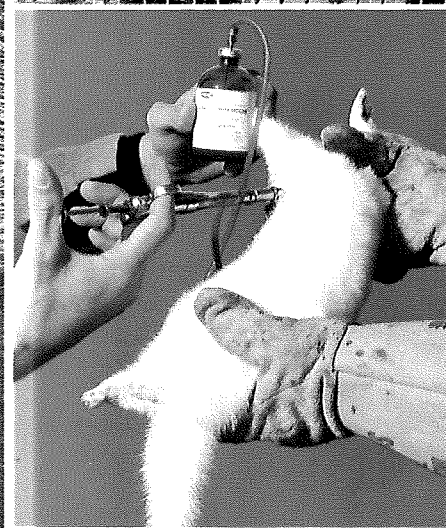
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DIMETILNITROSAMINE INTOXICATION IN MINK.

(Intoxicación por dimetilnitrosamina (DMN) en visones).

Pablo Martino, Jorge Villar, C. Artuso, A. Pizzi, J. Casal.

The first 26 cases of death in mink by Dimetilnitrosamine (DMN) intoxication in Argentina, are reported.

Macro and histopathological lesions observed, corroborate the toxic-carcinogenic action of DMN.

Verification of great qualities of DMN in mink feed ingredients (2.5 ppm in fish meal), sodium nitrite (19 ppm in fish meal and 1.5 ppm in fish waste (*Merluccius hubbsi*), and sodium nitrate (48 ppm in fish meal), confirm death by intoxication with DMN.

Proceedings from the X Panamerican Congress of Veterinary Medicine and Zootechnics, 376, 1985.

2 figs., 11 references.

Authors' summary.

In SPAN.

TUBERCULOSIS IN MINK.

(Tuberculosis en visones).

Pablo Martino, Juan Martino, Jorge Villar.

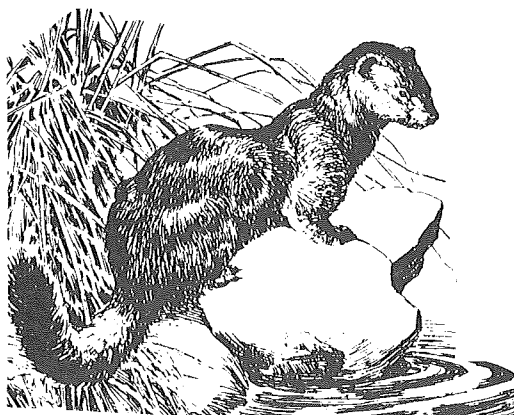
This work describes tuberculosis by *Mycobacterium bovis* in mink, from mink farms of Buenos Aires Province, Argentina. Between 1981 and 1984 93 cases of tuberculosis were diagnosed, 76 of these in females whose average age was three years old. The etiological agent was classified as *Mycobacterium bovis*. The main source of infection was found in infected organs of cattle from slaughterhouse offal, used as fresh feed ingredient in preparing the mink diet. Sixty-three animals (68%) presented an advanced state of cachexia. Most affected organs were lungs with tubercular lesions. Histopathologically, caseous necrosis, generalized, without giant cells of the Langhans type, was the common finding.

Proceedings from the X Panamerican Congress of Veterinary Medicine and Zootechnics, 377, 1985.

2 figs., 8 references.

Authors' summary.

In SPAN.



**HEMORRHAGIC PNEUMONIA IN MINK (MUSTELA VISON), IN ARGENTINA.
(La neumonia hemorrágica en visones (Mustela vison) en la república Argentina).**

Pablo Martino, Juan Martino, Jorge A. Villar.

The first hemorrhagic pneumonia cases observed in mink, not only in Argentina but in the southern Hemisphere, are described. Epidemiology, symptomatology and pathological lesions found are similar than those described in other countries. Diagnosis was made by isolation of *Pseudomonas aeruginosa* in large numbers from affected lungs, and serotype n° 6 (Difco System) was the most frequent.

Hemorrhagic pneumonia was experimentally reproduced after infecting intranasally narcotized mink.

Proceedings of the X Panamerican Congress of Veterinary Medicine and Zootechnics, 378, 1985.

21 references.

Authors' summary.

In SPAN.

EXPERIMENTAL INVESTIGATIONS REGARDING INFECTION WITH ALEUTIAN DISEASE VIRUS IN MINK WITH SPECIAL ACCOUNT TO ACUTE, INTERSTITIAL PNEUMONIA IN KITS.

(Eksperimentelle undersøgelser vedrørende infektion med Aleutian Disease virus hos mink med særlig henblik på akut, interstitiel pneumoni, hos hvalpe).

Søren Alexandersen.

Chapter 1.

A review of the results published on Aleutian disease (AD) of mink is given. The reason for the name Aleutian disease is mentioned, and a brief characterisation of the special biology of mink is given. The Aleutian disease virus (ADV) is described with regard to the stability, morphology, nucleic acid content, protein chemistry and replication. The immune response, clinical signs and pathological lesions of mink infected with ADV are described, and possible mechanisms for the development of lesions in AD are given. Finally transmission and host range for ADV and procedures for eradication of the disease are mentioned.

Chapter 2.

The pathological lesions in adult littermates to mink kits that had died during the spontaneous outbreak of interstitial pneumonia, are described. In these mink characteristic lesions of AD were found, but no residual lesions of previous interstitial pneumonia. Mink with AD had lipid pneumonia and hypertrophy of the bronchus-associated lymphoid tissue. The pathogenesis of the lesions and their possible relation to ADV infection are discussed.

Chapter 3.

The preparation of an organ homogenate from liver, spleen and lung from kits that had died of interstitial pneumonia is described. The infectivity of this homogenate is tested by intraperitoneal inoculation of adult ADV-

negative mink. The findings of characteristic lesions of AD and antibodies against ADV in inoculated mink, showed that the organ homogenate contained infectious ADV.

Lung tissue from inoculated mink was processed by different techniques for electron microscopical examination. A suitable technique is described, and the alveolar ultrastructure of the mink lung is described and found to be in accordance with the published alveolar ultrastructure of other species.

Chapter 4.

Acute interstitial pneumonia in mink kits is experimentally reproduced with an organ homogenate containing ADV. Lung lesions were only reproduced by inoculating newborn kits from ADV-negative dams. Older kits and kits from ADV-positive dams did not develop interstitial pneumonia, but later developed the classical form of AD. The findings of intranuclear inclusion bodies and intranuclear ADV-antigen in alveolar type-II cells in affected lungs, and the apparent lack of immunologically mediated lesions, suggest that the lung lesions result from a primary viral injury to alveolar type-II cells caused by infection with an isolate of ADV.

In the experiments it was also shown that infection of dams with ADV before pregnancy decreases the number of kits per mated dam, and infection with ADV in mid-pregnancy caused fetal death, fetal resorption or abortion.

Chapter 5.

Electron microscopical examination was performed on purified suspensions of defined ADV-isolates and on purified organ homogenates from kits with spontaneous or experimentally reproduced interstitial pneumonia. In kits from both groups a virus, morphologically resembling the defined ADV-isolates, was demonstrated.

A suitable technique for purifying ADV for electron microscopical examination is described, and it is concluded that the morphology and size of ADV depends on the purification process.

Chapter 6.

This chapter contains the conclusions and a general discussion of the results obtained during the experiments. It is concluded that acute interstitial pneumonia in mink kits can be produced by infection with an ADV. The acute interstitial pneumonia is seen when kits from ADV-negative dams become infected shortly after birth. A short comment is given on future experiments designed to show whether ADV has a general ability to cause interstitial pneumonia in mink kits or the actual isolate is a special variety of ADV with affinity for lung tissue.

The role of the kits immune system and the age of the kits on development of interstitial pneumonia are discussed.

The acute lung lesions in mink kits are compared with other lesions caused by parvovirus infection in other species. It is concluded that the acute infection of newborn mink kits with ADV has similarities with canine parvovirus-2 and feline panleukopenia virus infection in the dog and cat.

A change of the name Aleutian disease virus to mink parvovirus-2 is suggested. This would be in accordance with the accepted parvovirus nomenclature, and it would make it easier to distinguish between acute disease, i.e. acute interstitial pneumonia (new name "mink parvovirus pneumonia"), and chronic disease, i.e. Aleutian disease (new name "mink parvovirus plasmacytosis").

The distribution and morphology of the lesions seen in kits with interstitial pneumonia are compared with lesions in other viral respiratory diseases. The findings suggest that the interstitial pneumonia caused by infection with ADV is different from other viral lesions in the respiratory tract. ADV attacks primarily alveolar type-II cells, while in most viral pneumonias initial lesions are in the bronchiolar epithelium, and if lesions are seen in the alveolar region they spread from the afferent bronchioles.

The infection with ADV in mink causing decreased fertility is compared with the infection of swine with porcine parvovirus and the infection of cattle with bovine parvovirus.

Finally it is concluded that the experiments have shown that at least one ADV-isolate can give acute manifestations, both clinically and pathologically, resembling manifestations of infection with parvovirus in other species. The persistent infection with ADV, causing chronic immune complex mediated disease, still gives Aleutian disease virus a special position among parvovirus.

Ph.D. dissertation. Inst. for Vet. Pathology, KVL, December 1985.
133 pp, 40 figs., 188 references. Author's summary.
In DANH. Summary in ENGL.

TEMPORAL REPLICATION OF THE PULLMAN STRAIN OF ALEUTIAN DISEASE VIRUS IN ROYAL PASTEL MINK.

William J. Hadlow, Richard E. Race, Richard C. Kennedy.

Information was sought on the temporal replication of Aleutian disease virus in 27 royal pastel mink. Groups of three were examined 8 to 126 days after they were inoculated subcutaneously with 10^3 50% lethal doses of the Pullman strain. Much individual variation was noted in the onset of infection, occurrence of viremia, and extent of virus replication in the tissues. Thus, virus was detected in lymph nodes regional to the site of inoculation in only some mink during the first 14 days after inoculation. During this period, virus was often present as well in the mesenteric lymph node and spleen. First detected on day 10, viremia was present in all mink examined on day 28 but occurred irregularly thereafter, even when virus was widespread in the tissues. Except in five mink succumbing to the disease, the tissue distribution of virus after day 28 tended to be more limited, and the titers were generally lower than they had been earlier. Even though present in the lymph nodes and spleen, virus was often absent from the kidney, liver, and intestine after day 28. Specific antibody was detected on day 28 and was present in all mink thereafter, ostensibly without any adverse effect on virus replication. In most mink, the infection was considered subclinical, for it was usually not accompanied by a rise in serum gamma globulin or by morphologic evidence of the disease. The virologic findings in this study have a bearing

on the relationship of subclinical infections to both horizontal and vertical transmission of the virus.

Journ. of Virology, 55, 3, 853-856, 1985.

1 table, 18 references.

Authors' summary.

ALEUTIAN DISEASE VIRUS IN B AND T LYMPHOCYTES FROM BLOOD AND SPLEEN AND IN BONE MARROW CELLS FROM NATURALLY INFECTED MINK.

Susanne Roth, Oskar-Rüger Kaaden, Sabine van Dawen, Volker Moennig.

In the nuclei of 4% of peripheral blood or spleen mononuclear cells (MNC), Aleutian disease virus (ADV)-specific antigens were found by a direct immunofluorescence test. The MNC were further fractionated by nylon wool, affinity chromatography using *Staphylococcus aureus* protein, or Percoll gradient techniques. ADV and specific antigens were detected in MNC fractions enriched in either the B or T lymphocytes. In the bone marrow up to 40% antigen-positive cells were demonstrated over a period of 15 months. These findings were confirmed by the detection of infectious virus in the MNC of blood and spleen and in bone marrow cells. Adherent cells from mink and control cells from ADV-negative ferrets were negative in both tests. These findings indicate that ADV exhibits a lymphotropism and can persist in the B- and T-cell fractions from ADV-infected mink over a long period of time. Furthermore, co-cultivation of mink MNC and bone marrow cells with the CCC clone 81 cells was shown to be a reproducible method for the detection of ADV in persistently infected mink.

Intervirology, 22, 4, 211-217, 1984.

2 tables, 1 fig, 28 references.

Author's summary.

EXPERIMENTAL TRANSMISSION OF ALEUTIAN DISEASE VIRUS (ADV) TO DIFFERENT ANIMAL SPECIES.

Søren Alexandersen, Åse Uttenthal Jensen, Mogens Hansen, Bent Aasted.

Two animals from each of 8 different species (mink, Finn raccoon, cat, dog, ferret, blue fox, mouse and rabbit) were inoculated with the highly virulent Utah I strain of ADV. Only the mink developed hypergammaglobulinemia. All animals produced antibodies to ADV antigens, but with different titres. Mink sera had much higher antibody titres than the other animal sera. Antibodies to the ADV-coded, non-structural polypeptide (p71) were found in mink, Finn raccoons and dogs only. Presence of this kind of antibodies was taken as evidence of ADV replication, because p71 was not present in the ADV inoculum. The animals were killed 4 weeks after virus inoculation. Homogenates of different organs from mink, Finn raccoons, ferrets, dogs, mice and the cat were shown to infect ADV-negative mink, which developed antibodies to ADV following inoculation. We conclude from the present studies that mink and Finn raccoons are potential threats as ADV transmitters. Cats, ferrets, dogs and mice may be considered potential ADV reservoirs, because they possibly harbour ADV for 4 weeks or longer. Blue foxes and rabbits did not seem to be a risk factor for ADV transmission.

Acta path. microbiol. immunol. scand. Sect. B, 93, 195-200, 1985.

3 figs., 2 tables, 14 references.

Authors' abstract.

**EXAMINATION OF ALEUTIAN DISEASE VIRUS IN CHARGE-SHIFT
CROSSED IMMUNOELECTROPHORESIS.**

Søren Alexandersen, Jan Hau, Steen Larsen.

The surface properties of Aleutian disease virus were studied by charge-shift crossed immunoelectrophoresis. When different strains of Aleutian disease virus were treated with non-charged detergent followed by charged detergents, they showed bi-directional migration velocity shifts in electrophoresis, indicating amphiphilic surface properties of the virus.

Acta path. microbiol. immunol. scand., Sect. B, 92, 331-334, 1984.
1 table, 2 figs., 13 references. Authors' summary.

**THIN-LAYER COUNTER CURRENT LINE ABSORPTION IMMUNOELECTROPHORETIC
ANALYSIS OF ANTIGENS AND ANTIBODIES TO ALEUTIAN DISEASE VIRUS
- A MINK PARVOVIRUS.**

Søren Alexandersen, Jan Hau, Bent Aasted, Otto M. Poulsen.

A thin-layer counter current line absorption immunoelectrophoresis (TL-CCLAIE) assay was developed for the analysis of antigens and antibodies to Aleutian disease virus. The TL-CCLAIE assay is a rapid and sensitive assay employing 0.4 mm gels cast in moulds in order to allow technicians not routinely engaged in electrophoretic work to perform the assay. Thin gels allow a higher voltage and thus higher electrophoretic mobility of the antigens, making it possible to perform the complete assay within 2 hours.

6 figs., 1 table, 9 references. Authors' summary.

**THE CHÉDIAK-HIGASHI SYNDROME.
(Het Chédiak-Higashi syndroom).**

F.J.C.M. van Eerdenburg, J. Bouw.

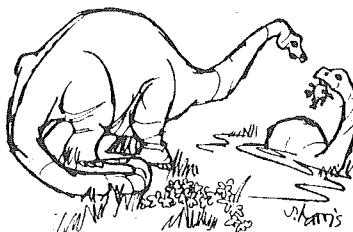
As the Chédiak-Higashi Syndrome (CHS) is rare in various species of mammal and occurs almost only in very young to young animals, it is virtually unknown and may therefore pass unnoticed. For this reason, the symptoms as reported for example in man, cattle, cats and mink are brought together and compared in the present paper. The most important symptoms are dilution of the pigment of skin and fur and increased susceptibility to infection. Enlarged granules are found in leukocytes and various other types of cell. The basis for this defect should be sought at the level of the microtubules. Moreover this report is concerned with genetic features of this type of defect. The criteria to be applied in the diagnosis of the CHS are discussed.

Tijdschr. Diergeneeskd. 110, 10, 391-399, 1985.

2 figs., 49 references.

In DUTH. Summary in ENGL.

Authors' summary.



AN OUTBREAK OF SALMONELLOSIS IN A DANISH FOX FARM.

P. Henriksen, K.G. Waechter.

Salmonellosis is seldom seen in Danish mink and fox farms. The construction of central feed kitchens has reduced the incidence in Denmark to 1-3 cases every year. In other countries outbreaks are seen every year and cause severe losses of whelps.

The most frequent types of *Salmonella* in mink and foxes are *S. dublin*, *S. enteritidis* and *S. typhi murium*.

This short report deals with a severe outbreak of salmonellosis in blue foxes in Denmark during the summer 1984.

Central nervous symptoms in foxes can be caused by salmonellosis and immediate therapy is necessary in order to prevent a high mortality among the whelps. Chloramphenicol treatment eliminated the clinical symptoms within a week but the *Salmonella* bacteria can persist in foxes for months and perhaps years. The origin of salmonellosis could not be identified in this case.

Nord. Vet.-Med. 37, 107-108, 1985.
8 references, 2 tables.

Authors' introduction and conclusion.

AN OUTBREAK OF METRITIS CAUSED BY PSEUDOMONAS AERUGINOSA AMONG BLUE FOX (*ALOPEX LAGOPUS*) IN NORWAY.

(Utbrudd av metritt hos blårev forårsaket av *Pseudomonas aeruginosa*).

W. Farstad, J. Reiersen, I. Solberg, I.B. Forus, K. Fossum.

An outbreak of endometritis/pyometra occurred among Blue fox (*Alopex lagopus*) vixens in the province of Rogaland, Norway, during the mating season 1983. *Pseudomonas aeruginosa* was isolated from infected uteri in 72% of the cases. Of 46 affected vixens 41 were artificially inseminated.

Nord. Veterinærtidsskrift, 97, 4, 1985.
3 tables, 5 references.
In NORG. Summary in ENGL.

Authors' summary.

STAPHYLOCOCCUS INTERMEDIUS IN UROLITHIASIS OF MINK.

(*Staphylococcus intermedius* bei der Urolithiasis des Nerzes).

W. Witte, H. Zimmermann.

The crystal-violet type C and haemolysin type A (above all alpha-haemolysin) were characteristic features of *Staphylococcus intermedius* strains which had been isolated from minks with urolithiasis. All the other properties also identified were in full keeping with HAJEK's description of the species (*Int. J. System. Bacteriol.* 26, 1976, 401).

Arch. exper. Vet.med. Leipzig, 39, 560-564, 1985.
2 tables, 19 references.

Authors' summary.

In GERM. Summaries in RUSS and ENGL.

**PATHOLOGY OF EXPERIMENTAL INFECTION WITH BRUGIA MALAYI IN FERRETS:
COMPARISON WITH OCCULT FILARIASIS IN MAN.**

R.B. Crandall, J.P. Thompson, D.H. Connor, P.B. McGreevy, C.A. Crandall.
Ferrets experimentally infected with *Brugia malayi* (subperiodic strain) developed eosinophilia at patency and usually became amicrofilaremic. Ferrets necropsied within 3 months after becoming amicrofilaremic had granulomas and focal reactions to degenerating microfilariae in their livers, lungs and lymph nodes essentially identical to those of tropical eosinophilia. Four of 7 ferrets had received multiple inoculations of larvae, developed edema of the inoculated paw and leg after becoming amicrofilaremic and 6 of these 7 ferrets had granulomatous lymphagitis and lymphadenitis of inoculated limbs but not the lesions of lung and liver characteristic of occult infection.

Acta Tropica, 41, 373-381, 1984.
8 figs., 18 references.

Authors' summary.

**CUTANEOUS LESIONS IN SARCOPTIC MANGE OF RED FOX (*VULPES VULPES*).
(Lesioni cutanee nella rogna sarcoptica nella volpe rossa (*Vulpes vulpes*)).**

E. Bollo, F. Brusa, L. Rossi.

The Authors make an anatomo-isopathological description of cutaneous lesions observed in some outbreaks of sarcoptic mange in wild red foxes (*Vulpes vulpes*).

La Clinica Veterinaria, 106, 11/12, 233-237, 1983.
5 figs., 9 references.

Authors' summary.

In ITAL. Summary in ENGL.

DISEASES IN COYPU AND THEIR TREATMENT.

(Krankheiten bei Sumpfbibern und deren Behandlungsmöglichkeiten).

E. Körner.

The article reports important diseases and different farming techniques of nutria. *E. coli* and salmonella infections are the most important bacterial diseases. Coccidiosis and strongyloidosis are frequently observed in nutria farms. Differentiated prophylactic treatment and hygiene are necessary for optimal breeding conditions.

Tierärztl. Prax. 13, 235-240, 1985.
2 pictures.

Author's summary.

In GERM. Summary in ENGL.

VACCINATION PROGRAMMES FOR RABBITS AND FURBEARING ANIMALS.

(Schutzimpfungen bei Kaninchen und Pelztieren).

S. Matthes.

Short survey of vaccination programmes for rabbits and fur animals and of vaccines, available in Western Germany.

Rabbits: myxomatosis, pasteurella infection, dysentery; mustelides (mink, polecat a.o.): distemper, virus enteritis, botulism, pseudomonas infection; fox: leptospirosis, distemper, fox encephalitis; ocelot: panleukopenia; chinchilla: pseudomonas infection, coli infection, yersinia infection.

Tierärztliche Praxis, 13, 1, 107-112, 1985.

3 tables, 4 references.

Author's summary.

In GERM. Summary in ENGL.

EVALUATION OF USEFULNESS OF SOLUTION CONTAINING CHLORMIDAZOLE HYDROCHLORIDE AND SALICYLIC ACID FOR COMBATING DERMATOMYCOSIS OF ANIMALS.

(Ocena przydatności roztworu zawierającego chlorowodorek chlormidazolu i kwas salicylowy do zwalczania grzybicy skóry u zwierząt).

Alojzy Ramisz, Zygmunt Golucki, Jan Serwin.

The usefulness of solution containing 5% chlormidazole hydrochloride and 1% salicylic acid in organic solvents for combating dermatomycosis of animals was evaluated. The observations were carried out on 56 pieces of cattle, 14 dogs and 2 herds of foxes containing 750 animals. Dermatomycosis was diagnosed on a base of clinical, microscope and bacteriological (breeding on the nutrients) investigations. The fungi were isolated from areas of the skin indicating morbid changes as follows: in cattle - Trichophyton verrucosum and Trichophyton mentagrophytes; in dogs - Candida albicans and Microsporus canis; in foxes - Microsporus and Trichophyton gypseum.

The investigations showed more than 92% and 100% of cures after the 3-th and 5-th procedure, respectively. The results obtained indicated very profitable therapeutic index at the solution containing 5% chlormidazole hydrochloride and 1% salicylic acid. The feature makes possible administration, of the preparation independently on the age and physiological state of treated animals.

Nowosci Weterynarii, Poland, 13, 3-4, 146-150, 1983.

3 tables, 4 references.

Authors' summary.

In POLH. Summary in ENGL and RUSS.

THE INTESTINE OF FERRET - A POSSIBLE SITE OF INFLUENZA VIRUS REPLICATION.

H. Glathe, M. Hilgenfeld, A. Lehardt, H.U. Strittmatter, P. Schulze, B. Brandt.

Anal virus shedding and stimulation of the immune response were observed in ferrets after oral and rectal administration of influenza A/Hongkong/1/68 (H3N2) virus. Despite of the low pH in the stomach, the virus had reached the intestines after oral administration and was found in high concentration in faeces and in mucosal cells lining the colon. Using immunofluorescent staining, the virus antigen was detected in cytoplasm of columnar epithelial cells. Virus replication also occurred in the respiratory tract, probably as result of inhalation of anally shedded virus. However, the virus replication in the lungs did not seem essential for

virus isolation from the intestines. Taking into account the very short food passage time in ferrets the results could indicate the replication of influenza A/Hongkong/1/68 virus in the digestive tract of ferrets.

Acta virol. 28, 287-293, 1984.

5 tables, 18 references.

Authors' summary.

DISTEMPER IN STONE MARTEN (MARTES FOINA, ERXL.) IN SCHLESWIG-HOLSTEIN - A CONTRIBUTION TO THE EPIDEMIOLOGY OF DISTEMPER.

(Staupe beim Steinmarder (Martes foina, Erxl.) in Schleswig-Holstein - Ein Beitrag zur Epidemiologie der Staupe -).

P. Steinhagen, W. Nebel.

The study concerns the increase of distemper virus infections in stone beech martens (*Martes foina*, Erxl.) during the period of 1979-1984 in Schleswig-Holstein.

The occurrence of distemper in martens seems to be epidemically related to same period. The study recommends giving more attention again to instances of infection by distemper with special consideration of susceptible wild animal population.

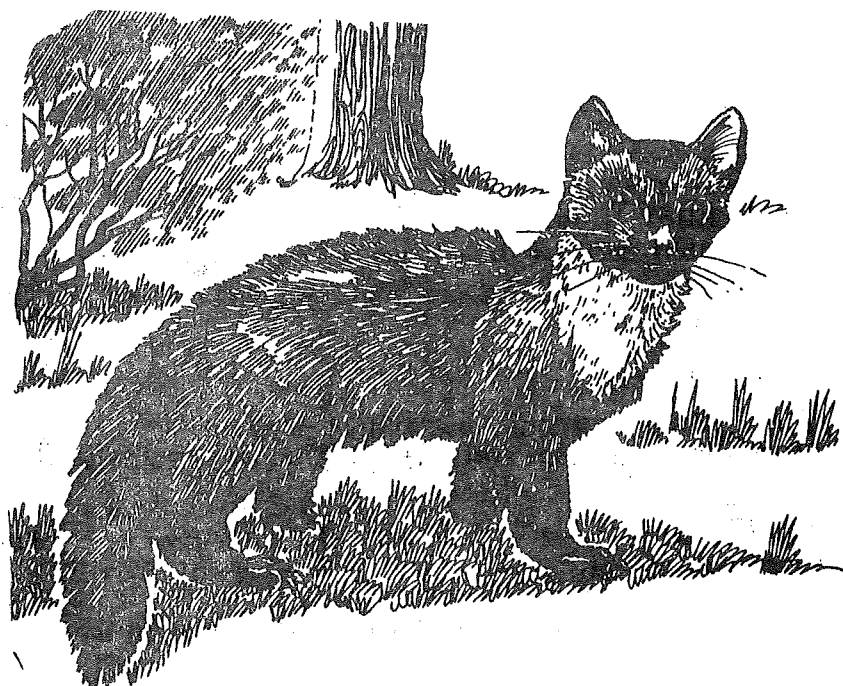
A comprehensive bibliography is found in PALMER et al. (1983).

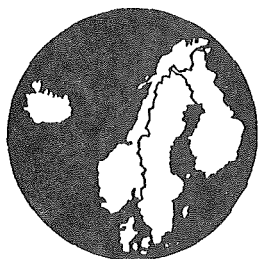
Deutsche Tierärztliche Wochenschrift, 92, 5, 178, 180-181, 1985.

5 figs., table, 5 references.

Authors' summary.

In GERM. Summary in ENGL.





**SCANDINAVIAN ASSOCIATION OF AGRICULTURAL SCIENTISTS
FUR ANIMAL DIVISION.**

Abstracts of reports given at
NjF SEMINARIUM No. 85 - 1985.

Complete reports are published in Scandinavian languages as number 20
in the serie "NjF Utredninger/Rapporter".

Can be obtained from Danish Fur Breeders Association, 60 Langagervej,
DK 2600 Glostrup, Denmark. (Price: Dcr. 70.-).

PARAMETERS OF REPRODUCTION IN BLUE FOX.

E.J. Einarsson.

In a material of 853 blue fox females, with 707 giving birth the following figures were observed. 17% barren females. 9.6 kits at birth per successful female, 32% kit mortality from birth to weaning and 6.5 kits at weaning per mated female.

Different methods of estimation were practised, mainly based on sib-correlations and regression of daughter on dam. The family size in the present material favored the method based on sib-correlations. On average, 8.1 daughters giving litter were observed within sire. The conclusion of the estimation was to use 0.2 as heritability for litter size in the breeding program for blue fox. Genetic correlation within sib group within sire, was calculated to 0.3.

There was no evidence of negative correlation between direct and maternal effect for litter size in blue fox. This factor can therefore be neglected in the breeding program.

Author's abstract.

PREGNANCY DIAGNOSIS IN FOXES.

Maija Valtonen, Sören Bondestam.

Early detection of pregnancy in foxes would be desirable for proper management of the pregnant and non-pregnant females during the breeding season. However, no methods of pregnancy diagnosis have been applied routinely in foxes. This investigation was performed to evaluate two ultrasonic devices, a portable real-time ultrasound scanner and a Doppler ultrasound pregnancy detector developed for small animals, for pregnancy diagnosis in foxes. Twenty eight foxes, 9 silver and 19 blue were examined with the ultrasound scanner and a total of 95 foxes of which 30 were silver foxes were tested with the Doppler device. The ultrasound scanner was a very reliable device in detecting pregnancy in foxes. The overall accuracy was 100% in silver and 95% in blue foxes. The examination cannot, however, be performed until on fourth week of gestation. While pregnancy could be detected already during the second week after breeding with the Doppler device. The overall accuracy with the Doppler method was 89% for silver foxes but only 81% for blue foxes.

Urine estrogen concentrations were determined in samples of 12 females collected twice a week during pregnancy, as an alternate method of pregnancy diagnosis. However, neither urine estrogen concentrations nor the total estrogen excretion during the collection period differed significantly between pregnant and non-pregnant females.

3 references.

Authors' abstract.

INVESTIGATIONS INTO SPERMATOGENESIS IN MINK.

Christer Sundqvist, Altti Lukola.

In order to study the male mink infertility, detailed investigations into spermatogenesis in mink were performed during a 4-year period.

We have used the following methods: estimation of serum testosterone concentrations with radioimmunoassay and a newly developed time-resolved fluoroimmunoassay, hormonal therapy, conventional light- and electron microscopy, quantitative and morphometric analyses, dissection and transillumination of seminiferous tubules, phase contrast microscopy of live cell squashes, estimation of spermatogenic cells in a DNA-flow cytometer and fine-needle aspiration biopsy of the testis.

It was possible to characterize 14 different stages of the spermatogenesis in mink. Studies on infertile mink testes showed that spermatogenesis could be disturbed in an early stage. This disturbance was reflected in altered serum testosterone concentrations, changes in the distribution of cell organelles and the distribution of specific cell types. Alterations in the Sertoli cell organelles were found in minks having normal, hypoplastic or cryptorchid testes. Sertoli cells of cryptorchid testes had significantly less mitochondria and significantly more lipids than normal testes.

In rapidly proliferating tissue there is always a risk for disturbances. The mink appears to be a suitable model for alterations in spermatogenesis: 1) sterility is not unusual, 2) experimental animals are often available in proper quantities, and 3) there is a need for managing these kinds of problems in this valuable fur animal. The short breeding season, however, restricts its usefulness for basic studies on testicular biochemistry and steroidogenesis.

Authors' abstract.

ECONOMIC WEIGHTS FOR PELTQUALITY.

Ejner Børsting, Einar Einarsson, Ulla Joutsenlathi.

The design of a breeding program is based - among other factors - on the economic value for the biological traits under selection. As a part of an interscandinavian project analyses were done on auctiondata from Denmark, Finland and Norway. By the construction of a selectionindex every trait is given an economic value expressed as the value of one unit change of the trait.

The effects of changes in the quality traits were isolated in a calculation of LS-means. These factors were used in a simulations model and the relations between the financial importance of change in litter size, pelt quality and pelt size were estimated.

Authors' summary.

ECONOMICAL WEIGHTS AND HERITABILITY ESTIMATES FOR PELTGRADINGS OF STANDARD MINK.

Gabrielle Lagerkvist, Nils Lundeheim.

At the research station in Funbo-Lövsta, Uppsala, data from pelt gradings (in August and November) and body weight in September were registered and analyzed. Information on skin gradings and sales price for the pelted animals was added to the material. 3000 standard mink were included in the analyses and data was collected in the years 1980, 1981 and 1983.

Economical weights.

- Colour shade, judged in November according to a 8-point scale (ex ex pale-black): 1-5 SEK per point.
- Fur density in November, judged according to a 5-point scale: 1 SEK per point.
- General impression of the pelt characteristics in November, judged according to a 10-point scale: < 1 SEK per point.
- Body weight in September: 2-5 SEK per 0.1 kg live weight.

Heritabilities (h^2).

- Colour shade: >0.5.
- Fur density: 0.1-0.2.
- Quality of the guard hairs: 0.1-0.2.
- General impression of the pelt characteristics: 0.3-0.4.
- Body weight in September: 0.2.

The highest maternal effect (C^2) was noted for body weight: 0.1.

The genetic correlation between body weight and density of the underfur was slightly negative.

Authors' summary.

EVALUATION OF BREEDING VALUE BY PROGENY TEST IN FUR ANIMAL PRODUCTION.

Outi Lohi, Knud Christensen.

In mink breeding a male is mated to only a limited number of females. Progeny tests therefore have not quite as a much interest in fur animal breeding as with other domestic animals. However, the genetical differences in the breeding stock between different farms is a matter of interests in connection to purchase of breeding animals. Therefore, the aim with the progeny tests was first of all to study whether the differences between the farms will be eliminated if the animals are submitted to the same environmental conditions from July until pelting time.

In this study animals from 19 farms were included. The progeny groups consisted of 8 half sibs (4 male and 4 females) after each male. The same number of siblings to these, growing up on the owner's ranch, were used as controls.

The characteristics evaluated were:

Live weight in July, August and October, the skin quality judged in points

and in auction classifications, the size of the skin in cm and in auction classifications, colour and shade of the colour according to the auction classification, skin weight, length of the underfur and the guard hair.

The differences between animal groups from different farms were a little less in the progeny groups than in the control groups but uniform environmental conditions from July throughout pelting did not totally eliminate the differences.

Maternal variation was clear in characteristics, size and quality. It was calculated to be from 3-5%.

The heritability of the characteristics studied was calculated to be: Size, (auction classification) $h^2 = 0.13$, size in cm $h^2 = 0.18$; quality (auction classification) $h^2 = 0.09$; quality (in points) $h^2 = 0.32$; colour (auction classification) $h^2 = 0.26$.

A negative correlation between characteristics, quality and size was observed. Auction price was strongly correlated to size but also a noticeable correlation to the quality was observed. These correlations, however, varied from year to year.

The model of progeny test gives good information about the genetical differences between farms, but due to the great variation from farm to farm it is not ideal for comparing different breeding males. It would, however, be important to try to eliminate the environmental differences even more by starting the progeny test with mated females submitted to the same environmental conditions already during the gestation period.

Authors' summary.

ORGAN WEIGHTS AND THEIR DIAGNOSTIC SIGNIFICANCE IN THE RACCOON DOG.

Mikko Harri, Hannu Korhonen.

The present study aimed at 1) characterizing a normal size variation of the organs in the raccoon dog as well as the factors influencing it; and 2) at elucidating the effect of different dietary regimen on organ weights.

Body and organ weights were measured for 248 raccoon dogs. The animals, both males and females, whelps and older animals, originated from 5 different farms. The animals were fed on three different diets. The measurements were performed during three subsequent years. In addition to body weight, body length was measured and obesity index was calculated = (weight (g)/0.026 x length³ (cm)) x 100.

Factors having an influence on organ weights.

The weights of organs were most dependent on body weight but different organs in different ways: there was best correlation between the weight of liver and kidneys and the actual body weight, and between the heart weight and the weight of fat free carcass. By contrast, the weights of brain and adrenals were independent of body weight. Also the differences obtained often were greater within the animals of the same farm than between the animals of different farms. The weights of liver, kidneys and skin were smaller for females than for males. The weights of thymus and kidneys were smaller for young than for older animals.

Organ weights of the animals fed on different diets.

Because the weight of the organs are dependent on many coexisting factors, all of these should be taken into account and the values corrected by means of an analysis of covariance. If after the correction there still exist differences between groups, can we draw the conclusion that these differences are caused by the different histories the animals in question have? However, concerning many organs in our material, there were more differences between the animals on farms using the same feed than between those fed different diets. Animals on one farm were malnourished and their nutritional status could be judged already from their body weight and obesity index. Animals fed on high energy diet (27% protein, 42% fat) were bigger and fatter than animals fed on basal diet (32% protein, 19% fat). In addition, the formers had significantly smaller liver, kidneys and thyroid glands than the latters.

Authors' summary.

PLASMACYTOSIS-PNEUMONITIS IN MINK KITS.

S. Alexandersen, S. Larsen, E. Lund, A.U. Jensen, B. Aasted, A. Cohn, M. Hansen.

In 1982 acute interstitial pneumonitis caused excessive mortality within the first 2 1/2 months after parturition in mink kits from four Danish ranches. The disease was found to be connected with an infection with Aleutian disease virus (ADV) and could be reproduced experimentally by inoculation of neonatal kits with material from spontaneous cases, as well as with other strains of ADV. Experimental reproduction was only possible in kits from dams free of aleutian disease (AD), whereas kits from dams experimentally or naturally infected with ADV developed no lung changes. In later studies it was shown that ante partum inoculation of the dams with the known avirulent cell-cultured strain of virus (ADV-G), protected the kits against lung lesions, while a formaline-inactivated vaccine gave no or very little protection. Treatment of the kits with anti-ADV serum gave some protection. Presently available evidence indicates that the initial lung lesions result from primary viral injury to type II alveolar cells during the virus replication in these cells.

Authors' summary.

"EXPERIMENTAL TRANSMISSION OF ALUTIAN DISEASE VIRUS" (ADV) TO DIFFERENT ANIMAL SPECIES.

Åse Uttenthal Jensen.

The animals from each of 8 different species (mink, Finn raccoon, cat, dog, ferret, blue fox, mouse and rabbit) were inoculated with the highly virulent Utah 1 strain of ADV (Aleutian disease virus). The sera were tested by zoneelectrophoresis, only the mink developed hypergammaglobulinemia. All animals produced antibodies to ADV antigens, but with different titres. Mink sera had much higher antibody titres than the other animal sera. Antibodies to the ADV coded, non-structural polypeptide (p71) were found in mink, Finn raccoons and dogs only. Previous studies have shown, that the inoculum did not contain this protein, therefore, presence of this kind of antibodies was therefore taken as evidence for ADV replication.

The animals were killed 4 weeks after virus inoculation. Homogenates of different organs from mink, Finn raccoons, ferrets, dogs, mice and the cat were shown to infect ADV negative mink, which developed antibodies to ADV following inoculation. We conclude from the present studies that mink and probably Finn raccoons are able to transmit ADV. Cats, ferrets, dogs and mice may be considered potential ADV reservoirs, because they possibly harbour ADV for 4 weeks or longer. Blue foxes and rabbits did not seem to be a risk factor for ADV transmission.

Authors' summary.

ENTEROVIRUS AT "3-DAYS DISEASE" IN MINK.

Gunnar Rockborn, Berndt Klingeborn, Lena England, Torbjörn Mejerland.

During the last years several efforts have been made to isolate virus from the faeces of minks at "3-days disease". Suspension of faeces produced cytopathic effect (CPE) in primary pig kidney culture similar to that of Smedivirus. CPE disappeared after a few passages in cell culture. It was deemed possible that a porcine virus had spread to the mink by food. A large batch of the isolated virus was produced to prepare an inactivated test vaccine. According to the farmers it had a preventive effect. Satisfactory analysis of that virus, however, was not possible to make.

In 1984 inoculation of faeces began from 28 minks into mink lung cell culture, kindly provided by Dr. Erkki Neuvonen, SVA, Helsinki. The infection material came from a transmission experiment in minks in the National Veterinary Institute. Clinically healthy minks received the infection by contact with primarily diseased animals from the breeding area in "Listerlandet" and partly by feeding faeces suspension from these animals. After faeces inoculation into cell culture CPE was observed from 4 materials, 5 days post inoculation. In passage 2 CPE was seen after 1-3 days from 17 materials. The CPE was of roundcell type. A large batch was cultivated in bottles for infection experiments in minks. CPE was found in passage 4 and 6 in 6 materials after 1-2 days. Titration of the virus was performed with the supernatant from the 5th passage of 3 materials. The titer was $10^{6.5}$, $10^{5.5}$ and $10^{6.0}/0.1$ ml.

Neutralization test of the isolated virus against Smedi A and C antisera as well as against SVD antiserum was negative.

Out of serum from 5 affected minks, 4 produced positive neutralization tests in the dilution $\geq 1:125$, $\geq 1:125$, $\geq 1:5$ and 1:5. In the tests c:a 100 TCD₅₀ of the virus was used.

Electron microscopic study has revealed virus particles around 32 nm. The next experiment will be infection in minks with the isolated virus.

Authors' summary.

**NOSEMATOSIS (ENCEPHALITOOZONOSIS) IN MINK.
PRELIMINARY EPIDEMIOLOGICAL AND PATHOLOGICAL INVESTIGATIONS.**

Knut Nordstoga, Gudbrand Loftsgaard.

The microsporidian parasite Nosema (or more correct: Encephalitozoon cuniculi) was first known as a pathogen in blue foxes about 1965. Outbreaks of nosematosis, of varying severity, have since then been reported in many countries, while mink fed the same feed, have not been affected.

During the autumn of 1984 a considerable number of mink was reported to suffer from bilateral cataract ("white eyes") in a south-western district in Norway (Jæren). The first cases occurred in farms also affected by plasmacytosis (AD). Our investigations showed, however, that the ocular changes had no relationship with plasmacytosis, as many animals were free from plasmacytosis, as demonstrated by the agar test. Some animals had also posterior paralysis, but did not exhibit other symptoms, and there was no increased mortality rate among the blind animals. The majority of the blind was pelted; some of them were necropsied, and their organs examined microscopically.

In addition to the ocular lesions, all affected animals had macroscopical renal lesions different from those occurring in plasmacytosis, the changes consisting of multiple cysts in the cortical paranchyma, originating from renal tubules. Microscopically, arterial and cerebral lesions of the same type as those occurring in blue fox nosematosis were found, and even in moderate affected animals, there were found obvious cellular infiltrations in the peripheral nerves, an observation which is uncommon both in fox nosematosis and in plasmacytosis in mink. In most animals the parasite was demonstrated only in the cataractous lens.

In the following winter and spring more mink in the same district developed eye lesions of the same type. Thus, in 26 farms, with more than 10,000 female breeders altogether, bilateral cataract was observed in 176 females. The blind animals were all born in 1984, and in farms receiving the feed from the same kitchen. The average litter size for the blind females was 2.46 at weaning, whereas the average size was 4.23 for the remaining approx. 10,000 normal females. The early kit mortality seemed to be a major factor as to the reduced litter size, and since it only concerns 1984-females, we believe that a feed-born infection in the spring of 1984 was responsible for the problems both in foxes and in mink, although the clinical symptoms were somewhat different.

Authors' summary.

NURSING SICKNESS IN MINK.

Per Henriksen, Folmer Elling.

Nursing sickness is a disease entity in lactating mink characterized by anorexia, dehydration, loss of body weight and progressing weakness resulting in death. The disease appears in the last trimester of lactation and females with more than 6 kits are most often affected. The incidence is increasing with increasing age. The prevalence varies between 1 and 15%. About 30,000 females die of Nursing Sickness each year in Denmark representing a value of 1 mill. \$.

In clinical pathology, hemoconcentration, uremia, hypoglucaemia and proteinuria are evident.

At autopsy emaciation and dehydration are obvious. The mean body weight is 25% lower when compared with normal lactating females. The liver is yellow and the adrenals are enlarged to at least the double size. Ventricular ulcers are common and resulting in melaena. Mastitis is seen with very different incidence. Histopathologically, the main alteration is vacuolation of the renal tubules. The vacuoles are not stainable with H&E, PAS or Oil Red O. In the liver fatty infiltration and focal lipogranulomas are seen. Electron micrographs reveal large non-membrane bounded vacuoles in the renal tubules. Other organs appear of normal morphology.

Analyses of the diet reveal normal quality parameters including the vitamin B₁ content.

The cause of death in Nursing Sickness is uremia due to the renal tubular vacuolation. The morphology is identical to the potassium-deficiency alteration described in rat and man.

The pathogenesis is not known at present, but potassium metabolism must play a significant role.

Authors' summary.

**USE OF LACTOBACILLUS FOR PRESERVATION OF RAW MATERIAL
OF ANIMAL ORIGIN.**

Sven Lindgren.

Lactic acid fermentation of waste products used for animal feeding can only be accepted if a hygienic product is obtained with a well-documented storage potential. To undergo a proper fermentation, the material must contain lactic acid bacteria (LAB), nutrition that permits an optimal fermentation and have a temperature which is within the range of the fermentative bacteria.

Fish and slaughterhouse wastes cannot be subjected to fermentation without the addition of supplements. The methods used are based on an addition of lactic acid bacteria and fermentable carbohydrates.

The preservation relies on the production of organic acids. The effect of other antibiotic substances produced by LAB is still obscure.

Degradation of proteins to amino acids and amines is observed during storage of fermented fish silage. This autolysis is mainly caused by endogenous enzymes. The activity increases the content of basic metabolites which reduces the storage stability. To avoid this phenomenon but also in order to reduce the microbial contamination, fish and slaughterhouse wastes used for animal feeding are subjected to a heating process.

Spoilage of fermented products during storage is mainly caused by the activity of yeasts and moulds. The phenomenon does not occur in an anaerobic atmosphere. During aerobic storage these organisms can metabolize the organic acids which reduces the storage properties. Sorbic acid and

benzoic acid can be used in order to increase the stability. The cost for the additives is however high, which reduces the potential.

Author's summary.

POSSIBILITIES AND LIMITATIONS IN UTILIZATION OF OILSEED RAPE AND SOYBEAN MEAL OF DIFFERENT QUALITY IN DIETS TO MINK.

Kirsten Mortensen, Hilmer Sørensen.

Efficacious mink production require consideration of both price and quality of the applied diet. For that reason it comes naturally to take an interest in protein rich vegetable feeding stuffs. Oilseed rape and soybean meal are of topical interest, but some problems with the quality of these protein sources need to be considered. In the present project fundamental natural product chemistry and biochemistry have been applied in systematic investigations directed at establishment of requirement to the quality of oilseed rape and soybean meal which are intended to be used as vegetable protein rich mink feeding stuff.

Rapeseed meal and especially soybean meal have a relatively high content of protein. The proteins in soybean meal have a fairly good amino acid composition. The rapeseed proteins have an even better amino acid composition with a relatively high content of methionine and threonine which is expected to be of value for the mink production. The biological value is high for these plant protein, which is in agreement with their well balanced amino acid pattern.

The utilization of both the protein and the energy in soybean meal and especially in rapeseed meal are generally much lower than expected from consideration of chemical composition of the feeding stuffs. This is also the case for other feeding stuffs. Use of appreciable amounts of soybean meal in diets to mink results in reduced fur quality, which do not seem to be caused by proteinase inhibitors as it has been proposed elsewhere. However, the activity of these inhibitors in soybean meal need to be reduced or destroyed in order to have a sufficient high quality of the meal. Extraction of low molecular weight constituents from soybean meal results in protein concentrates with further improved quality. However, the extracted low molecular weight constituents are of high nutritive value and the processing methods required are expensive, resulting in expensive feeding stuffs. Investigations now performed are directed toward other solutions of these quality problems.

The main quality problem in relation to efficient utilization of rapeseed is a too high concentration of glucosinolates and degradation products thereof. Mink seems to be affected by these compounds as it is found to be the case for other monogastric animals. This mean that the requirement to acceptable oilseed rape is double low varieties with a level of glucosinolates of only some few micromoles per g of seed. Several double low varieties have a too high concentration of 4-hydroxyglucobrassicin and some other glucosinolates, which escape detection in methods of glucosinolate analysis previously used e.t. those methods based on GLC.

Tannin gives in some cases a reduced digestibility of both protein and energy. This seems to be a common problem for all plant products including oilseed rape and soybean meal but varying in importance among different plant feeding stuff sources.

The potential possibilities for use of oilseed rape and soybean meal in diets to mink are promising. The requirement for avoiding problems is use of feeding stuffs with a sufficient low content of the quality reducing compounds which is possible by choice of appropriate plant varieties and/or appropriate processing methods. Analytical methods are recommended to control of the level of the quality reducing constituents in the feeding stuffs.

Authors' summary.

DIGESTIBILITY TRIALS ON SOME PLANT PROTEIN FEEDSTUFFS.

Tuomo Kiiskinen, Jaakko Mäkelä.

The apparent digestibility of some plant protein sources (soybean products, gluters, wheat protein concentrates, potato protein, distillers dried by-products) was studied in minks. The effect of grinding and special processing on digestibility of extracted soybean meal (SBM) was examined, too. The difference method of total excreta collection was used.

The digestibility of organic matter was 55.5 and that of crude protein 78% for fine ground SBM. The corresponding values of fine ground and specialprocessed SBM were 61 and 83%. The values for more coarse SBM were 2-4 and 5-6 percentage units lower, respectively.

Digestibility of the soyprotein concentrate (Soycomil) was very high: organic matter 91.0 and crude protein 92.9%. The values of the fermented SBM corresponded with the digestibility of fine SBM. Excluding Soycomil digestibility of total carbohydrates in the soyproducts was on an average 20%.

The gluters also were highly digested, organic matter 86 and crude protein 94% on an average. The differences between wheat and corn gluters were rather negligible. The digestibility values of the wheat protein concentrates which are produced as by-products in manufacture of wheat gluten were rather good; organic matter approximately 76% in each, crude protein 85.6 and 89.3%, total carbohydrates 68.4 and 60.6%. The higher value of crude protein and lower value of carbohydrates was obtained on the product which contained more protein (46% in d.m.). The corresponding values for potato protein were 81.3, 80.9, and 85.0%.

Distillers dried by-products were poorly digested by mink. At best the values were 51.4 and 74.6% for organic matter and crude protein, respectively.

The ME-values of the protein sources were calculated using the obtained digestibilities.

Authors' summary.

FAT SOURCES IN PELLETTED DRY DIETS FOR MINK AND FOXES.

Anders Skrede, Knut Erik Gulbrandsen.

Experiments were carried out to compare fish oil produced from capelin with soybean oil as fat sources in pelleted dry diets for mink and foxes. Main emphasis was placed at varying supply of the polyunsaturated long-chain fatty acids in fish oil, and different levels of essential fatty acids.

The experiments comprised 4 groups with 48 mink kits and 48 fox kits each during the period from July to November. The supplementary fats used in the 4 diets were: 100% soybean oil, 2/3 soybean oil and 1/3 capelin oil, 1/3 soybean oil and 2/3 capelin oil, and 100% capelin oil.

Analyses of the diets showed small changes in fat quality during storage. Neither was there any effect of fat source on the content of vitamin E in diets stored during the experimental period.

The experiments revealed no clearcut effects of fat source on palatability, growth, feed consumption, health condition or fur quality. Analysis of the content of vitamin E in mink and fox livers at pelting showed considerable individual variations, but no effect of fat source. The fatty acid composition of subcutaneous depot fat or liver fat was greatly influenced by the dietary fat source. The use of fish oil caused decreased accumulation of linoleic acid and linolenic acid, and increased levels of the typical long-chain fatty acids in fish oil. There was, however, no signs of essential fatty acid deficiency. The experiments will continue in order to study long-term effects.

Authors' summary.

THE INFLUENCE OF SOME FEED-FACTORS ON THE WATER BALANCE IN MINK.

Maria Neil.

Effects of some commercial dry diets - fed dry or soaked - of addition of some water absorbants in wet feed, of severe or gently drying of wet feed and of extruded or cooked cereals in the diet, on the water balance have been studied in comparative experiments with mink. Water consumption by feed and drinking-water, water output in urine and faeces, and urine osmolality were investigated. Soaking of the dry diets tended to increase water consumption and decrease urine osmolality. Feeding the severely dried diet resulted in diarrhoea and compared with feeding the fresh or gently dried diets almost doubled the amount of faecal water. When comparing cooked or extruded cereals in the feed, no differences were observed in water intake or faecal water output. The total and urinary water output was slightly decreased in the group fed cooked cereals, probably due to the somewhat lower feed consumption in this group. Water consumption and faecal water output increased, and there was at least a tendency for increased urinary concentration, when water absorbants were added to the diet. The water bound to the absorbants added is unavailable to mink. The absorbants used were considered indigestible.

Author's summary.

ALGINATES AS AN ADDITIVE IN MINKFEED.

Jaakko Mäkelä, Maija Valtonen, Hans Berg, Tuomo Kiiskinen, Lea Eriksson.

Fur animal feed with a high content of dehydrated protein feed stuffs have a high dry matter content and a high rate of spillage. Alginates have proven to be good binding agents in wet feed. The effects of an alginate (Protatek BF-40) on the water binding capacities of feed, digestibility, consistency of faeces, animal growth and need for drinking water was studied. Protatek BF-40 bound water 10 times its own weight and potato starch (Calfamyl), which was used as a comparison, 6 times its own weight. In the digestibility trials it was established that protein digestibility in a feed with 40% of DRP from dehydrated protein feed stuffs was 82% and with 0.5% Protatek added 81%. In conventional wet feed the protein digestibility was 86% and with 1% Protatek added 85%. With an addition of 1% Protatek in a meat/fish diet the protein digestibility declined from 87% to 84% and a 3% addition gave a decline from 87 to 81%. Since the use of Protatek BF-40 normally is 0.5-1.0%, it should have no major effect on digestibility in practice. In growth trials an addition of 0.5% Protatek had no negative effect on animal growth. Since Protatek BF-40 has a particularly good water binding capacity and contains ample amounts of minerals, its use also affects the water balance of the animal. An addition of 0.5% Protatek bound additional water to the feed and the animal drank less water than with a feed containing no thickener. Most water bound to the feed was absorbed in the intestines and excreted mainly in the urine. The faeces were more firm and their dry matter content higher than in the control group. Sodium in Protatek occurred mainly in an indigestible form and was excreted in the faeces. However, these small amounts of sodium did not cause any changes in the faeces. Used in greater (1-3%) amounts water bound to Protatek was mostly excreted in the faeces and did not meet the needs for the animal. A Protatek addition of 3 % deteriorated the palatability of the feed and caused loose faeces.

2 references.

Authors' summary.

FIBROUS COMPOUNDS IN FUR ANIMAL DIETS.

Niels Enggaard Hansen, Steen Møller, Heddie Mejborn.

Increasing use over the past few years of easily digestible feeds has incurred an added risk of more liquid consistence of gastrointestinal contents as well as that of faeces. To counteract this problem various fibrous compounds have been used in the diets.

Little information is available on the effect of fibers on digestibility of nutrients and excretion of water in faeces. Against this background an experiment was carried out to elucidate these questions. The following substances were tested: wood fibre (cellulose), dried sugarbeet pulp, wheat bran, potato pectin (Avebe PPC/DV and oat husk meal.

Five adult males were used per experimental treatment and the experimental period covered three weeks with collection of faeces during the last 96 hours. All experimental animals were fed the same compound feed as the control group, and the individual fibrous compounds were fed in quantities corresponding to 3, 6 and 9 per cent on a wet weight basis. The consistence of the feed was regulated by addition of water. The experiment was carried out as a digestibility experiment according to the regression method and digestibility was determined for crude protein, crude fat (Stoldt), sugar, starch, readily hydrolysable carbohydrates (LHK), calcium,

phosphorus, sodium and potassium.

Results obtained show that the fibrous compounds tested led to a decline in digestibility of crude protein and to a lesser extent of crude fat. digestibility of LHK was not affected.

The greatest effect was found in water, sodium and potassium excreted in faeces. Fibers led to an increase in the amount of water excreted - dependent on level of admixture. The highest effect was found for use of dried sugarbeet pulp in the diets. Increased faecal water excretion was compensated through a rise in water intake with the feed. This did not apply to sugarbeet pulp diets, however. Digestibility of sodium fell markedly, and a significant dependence of level of admixture of fibrous compounds was recorded, except for wheat bran. The same dependence was found for potassium, but the effect was generally less than that found for sodium.

A difference in uptake of sodium and potassium from the intestine was ascertained owing to variations in contents of the two minerals in the different fibrous compounds. A markedly low uptake of sodium and, in part, of potassium was found on addition of dried sugarbeet pulp. A similar effect on uptake of sodium was found when potato pectin was added to the diets.

Authors' summary.

EFFECT OF DIETARY PROTEIN LEVEL ON BLOOD VALUES COMPARED TO PELT CHARACTERISTICS IN MINK.

Hans Berg, Jouko Työppönen, Maija Valtonen.

A distinctive feature of a carnivorous diets is that a high proportion of its energy comes from protein. The metabolism of Carnivora is oriented to the utilization of amino acids for the synthesis of tissue proteins and nitrogen-containing compounds as an important energy source and for elimination of nitrogen. Strict carnivores have a restricted ability to response to a low level of protein in the diet.

Lowering of the dietary protein level during the growth period has been shown to give good growth and pelt characteristics. With a protein level much under 30% of ME resulted in a deterioration of the pelts. In this paper we studied if plasma amino acids and other blood parameters can be used as an aid for finding the optimal protein level in mink feed.

The experiment was carried out with four test groups, 32 male and female kits per group, from weaning to pelting. The protein levels in the test diets during the summer was 40-36-31-27% of ME and during the autumn 36-31-27-23% of ME respectively. The body weight and feed consumption of the animals were recorded. Variation in weight at pelting was insignificant between groups. Energy intake during the experiment (2.7-2.12) was 204-202-213-227 MJ ME in the groups respectively. Pelt size showed no significant differences between groups. Pelt quality was significantly worse in the group with lowest dietary protein. Blood samples were taken four times during the experiment. Hemoglobin, hematokrite, leucocytes, ALAT, ASAT, urea, creatinine, albumin, total protein and amino acids were determined. On a lower dietary protein level albumin and total protein concentrations increased slightly. Transaminase (ALAT, ASAT) levels were also increased. The concentrations of free amino acids in plasma of the group with lowest protein were slightly higher than in the control group.

As an exception of the general plasma amino acid pattern, glutamine concentration in the low protein group is lower than in the control group.

A lowered dietary protein was compensated by increased energy intake. Amino acid deficiency could not be detected. The blood parameters indicate some response of mink to a low dietary protein level. A direct relationship between plasma amino acids, protein intake and pelt characteristics could not be detected. The use of plasma amino acids as indicators of dietary protein quantity seems to lack application.

Authors' summary.

THE INFLUENCE ON REPRODUCTION, GROWTH AND PELT QUALITY IN MINK OF FEEDING MANAGEMENT.

Anne-Helene Tauson.

Effects of pre-mating weight change in yearling females, effects of different feeding intensity levels, effects of flushing and effects of dietary lactic acid bacteria (LAB) on reproductive performance, pre- and post-weaning kit growth rate and fur quality characteristics were investigated in mink.

In yearling females, severe weight reduction from November to March gave inferior reproductive results compared with females kept in moderate condition.

For males on high feeding intensity (ad. lib.) or in a high condition, litter size, barren frequency and rate of stillborn kits were non-significantly increased compared with animals on a low intensity (20% restriction). Similarly, in females litter size, barren frequency, rate of stillborn kits and kit losses during lactation tended to increase for females on high intensity. Yearling females strongly reduced in weight from November to March had poor performance, but in adults conditioning had little effect. On low intensity a tendency for improved longevity was recorded, but at an age of 5 years all females had very poor results.

Kit birth weights were unaffected by intensity level of the dams, but pre-weaning growth was superior on high intensity. Post-weaning growth, final body length and skin length were more affected by intensity during July-August than by intensity from September to pelting, but the feeding level in the nursing period was still more important. Fur quality tended to be improved by a high intensity prior to pelting.

Flushing by ad. lib. feeding of formerly restricted yearling females commenced 4-5 days before the start of the mating season tended to increase litter size. Similarly, a tendency for increased number of corpora lutea was recorded but plasma progesterone levels were not conclusively affected.

Dietary LAB in late gestation and during lactation, with one exception, did not improve kit growth performance. Some positive effects on reproductive results could not be excluded, but field data showed a considerable variation between farms.

Author's summary.

GROWTH AND DEVELOPMENT OF HAIR:

Leena Blomstedt.

Fur animals have more than 4000 hairs/cm², but valuable fur animals may have 30,000/cm² or more.

Skin structure

The skin consists of two distinct layers: a thin called epidermis and a thick called dermis. The hair sacks (hair follicles) are the most prominent skin structures. They are extensions of the epidermis pushing deep down into the dermis, as do the sebaceous and sweat glands. The hair sacks are surrounded by a network of blood capillars and nerves. Beneath the dermis is a looser layer of connective tissue, which in many places is largely transformed into subcutaneous fat.

The growth cycle of hair.

The hair has phases of growth (anagen, catagen) alternating with periods of rest (telogen). The hair length is growing during anagen, during catagen the hair sack is getting shorter. During telogen the hair does not grow any more, the hair sack atrophies leaving only the part close to skin surface intact.

Hair growth

The hair development begins during the second half of foetal life, before keratinizing of epidermis has occurred. At that stage epidermal primary follicles, producing guard hair, and epidermal secondary follicles, producing down, develop. The epidermis is keratinized around the time of birth, with a variation of a few weeks for different species. After keratinization of epidermis an other typer, the derived hair follicle, is being formed through budding of somer epidermal follicles. These hair sacks also produce down.

Fur animal down grow in bundles, which may or may not include one guard hair. The hair sacks of one bundle unite at the level of the sebaceous glands forming a common hair canal to the skin surface. All hair canals develop during the foetal stage and they do not increase in number with the size of the animal nor with the amount of hair.

Moult.

Fur animal renew their fur coat once or twice a year in cold or temperate climates. The summer coat may have up to 30% less down in comparison to the winter coat. This difference is due to change in the number of derived follicles, whereas the number of primary follicles do not change. The derived follicles may atrophy during moulting in the spring, and reappear late in the summer when the follicular activity is increased due to shortening of the day.

Factors affecting hair growth.

A hair sack in anagen is sensitive to external disturbances. Deprivation of some substances during pregnancy, e.g. iodine, has caused offspring with scarce haired or hairless skin in cattle, hog and sheep. The epidermal hair follicles were probably affected, since the hair growth never reached the normal level despite efficient feeding. Feed of bad quality during the breeding period is know to reduce the number of hair per bundle, the adverse effect being projected on the derived follicles.

6 references.

Author's summary.

EFFECTS OF MELATONIN IN MINK.

Maija Valtonen, Leena Blomstedt, Katriina Jokivartio.

A total of 1270 minks in 14 different experimental groups were inserted during the last week of June with a silastic implant containing 10 or 12 mg melatonin. The experiment involved both adolescent and adult females and males and three different colour phases, dark, pastel and wild type were included.

Towards the end of July the melatonin treated minks had a much better appetite and they ate more than control animals. Their weight also increased considerable faster. During September feed consumption slowed and the weight gain levelled down. However, the final weight in the experimental group by pelting didn't differ from the control group. As the melatonin treated minks could be pelted by mid October, the total feed consumption for the adolescent animals was about 35% less than in the control group. Summer coat matured about a month earlier in melatonin treated animals compared to the controls. In the beginning of August winter coat of the melatonin group was already maturing while in control group summer coat was still growing. At the autumn moult the females in both groups were about two weeks earlier than the males. Winter coat in the melatonin group was prime in the middle of October while some animals in the control group still had summer coat. The control group was ready for pelting in the beginning of December.

All skins were graded according to normal FFS Co quality grading. The quality and length of the skins were in alle melatonin groups similar to the control groups. Adolescent melatonin minks had lighter fur colour and fur density was inferior to that in control animals. In most melatonin groups there were less skin quality defects than in control groups.

In melatonin treated adolescent males hemoglobin rose faster than in control animals but didnt reach the adult level by the mature winter pelt. In treated animals testicular development was much faster in adolescence as well as adult males. For the beginning of August melatonin concentrations in melatonin and control groups didnt differ makedly from each other. In melatonin animals as well as controls the highest melatonin levels were reached in the beginning of September. After that melatonin levels decreased.

Authors' summary.

BIOCHEMICAL STUDIES ON MINK SKIN.

Nelly Blumenkrantz.

Chelators of iron and copper produce depigmentation of Scanblack minks.
Subcutaneous injection of chelators of iron and copper produced depigmentation of Scanblack minks. The chelators injected were alpha alpha' di-pyridyl, 8-hydroxyquinoline, sodium diethyldithiocarbamate and adrenaline. Adrenaline was the most efficient bleaching agent. The fact, that tyrosine hydroxylase is a copper-containing enzyme which requires Fe²⁺ ions as cofactor, can explain the reported effect of the chelating agents.

Heparin is able to stimulate hair growth in pastel minks.

Various glycosaminoglycans (GAG) were injected subcutaneously to pastel minks. Similar areas were shaved before starting the injections. Injections with heparin could stimulate hair growth on the shaved area. The other two GAG normal components of the skin dermatan sulfate and hyaluronic acid did not differ in relation to the saline-injected controls. The quality of the fur did not differ after the injections.

Effect of an antiviral agent added on the depigmentation of the underfur of minks.

Effect of a biguanidine on the depigmentation of the underfur of mink kits: Vantocil, a biguanidine has been added to minks food as antiviral agent. Some of the minks received that food during pregnancy and lactation period. Some of their kits showed depigmentation of the underfur. We investigated the possibility of the antiviral agent to act as a chelator of iron/copper, and proved the formation of chromogens with both metals. We assume that the antiviral agent can act as an inhibitor of tyrosine-hydroxylase, the copper enzyme involved in the two first steps of melanogenesis.

Biochemical studies on Ehlers Danlos Syndrome (EDS).

EDS is one of the more studied inborn errors of metabolism. It is characterized by hyperextensibility of the skin and previous studies have been focussed in collagen. Till the present, ten types of the disease have been described and only four of these types have been characterized biochemically. The so-called Type I, whose biochemical alteration is not known affects minks, cats, dogs and human beings. We have studied the two main macromolecules of connective tissue, i.e. glycosaminoglycans and collagen, and found alterations in both of them associated with increased solubility in skin connective tissue of minks suffering from EDS.

Topographical differences in skin connective tissue compounds of the skin of minks.

The content of Hyp and Hyl calculated as percent of the dry defatted skin is higher in the dorsal than in the ventral skin, and in the former it decreases from the neck to the haunch.

It is important to consider this topographical variation in studies related to biochemical composition or qualitative estimations. Similar areas should be compared.

Vitamin C should be added daily to mink food.

The ability of ascorbic acid for oxygen, makes of Vitamin C an excellent reducing substance. We have shown that 50% of the Vitamin C contained in the food, placed on top of the cages, is converted into dehydroascorbic acid after 20 hours of being exposed to the air. The levels of the reduced and the oxidized forms of ascorbic acid after storage of the food should be controlled.

Expression of urinary excretion of certain metabolites per ml of urine is not accurate.

Urine excretion and urinary excretion of glycosaminoglycans in mink are larger at afternoon-night than during the morning. Therefore, the content of certain urinary metabolites expressed as µg/ml urine is not enough, but also the total urine excretion has to be considered.

Author's summary.

FREEZING OF FOX SEMEN - PRELIMINARY RESULTS.

Peer Ola Hofmo.

In 1985 the Norwegian College of Veterinary Medicine and the Norwegian Fur Breeders Association initiated a joint project designed to develop an adequate freezing procedure for fox semen. So far, one has particularly been trying out different types of extender. Later, optimal rates for cooling, freezing and thawing, time of cryoprotectant equilibration and adaption will be investigated.

Experiences and results.

The quality of frozen fox semen is highly dependent on semen quality just after collection. Progressive motility should exceed 80 per cent, and the rate of motility should be high.

The freezing procedure results in a loss of 20-30 per cent. Fox spermatozoa are highly susceptible to membrane damage during freezing and thawing. The most prevalent damage is dissolution of the outer part of the acrosomal membrane anterior to the equatorial segment. Other harmful effects are swelling of the acrosome and "lip formation" due to doubling up to the acrosome. Intact acrosome is essential to normal fertilization, and this parametre should be emphasized when evaluating freezing procedures. There seems to be no correlation between acrosome integrity and motility after freezing and thawing.

Milk-based extenders result in low survival rates, but seem to counteract membrane damage. TRIS-extender (osmolality 320 m osmol/l and pH 6.8) results in high survival rates, however, the prevalence of acrosome damage is somewhat higher. Antibiotics commonly used in extenders do not seem to have any negative effects on fox spermatozoa.

The critical temperature interval for spermatozoa is from the point of crystallization at -7° C down to -30° C. Fast colling in this interval and, subsequently, fast thawing have produced the best results.

Author's summary.

NEW BOOK**ZOONOSES AND THE FARMING OF FUR BEARING ANIMALS.**

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АКАДЕМИЯ НАУК КАЗАХСКОЙ ССР
 ИНСТИТУТ ЭПИДЕМИОЛОГИИ, МИКРОБИОЛОГИИ
 И ИНФЕКЦИОННЫХ БОЛЕЗНЕЙ
 МИНИСТЕРСТВА ЗДРАВООХРАНЕНИЯ КАЗАХСКОЙ ССР

М. М. РЕМЕНЦОВА, О. В. ПОСТРИЧЕВА,
 С. И. РЫБАЛКО

**АНТРОПОЗООНОЗЫ
 В ЗВЕРОВОДЧЕСКИХ
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Abstract.

The diseases discussed are brucellosis, tuberculosis, Q fever, Chlamydia infection, toxoplasmosis and leptospirosis, with special reference to the occurrence of these diseases in Kazakhstan. Hosts include musk-rat (*Ondatra zibethica*), silver fox, arctic fox (*Alopex lagopus*), souslik (*Citellus* spp.), mink and nutria (*Myocastor coypus*).

CAB-abstract

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VR Dr. Ulf D. Wenzel

Sumpfbiber

Eine Anleitung
über ihre Zucht, Haltung,
Fütterung und Nutzung

Mit 52 Abbildungen



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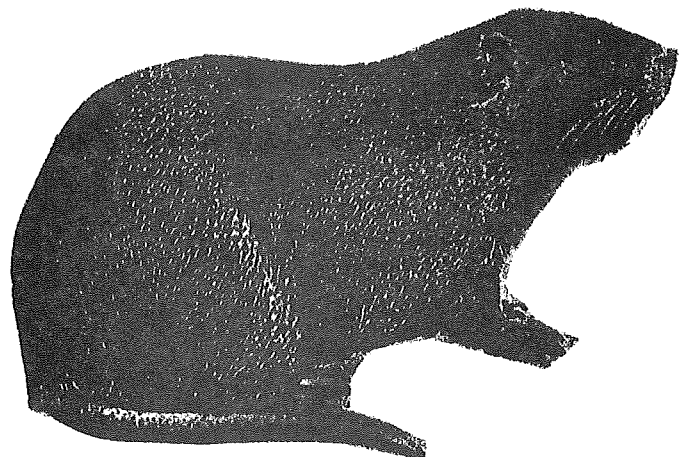


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NEW BOOK

DISEASES OF FUR BEARING ANIMALS.

by Danilov, E.P. (Editor); Maiorov, A.I.; Chizhov, V.A.;
Dakur, I.I.; Grabovskii, A.V.; Akulova, V.P.; Metelkin, O.A.;
Ryutova, V.P.; Slugin, V.S.

БОЛЕЗНИ ПУШНЫХ ЗВЕРЕЙ

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Освещены вопросы организации ветеринарно-санитарных мероприятий в звероводческих хозяйствах. На уровне последних достижений науки описаны инфекционные, инвазионные и незаразные болезни пушных зверей, разводных в неволе. Даны методы их диагностики, лечения и профилактики. Освещен опыт борьбы с болезнями в условиях промышленного пушного звероводства.

Для ветеринарных специалистов.

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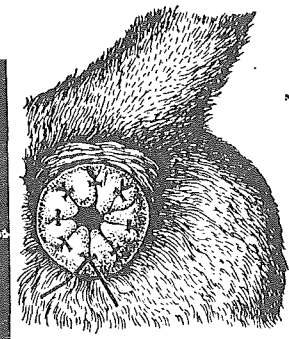


Рис. 28. Кисетный шов вокруг анального отверстия.

Abstract.

The principal Russian textbook on diseases of fur bearing animals was last published in 1973, under the editorship of S. Ya. Lyubashenko VB 44, abst. 3872. The host range is silver fox, arctic (or polar) fox, mink, polecat and sable. The chapter headings are much the same (with the addition of a chapter on staphylococcal infections), but there has been some revision. There is still uncertainly whether the rival disease of the central nervous system called 'dikovanie' is or is not rabies (though this chapter has been reprinted largely unaltered). The chapter on rabies is also largely unaltered, with no mention of recent diagnostic techniques.



Wildlife Laboratories

I N C O R P O R A T E D

Letter to the Editor

PRESS RELEASE FOR IMMEDIATE RELEASE: 8 JANUARY 1986

WILDLIFE LABORATORIES ANNOUNCES SUCCESSFUL DEVELOPMENT AND TRIAL OF A NEW EARLY PRIMING IMPLANT

Wildlife Laboratories of Fort Collins, Colorado has successfully completed development and clinical trials of a new early pelt priming implant (PRIME-X) according to Dr. William R. Lance, President and Mr. Terry Cairns, Vice President and General Manager. Implants were tested in over 5,000 mink in Canada during 1985. Implanted mink primed approximately 6 weeks earlier than controls. Treated mink also had increased body size, feed consumption and pelt length. Early pelting made possible by use of the implant, prevented late season mortality and loss of body condition due to weather stress. Application for FDA clearance is in process. This new implant is the result of Wildlife Laboratories' research and development to bring new pharmaceuticals to the fur industry. In addition to developing new pharmaceuticals for the fur industry, Wildlife Laboratories offers free diagnostic services to its customers through the specialized veterinary pathologists on its staff.

PRESS RELEASE FOR IMMEDIATE RELEASE: 8 JANUARY 1986

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