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CONTENTS.

1.	CONTENTS	269 -282
2.	NOTES	283
3.	<u>MULTIDISCIPLINARY</u>	
	THERMOPHYSICAL PROPERTIES OF NESTS OF FARMED MUSTELIDS: thermal insulation. Hannu Korhonen Code 10-3-M-F.	285
	GROWTH DYNAMICS OF TESTICLES AND ACCESSORY SEX GLANDS IN NUTRIA MALES DURING POSTNATAL DEVELOPMENT. Pavel Jelinek. Code 2-5-0.	292
	FUNCTIONAL STATE OF THE HYPOTHALAMO-PITUITARY NEUROSEC- TORY SYSTEM IN THE SILVER FOX VULPES FULVUS AT THE BEGIN- NING AND END OF RUT. M.N. Yurisova. Code 3-5-F.	292
	ACTIVITY OF ACID AND ALKALINE PHOSPHATASE IN TESTICLES AND ACCESSORY SEXUAL GLANDS OF NUTRIA DURING POSTNATAL DEVELOPMENT. P. Jelinek, M. Glásrová, G. Vlková. Code 3-5-0.	293
	STEROID METABOLISM IN THE CORPUS LUTEUM OF THE FERRET. Peggy Jo Kintner, Rodney A. Mead. Code 3-5-M-0.	294
	HEPATIC BIOTRANSFORMATION IN FARMED BLUE FOX AND RAC- COON DOG. M. Harri, O. Hänninen. Code 3-4-F-0.	295
	ULTRASTRUCTURE OF MINK SUBMANDIBULAR GLAND. B. Tandler. Code 2-M.	295
	INTERACTION BETWEEN HYPOPHYSEAL-ADRENAL AND GENITAL SYSTEM IN SILVER FOXES. N.M. Bazhan, P.M. Krass, L.V. Osadchuk. Code 3-5-F.	296

- THE ACCELERATION IN THE MINK FUR MATURATION WITH THE AID OF THE PHOTOPERIODIC CONDITIONS.** D.K. Belyaev, D.V. Klochkov, L.A. Prasolova, Iu. D. Koveshnikov, L.G. Komarova, Iu. V. Ignatov, M.A. Geyshin. 296  
Code 10-3-M.
- INDUCTION OF WINTER FUR GROWTH IN MINK (MUSTELA VISON) WITH MELATONIN.** J. Rose, F. Stormshak, J. Oldfield, J. Adair. 297  
Code 3-14-M.
- THE GROWTH OF YOUNG ARCTIC FOXES AND DEVELOPMENT OF WINTER COAT IN ANIMALS BORN AT DIFFERENT PERIODS IN THE UKRAINE.** V.V. Koshitskii, E.V. Terekhova. 298  
Code 2-14-F.
- A FIELD TRIAL TO DETERMINE PELT SILKINESS.** Hans Pedersen, Kr. Jensen. 298  
Code 14-M.
- CLASSIFICATION OF MINK PELTS IN AUGUST.** Gabrielle Lagerkvist, Jack Sevenius. 299  
Code 14-M.
- THE PROBLEM METALLIC SHEEN.** Lars Elofson, Jack Sevenius. 299  
Code 2-14-M.
- RETRO-ORBITAL TECHNIQUE FOR BLOOD COLLECTION FROM THE FERRET (MUSTELA PUTORIUS FURO).** James G. Fox, Kristine Hewes, Steven M. Niemi. 300  
Code 14-0.
- CAGE EXPERIMENTS WITH BLUE FOXES.** Stig Moss. 300  
Code 10-14-F.
- FLOORING FOR CHINCHILLAS.** Edmund Haferbeck. 301  
Code 10-12-0.

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##### GENETICS AND EVOLUTION OF THE MINK Lpm SYSTEM.

I. IDENTIFICATION AND GENETIC ANALYSIS OF THE Lpm6 ALLOTYPE. O.K. Baranov, D.K. Belyaev, M.A. Savina, V.I. Yermolaev. 302  
Code 4-3-M.

##### GENETICS AND EVOLUTION OF THE MINK Lpm SYSTEM.

II. THE INSTANTANEOUS EMERGENCE OF Lpm ALLOTYPIC POLYMORPHISM IN THE DOMESTIC MINK AS A POSSIBLE RESULT OF PHYLOGENETIC ACTIVATION OF "SILENT" GENES. 303  
D.K. Belyaev, O.K. Baranov, V.I. Yermolaev, M.A. Savina.  
Code 4-3-M.

##### KARYOLOGICAL EXAMINATION OF EARLY MINK EMBRYOS.

G.K. Isakova. 304  
Code 4-M.

CHROMOSOME LOCALIZATION OF THE GENES OF EN01, HK1, ADK, ACP2, MP1, ITPA, ACON1 and  $\alpha$ -GAL IN THE AMERICAN MINK (MUSTELA VISON). A.A. Gradov, N.B. Rubtsov, A.G. Shilov, M.N. Bochkarev, O.L. Serov. 305  
Code 4-M.

NOVELTIES IN FOX PRODUCTION. O. Lohi. 305  
Code 4-F.

- ARCTIC PEARL - A NEW NORWEGIAN BLUE FOX COLOUR MUTATION.** Norodd Nes, Jan A. Fougner. 306  
Code 4-F.
- THE GOLDEN ISLAND FOX.** Outi Lohi. 306  
Code 4-F.
- GENETICALLY INTERESTING RESULTS OF FOX MATINGS.**  
Vainö Hernesniemi, Tapio Iso-Mustajärvi, Jaakko Lumme,  
Jouko Meriläinen, Seppo Pasanen. 307  
Code 4-F.
- RED AND SILVER FOX MUTATIONS.** H. Konnerup-Madsen. 307  
Code 4-F.
- CROSSBREEDING OF FOXES.** Lars Elofson, Claes Hoff. 308  
Code 4-F.
- A WHITE RACCOON DOG MUTATION.** Jaakko Mäkelä, Ulla  
Katajamäki. 308  
Code 4-O.
- SELECTION OF BREEDING ANIMALS. BREEDING FOR IMPROVED  
FERTILITY.** Lars Elofson. 309  
Code 4-5-M.
- BREEDING WORK AT MINK-PRODUCING FARMS IN SWEDEN.**  
Karin Ericson. 309  
Code 4-12-M.

Titles of publications - not abstracted.

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5. REPRODUCTION

- RELATIONSHIP BETWEEN SERUM TESTOSTERONE CONCENTRATIONS  
AND FERTILITY IN MALE MINK (MUSTELA VISON).**  
C. Sundqvist, A. Lukola, Maija Valtonen. 311  
Code 3-5-M.
- REGULATION IN PREGNANT MINK (MUSTELA VISON) OF PLASMA  
PROGESTERONE AND PROLACTIN CONCENTRATIONS AND REGULA-  
TION OF ONSET OF THE SPRING MOULT BY DAYLIGHT RATIO  
AND MELATONIN INJECTIONS.** L. Martinet, D. Allain,  
M. Meunier. 312  
Code 3-5-10-M.

- USE OF PROSTAGLANDINS FOR TREATMENT OF PROLONGED GESTATION IN BLUE FOX (*ALOPEX LAGOPUS*). Ordin Møller, Leif Homme, Adrian Smith. 313  
Code 5-3-F.
- PRECOCIOUS INDUCTION OF LUTEAL ACTIVATION AND TERMINATION OF DELAYED IMPLANTATION IN MINK WITH THE DOPAMINE ANTAGONIST PIMOZIDE. Bruce D. Murphy. 313  
Code 5-3-M.
- EFFECTS OF SINGLE OR MULTIPLE INJECTIONS OF MEDOXY-PROGESTERONE ACETATE ON THE REPRODUCTIVE PERFORMANCE AND GESTATION LENGTH OF RANCH MINK. Bruce C. Murphy. 314  
Code 5-3-M.
- TEMPORAL RELATIONSHIPS BETWEEN HORMONAL CONCENTRATIONS AND THE ELECTRICAL RESISTANCE OF THE VAGINAL TRACT OF BLUE FOXES (*ALOPEX LAGOPUS*) AT PRO-OESTRUS AND OESTRUS. O.M. Møller, M. Mondain-Monval, A. Smith, E. Metzger, R. Scholler. 315  
Code 5-3-F.
- EFFECT OF LITTER SIZE ON GESTATION LENGTH IN BLUE FOXES. Outi Lohi, Kari Valkosalo. 316  
Code 5-F.
- MATING CONSIDERATIONS. NEW FINDINGS ON REPRODUCTION IN MINK. Lars Elofson. 317  
Code 5-12-M.
- INFORMATION OF CURRENT MATING SYSTEMS AND DATE OF MATING SYSTEMS. Lars Elofson, Gabrielle Lagerkvist. 318  
Code 5-M.
- SPERM TEST - A USEFUL TOOL IN BREEDING WORK OF MINK. Christer Sundqvist, Margaretha Gustafsson. 318  
Code 5-12-M.
- COLLECTION OF SEMEN FOR INSEMINATION OF FOXES. Väinö Hernesniemi, Jaakko Lumme, Jouko Meriläinen, Seppo Pasanen. 319  
Code 5-12-F.
- INSEMINATION OF FOXES IN 1983. Jan Fougner. 319  
Code 5-F.
- RESULTS OF INSEMINATING FOXES IN 1983. Maija Valtonen. 320  
Code 5-F.
- REPRODUCTIVE CHARACTERS OF RED FOXES AT THE SALTYKOV FUR FARM. T.M. Chekalova, O.N. Chupeeva. 321  
Code 5-4-12-F.
- RED FOX (*VULPES VULPES*) REPRODUCTION IN FRANCE. SEASONAL VARIATIONS AND FERTILITY OF VIXENS. M. Artois, M.F.A. Aubert, Y. Gérard. 321  
Code 5-F.

Titles of publications - not abstracted.

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- VITAMIN DISTRIBUTION IN THE ORGANISM OF MINKS AND POLAR FOXES. COMMUNICATION I. DEPOSITION OF VITAMIN A. V.A. Berestov, G.G. Petrova, S.P. Izotova. 322  
Code 6-3-M-F.
- NUTRITIONAL STATUS OF ADULT MALE MINK DURING THE YEAR. II. HEAT PRODUCTION AND MAINTENANCE REQUIREMENTS. Geneviève Charlet-Lery, Michèle Fiszlewicz, Marie-Thérèse Morel, J. Rougeot. 325  
Code 6-M.
- THE OPTIMUM CONDITION OF FEMALE MINK BEFORE MATING. A.P. Maksimov, A.A. Shkol'naya. 326  
Code 5-M.
- FLUSHING OF MINK. Maria Neil. 327  
Code 12-14-5-M.
- GROWTH AND MAINTENANCE OF THE RACCOON DOG (NYCTEREUTES PROCYONOIDES GRAY 1834) ON VARIOUS BREWERS' MASH AND BASAL DIETS. H. Korhonen, M. Harri. 327  
Code 7-6-0.
- TRUE DIGESTIBILITY OF AMINO ACIDS IN HIGH TEMPERATURE TREATED BARLEY IN FEEDING TRIALS WITH MINKS. N. Glem-Hansen. 328  
Code 7-M.
- THE SPECIFICITY OF ACTION OF DIFFERENT ALKYL COMPOUNDS ON THE PERFORMANCE OF FUR BEARING ANIMALS. Yu A. Perchikhin. 329  
Code 8-5-F.
- EFFECT OF NITROSODIMETHYL UREA ON DEVELOPMENT OF POLAR FOXES. V. Ya. Adamov. 330  
Code 8-F.
- INTOXICATIONS OF THE NUTRIA NY NITRO-COMPOUNDS. Jerzy Kulczycki, Andrzej Malinowski, Arnold Wasniewski. 330  
Code 8-0.
- STABILITY OF VITAMINS IN MOIST MINK FEEDS. Niels Glem-Hansen. 331  
Code 7-8-14-M.
- TRIALS WITH FROZEN INDUSTRIAL FISH IN THE GROWTH PERIOD. G. Hillemann. 331  
Code 7-M.
- TRIALS WITH DRY FEED PELLETS FOR MINK. G. Hillemann. 332  
Code 7-M.
- TRIALS WITH DRY FEED PELLETS FOR MINK. G. Hillemann. 332  
Code 7-M.

- TRIALS WITH COOKED, FROZEN POULTRY WASTE FOR MINK.**  
G. Hillemann. 333  
Code 7-M.
- TRIALS WITH DRY PELLETS FOR MINK.** G. Hillemann,  
Heddie Mejborn. 333  
Code 6-7-12-M.
- TRIALS WITH LINCO-SPECTIN<sup>R</sup> FOR MINK.** G. Hillemann,  
Heddie Mejborn. 334  
Code 7-8-M.
- TRIALS WITH SUPPLEMENT OF EASILY DIGESTIBLE FEEDS  
FOR MINK IN THE EARLY PERIOD OF GROWTH.**  
N. Glem-Hansen. 334  
Code 6-7-M.
- FEEDING TRIALS WITH BLUE FOXES IN 1982.**  
H. Konnerup-Madsen. 335  
Code 6-F.

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F.
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- MUSCULAR AND MYOCARDIAL DEGENERATION IN RAPIDLY GROWING MALE MINK KITS. K. Nordstoga. 336  
Code 9-M.
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Code 9-M.
- STUDIES ON THE PREVALENCE AND SPECIFIC PREVENTION AGAINST TRYCHOPHYTOSIS IN BREEDING FOXES. Stanislaw Woloszyn, Jacek Andrychiewicz, Krzysztof Kostro, Zbigniew Gradzki. 337  
Code 9-F.
- COMPARISON OF SUBCUTANEOUS AND INTRAMUSCULAR ADMINISTRATION OF A LIVE ATTENUATED DISTEMPER VIRUS VACCINE IN FERRETS. D.T. Shen, J.R. Gorham, J.F. Evermann, A.J. McKeirnan. 338  
Code 9-M-0.
- LYMPHATIC LEUKOSIS IN THE POLECAT. G. Loupal, Christine Dreier. 339  
Code 9-0.
- MASTITIS CAUSED BY HEMOLYTIC ESCHERICHIA COLI IN THE FERRET. A.J. Liberson, C.E. Newcomer, J.I. Ackerman, J.C. Murphy, J. G. Fox. 340  
Code 9-0.
- ROYAL PASTEL MINK RESPOND VARIOUSLY TO INOCULATION WITH ALEUTIAN DISEASE VIRUS OF LOW VIRULENCE. William J. Hadlow, Richard E. Race, Richard C. Kennedy. 340  
Code 9-M.
- CONTACT INFECTION OF MINK WITH 5 SUBTYPES OF AVIAN INFLUENZA VIRUS. K. Okazaki, R. Yanagawa, H. Kida. 341  
Code 9-M.
- REPORT ON THE TRIAL OF CLOSTRIDIUM BOTULINUM TYPE C VACCINE AGAINST BOTULISM IN MINK (IN CHINA). Kong Qing-song. 341  
Code 9-8-M.
- PREVALENCE OF ANTIBODIES AGAINST CANINE PARVOVIRUS IN FOXES. A. Schwers, J. Barrat, J. Blancou, M. Maenhoudt, P.-P. Pastoret. 342  
Code 9-F.
- STUDIES ON EXPERIMENTAL REPRODUCTION OF WELCHIOSIS IN MINK. V. Secasiu, N. Pastirnac, R. Zabava. 342  
Code 9-M.

Titles of publications - not abstracted.

MENINGEAL CRYPTOCOCCOSIS AND CONGESTIVE CARDIOMYOPATHY IN A FERRET. Paoul G. Greenlee, Elsa Stephens, The Animal Medical Center, 510 E 62nd St., New York, NY 10021. (JAVMA, 184, 7, 1984, 840-841). Code 9-0.

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Abstracts of papers from the 3rd International Congress, 1984.

- HEAT DETECTION IN FOXES AND OPTIMAL TIME FOR MATING AND AI: PRESENTATION OF A "RUT GAUGE" WITH DESINFECTION SYSTEM.** Jan A. Fougner. Code 5-F. 343
- IMPROVED SPERM COUNTS IN MINK MALES TREATED WITH CLOMIPHENE CITRATE.** Altti Lukola, Christer Sundqvist. Code 5-3-M. 344
- THE ARTICOP-INSTRUMENT AS A MEANS OF AMELIORATING SEMEN TRANSPORTATION IN THE ARTIFICIAL INSEMINATION OF THE FOX.** J. Meriläinen, S. Pasanen. Code 5-F. 344
- ON THE STRATEGY OF THE USE OF MALE FOXES IN ARTIFICIAL INSEMINATION.** Seppo Pasanen, Jouko Meriläinen. Code 5-F. 345
- DISTURBANCES IN THE APPEARANCE OF SEXUAL MATURITY IN MINK MALES.** Christer Sundqvist, Altti Lukola, Maija Valtonen. Code 5-3-M. 345
- SODIUM CITRATE AS FOX SEMEN EXTENDER AT VARIOUS TEMPERATURES.** Liisa Tång, Maija Valtonen. Code 5-F. 346
- EMBRYONIC DEVELOPMENT IN THE BLUE FOX.** Maija Valtonen, W.A. King., I. Gustavsson, Auli Mäkinen. Code 2-5-F. 346
- NUTRITIONAL MUSCULAR DEGENERATION SYNDROME IN MINK. CLINICAL CHEMICAL STUDIES.** Asbjørn Brandt. Code 9-3-M. 347
- ANTIBODY DEVELOPMENT, DURATION AND PROTECTION FOLLOWING A SINGLE DOSE OF VACCINE AGAINST PSEUDOMONAS PNEUMONIA OF MINK.** Laila Elsading-Elsheik, Rune Bergman, Christer Walter, Kenneth Janzon, Torbjörn Mejerland. Code 9-M. 348
- INTESTINAL ADENOMATOSIS IN THE BLUE FOX.** Karin Eriksen, Thor Landsverk, Knut Nordstoga. Code 9-F. 348
- CONTRIBUTION TO THE CONTROL OF ALEUTIAN DISEASE.** Jan Haagsma. Code 9-M. 349
- NUTRITIONAL MUSCULAR DEGENERATION SYNDROME IN MINK.** Per Henriksen. Code 9-3-M. 349
- THE EFFECT OF MATERNAL IMMUNITY ON SPECIFIC DISEASES AS IT RELATES TO THE OPTIMUM TIME OF MINK KIT VACCINATION.** Keith Hulsebos, Pamela Miller, Herbert Kammer. Code 9-M. 350
- CAMPYLOBACTER JEJUNI INFECTION IN RANCH MINK IN CANADA.** Bruce Hunter, J. Prescott, J.R. Pettit, D. Hoover. Code 9-M. 350
- EUTHANASIA OF FUR-BEARING ANIMALS FOR PELTING.** Hans Christoph Löliger. Code 14-M-F. 351
- CLOSTRIDIUM PERFRINGENS INFECTION IN MINK: A CASE REPORT.** S. Matthes, Hans-Christoph Löliger. Code 9-M. 351

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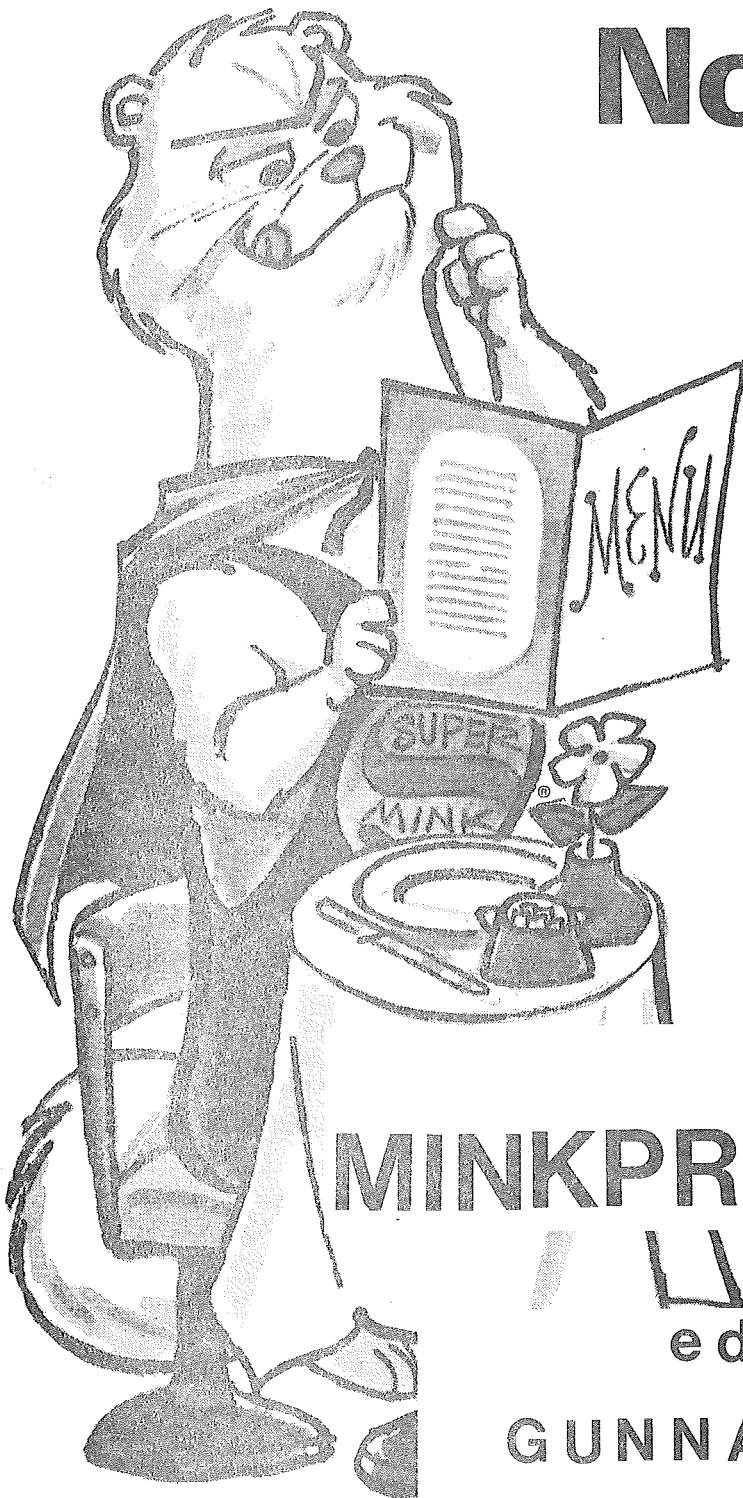
EDEL PELZTIERE. Ulf D. Wenzel. Code 14-M-F-0.

352

SCIENTIFIC FUNDAMENTALS OF FUR-BREEDING.

354

V. Berestov. Code 14-M-F-0.

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## NOTES

\* YOU DID SAY YOU WANTED A MINK FOR CHRISTMAS, DIDN'T YOU? \*

SCIENTIFUR, VOL. 8, NO. 4, 1984.

The year 1984 has not been the year where Orwell's prophecy come true. From a fur animal production point of view the 1984 has been the year with the best skinprices and the year with increasing international cooperation and communication. The 3rd International Scientific Congress in Fur Animal Production in Paris has been one of the most markable steps in that direction - THE RIGHT WAY.

1984 has been the year where the readers by SCIENTIFUR have been informed about more than 400 scientific reports of which more than 250 were abstracts and 12 original reports.

1984 has been the year of new books of importance as well for the scientific as for the practical side of fur animal production. More than ten books have been mentioned in SCIENTIFUR, but, unfortunately, none written in English language. Therefore, it is a great pleasure for us to tell you that the Danish Fur Breeders Association in order to support the international cooperation and the fur animal production has given SCIENTIFUR the rights to translation (into English) and distribution of the new book: MINK-PRODUKTION. The book was presented in SCIENTIFUR Vol. 8, No. 3, pages 264-265.

Further presentation of the book is given in the enclosed folder. After reading of this you will understand that it is up to you, how far the book should be distributed in English translation. ORDER THE BOOK NOW !!!

In this issue of SCIENTIFUR we as an experiment have given the original reports a professional typing and lay out. We hope to save space and to get a more professional and friendly lay out, and we hope in the future to be able to send 25 reprints to the authors in acknowledgement of the contribution.

We realize very well that the matters important for the readers of SCIENTIFUR will increase considerably in the future, and we have to find a way to overcome it. Do not forget the fact that development and future of SCIENTIFUR are depending on the economy. The easiest way to stabilization of this is increasing of the numbers of subscribers. Therefore, HELP THE FUTURE - HELP US TO GET NEW SUBSCRIBERS.

From many letters during the years and from personal communication we know that several people in the fur animal industry consider SCIENTIFUR as a very valuable help for fur animal production. We thanks for these messages. But, at the same time, we wonder, how far the various Fur Breeders Associations realize the importance of SCIENTIFUR - for their advisers, their scientific contacts, and local key-persons in the industry. Why not discuss this matter at the various boards and use a SCIENTIFUR-subscription as an acknowledgement to these persons or Institutes. USE SCIENTIFUR FOR YOUR OWN PROMOTION - BE SURE THAT SCIENTIFUR IS IN HAND OF PEOPLE OF WHOM YOU WANT PROFESSIONAL ASSISTANCE - GIVE THEM A SUBSCRIPTION AS YOUR SERVICE OR AS A GIFT. We should be glad to receive your subscription order.

Just after sending this last issue of SCIENTIFUR Vol. 8, we are going to send the invoices for the 1985-subscription (Vol. 9). The price will be the same as in 1984. We ask you, kindly, to handle the invoice as far as possible.

Finally, we wish to thank contributors and subscribers to SCIENTIFUR for their help during the year, and wish all of you a Merry Christmas and a Happy and Prosperous New Year.

Best regards



Gunnar Jørgensen

Editor





# Thermophysical Properties of Nests of Farm Mustelids: Thermal Insulation

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## Summary

The degree of thermal protection provided by a styrofoam-covered, plastic nest and a wooden one for polecats and minks was evaluated with different bedding constructions. Heat transfer coefficient derived from a cooling rate curve of deceased polecat gave a similar slope as that calculated from oxygen consumption data of live animals. The nests shifted lower critical temperature ( $T_{lc}$ ) of mustelid males to lower temperature ranges by 15-20° C, depending on the nest type. In mustelid females, the corresponding shift was about 10° C. Measurements on cooling rates of the polecat model showed that use of bedding on nest bottom markedly reduced heat loss. A covered nest provided better thermal insulation in comparison to an open one;  $T_{lc}$  difference of these two nest forms was 16° C. Heat loss of the model was clearly higher with wet than with dry beddings. The cooling rate of the model was not influenced by the presence of styrofoam shell around the plastic chamber. An increase in the amount of bedding material led to an increase in temperature differences between the inside of the nest and ambient air.

## Introduction

Laboratory measurements have shown that energy expenditure of the mink (*Mustela vison*) increases by about 40% when the ambient air temperature ( $T_a$ ) decreases from 20 to 0° C (Chwalibog et al. 1980; Korhonen et al. 1983). However, about half of the ranchproduced mink skins in the world originate from Scandinavia where the farms exist up to the northernmost part of Lapland. Under these circumstances, the animals are exposed to temperatures far below 0° C for shorter or longer periods of time before they are pelted. Extra heat production leads to an increase in feeding costs. Furthermore, the increase in metabolic heat production in response to cold stress is possible only to a limited extent. A better insulation, however, can shift the lower critical temperature ( $T_{lc}$ ) to a lower value without the necessity of increasing energy cost. Since the fur coat of farmed mustelids does

not give thermal protection to such an extent that they could maintain their homeothermy for a longer period of time in extreme winter conditions, the thermal protection provided by a nest is of the most importance. The purpose of this study was to evaluate the degree of thermal protection provided by different nest constructions for farmed polecats (*Mustela putorius*) and minks to analyze the microclimat inside the nests.

## Materials and methods

The following methods were used for determination of thermal protection of different nest constructions: (1) measurement of cooling rates of freshly killed animals with and without nests and (2) determination of an estimate of nest insulation using a polecat model. All measurements were made in a climatic chamber. Freshly killed animals used in this study were as follows: polecats (9 males, 8 females) and minks (8 males, 8 females). Their weights were 0.9-2.1 kg and 0.9-1.8 kg, respectively. Experiments were undertaken between November and February when the animals bore their winter pelage. The animals originated from commercial fur farms.

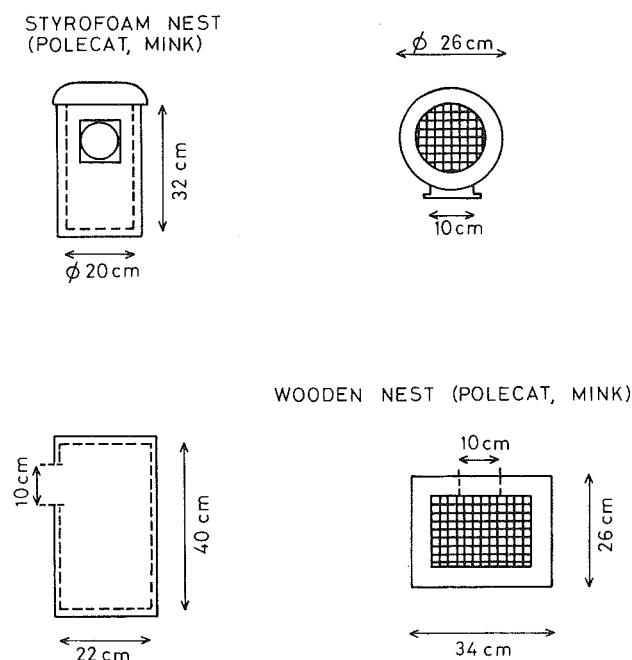


Fig. 1. Schematic pictures of experimental nest types.

Cooling rates were measured for deceased animals which were lying on a styrofoam mat without nest and which were inside styrofoam and wooden nest. The wooden nest was hand-made. Its sides and gables were made of 1.7 cm and 3.6 cm thick board, respectively. The styrofoam-covered, plastic nest was a conventional, commercially available nest type (Norcar Ltd.). Descriptions of these nests are presented in Fig. 1. Animals were killed with an electric shock and allowed to cool at an ambient air temperature ( $T_a$ ) of about  $\pm 20^\circ\text{C}$  with a thermocouple inserted about 15 cm into their rectums. Rectal temperatures were measured to the nearest  $0.1^\circ\text{C}$  for about 4 h with an Ellab du 3s (Copenhagen) thermometer. Thermal conductances were calculated by the Method of Morrison and Tietz (1957) assuming a specific heat of  $3.4\text{ J/g }^\circ\text{C}$ . The critical thermal gradient ( $\Delta T$ ) was calculated from cooling rate data:  $\Delta T = \text{RMR}/C_d$ , where RMR is the resting metabolic rate and  $C_d$  the heat transfer coefficient of the deceased animal. RMR values were based on our earlier paper (Korhonen et al. 1983). The lower critical temperature,  $T_{lc}$ , is then:  $T_b \div \Delta T$  where  $T_b$  is the temperature thermoneutrality extrapolates to the x-axis (Korhonen et al. 1983).

A model polecat was fabricated as follows: a plastic bag was filled with 5% agar jelly (Difto bacto-agar, Difto Laboratories, USA) in water (750 g). The bag was inserted into a tanned polecat skin with winter pelage and modelled into the shape of the animal's body. The model was supplied with a rubber tube extending into the center of the body. At the beginning of experiments, the model was heated to approximately  $35^\circ\text{C}$  in an oven. Thereafter, a thermocouple was inserted 15 cm into the rubber tube and cooling rate was measured as described above. Styrofoam and wooden nests were used. Four nest constructions were used for the styrofoam nests: (1) no bedding; (2) covered nest, 200 g of dry oat straw bedding formed into a round cavity with about 5 cm of straw above the cavity; (3) open nest, 200 g of dry straw with no animal cavity; and (4) covered nest, 200 g of 10 day old straw with animal cavity and 17% moisture. The wooden nest contained no bedding. The beddings were constructed by a polecat couple (male and female).

Microclimates were studied in occupied polecats on farms. Temperatures inside the nests and in ambient air were measured with an iron-constantan thermocouple in conjunction with Servogor 460 (BBC Goertz Metrawatt) chart recorder. Temperature measurements were made between November and February. The thermocouple was inserted into the nest from one side at a height of about 18 cm. Measurements generally lasted 2 to 3 days. Two polecat nests both of which were inhabited by a polecat couple (males weighing about 2 kg, females weighing 0.9 kg) were used for measurements. For further description of nest constructions see Figs. 2 and 3.

Relative humidity (RH) inside the styrofoam nest with open type bedding formulation (male and female

polecat inside) was measured with R.H. & T Indicator HMI 14 (Vaisala, Helsinki) in February ( $T_a$  about  $\pm 10^\circ\text{C}$  p.m., RH of air about 50%). Before measurement, old bedding was replaced with new, dry bedding. Moisture content of polecat couple beddings in styrofoam and wooden nests were determined at three 10 days periods during winter. Dry beddings were placed into both nests inhabited by the above mentioned polecat couples. After each 10-day period, beddings were removed and allowed to dry to constant weight. The moisture content was then calculated from weight difference of the bedding before and after drying.

The differences in heat loss of various body regions were evaluated using an AGA Thermovision 720 infrared system. By means of this thermographical method the warmer regions of the body could be seen lighter than the colder ones (for the method see Borg 1968; Veghte 1975). The animals were thermographed outside the nest in late January at  $T_a$  of  $\pm 10^\circ\text{C}$ . Back skin temperatures ( $T_{bs}$ ) of five female polecats were measured with subcutaneously inserted thermocouples in needles (Ellab AK8) connected to an Ellab du 3s (Copenhagen) thermometer. Measurements were performed under laboratory conditions at  $T_a$ 's of +20, +5 and  $\pm 18^\circ\text{C}$ . Before experiments, the animals were allowed to accustom to each temperature measured about half an hour. thereafter, temperatures were read every other minutes about half an hour at a given  $T_a$ .

Table 1. Heat transfer coefficient, critical thermal gradient ( $\Delta T$ ) and lower critical temperature ( $T_{lc}$ ) of deceased animals. Data source for live animals: Korhonen et al. 1983.

		Heat transfer coefficient ( $\text{W}/\text{kg}^{0.75}$ per $^\circ\text{C}$ )	$\Delta T$ ( $^\circ\text{C}$ )	$T_{lc}$ ( $^\circ\text{C}$ )	N
Polecat <i>male</i>	live animal	$0.215 \pm 0.027$	23.3	+14.7	4
	no nest	$0.149 \pm 0.016$	33.6	+4.4	4
	Styrofoam nest	$0.095 \pm 0.008$	52.6	$\div 14.6$	3
	wooden nest	$0.104 \pm 0.014$	48.1	$\div 10.1$	2
<i>female</i>	no nest	$1.177 \pm 0.005$	28.2	+9.8	3
	styrofoam nest	$0.130 \pm 0.007$	38.5	$\div 0.5$	2
	wooden nest	$0.132 \pm 0.020$	37.9	+0.1	3
	live animal	0.187	30.5	+7.5	1
Mink <i>male</i>	no nest	$0.150 \pm 0.018$	38.0	0	3
	styrofoam nest	$0.104 \pm 0.003$	54.8	$\div 16.8$	3
	wooden nest	$0.113 \pm 0.001$	50.4	$\div 12.4$	2
	no nest	$0.166 \pm 0.008$	34.3	+3.7	3
<i>female</i>	styrofoam nest	$0.117 \pm 0.007$	48.7	$\div 10.7$	3
	wooden nest	$0.132 \pm 0.004$	43.2	$\div 5.2$	2

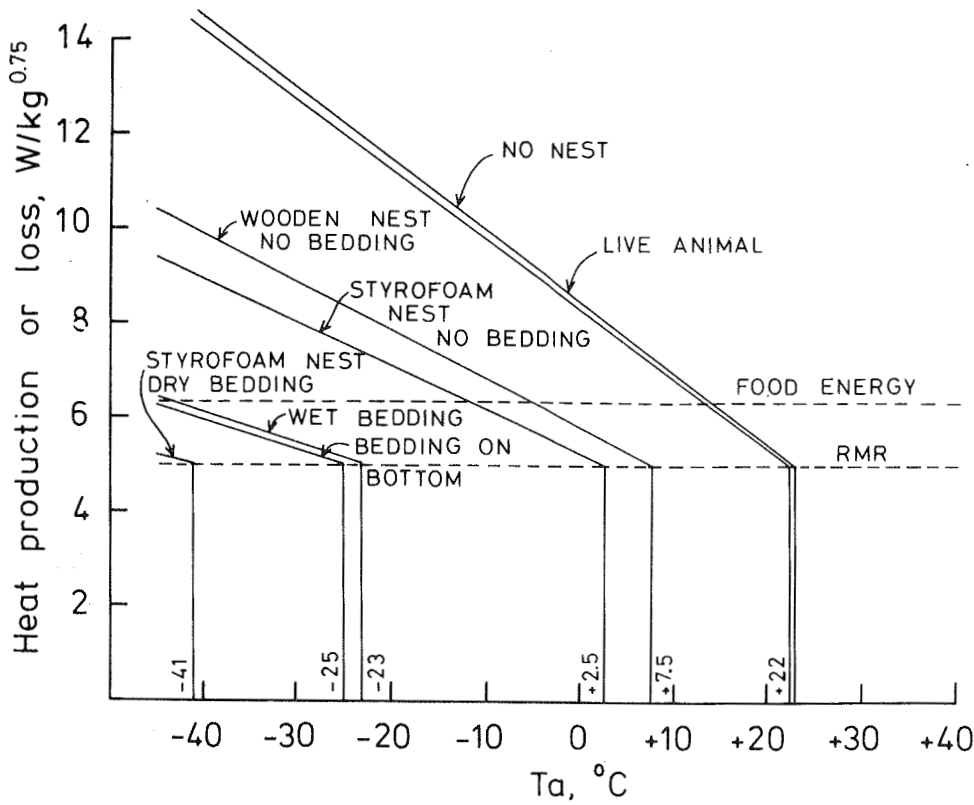


Fig. 2. Rate of heat loss of polecat with different nest types and constructions. Values are relative to heat production value measured for live animals.

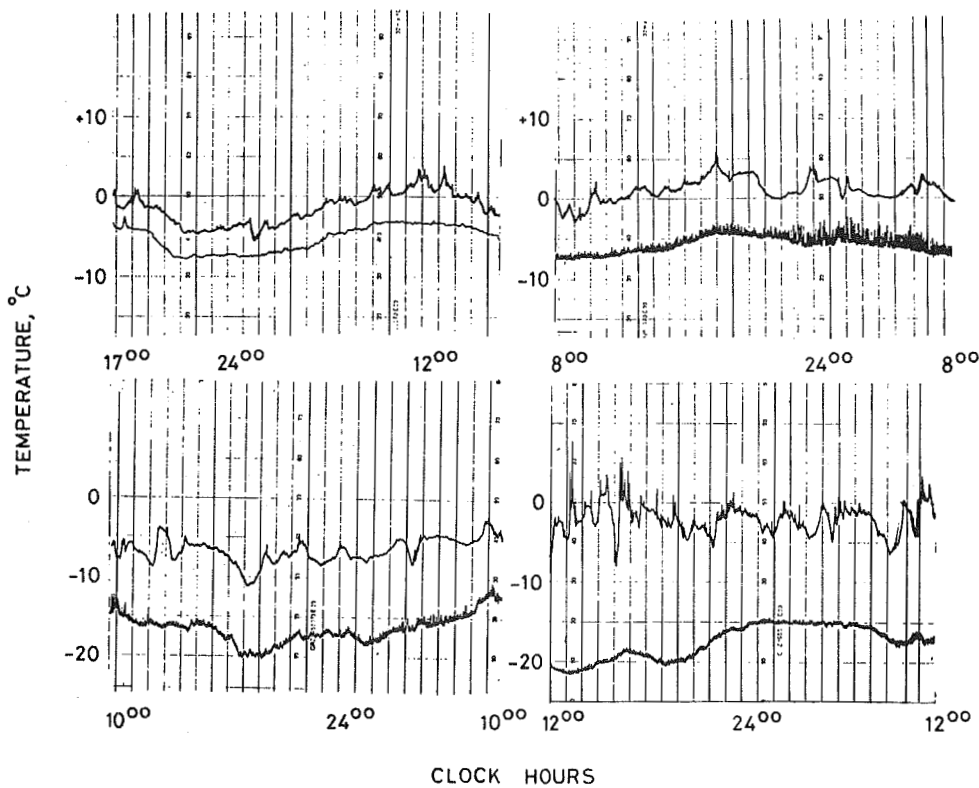


Fig. 3. Air temperatures inside (upper curve) and outside (lower curve) a styrofoam nest with different constructions. The nest was occupied by a polecat couple. Up left: 50 bedding on bottom. Up right: 100 g bedding on bottom. Down left and right: 200 g bedding, covered type.

**Results**

Heat transfer coefficients of deceased animals inside nests were clearly smaller than those of corresponding animals lacking the nests (Table 1). They were lowered over 30 and 25% for male and female polecats, respectively. Corresponding values were also determined for minks. Heat transfer coefficients in the

wooden nest tended to be slightly higher in comparison to those in styrofoam one. The nests clearly decreased  $T_{lc}$ 's of the animals and led to a substantial energy savings. The shift of  $T_{lc}$  of mustelid males to lower  $T_a$ 's varied from 15 to 20° C depending on the nest type. In mustelid females, the corresponding shift was about 10° C.

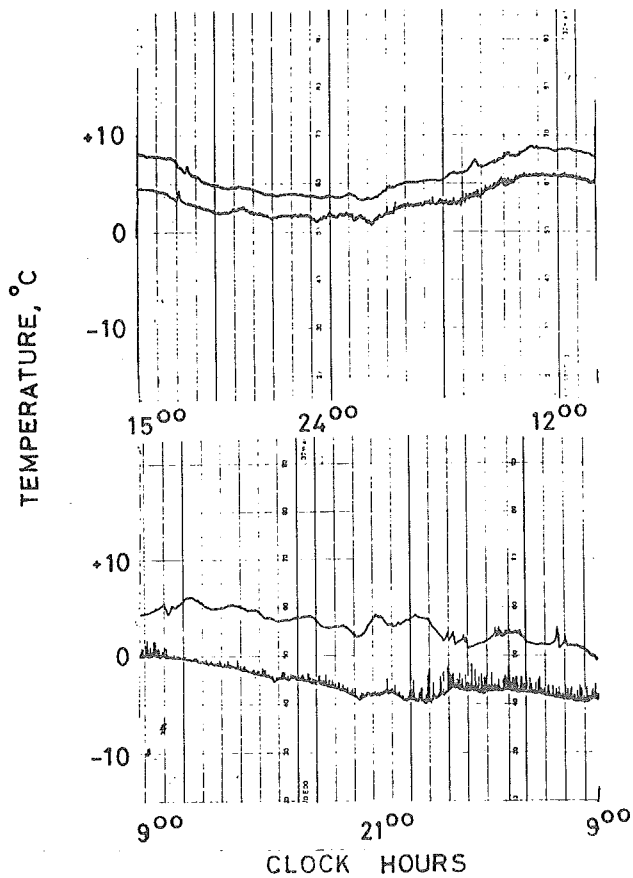


Fig. 4. Air temperatures inside and outside a wooden nest with different constructions. The nest was occupied by a polecat couple. Up: 50 g bedding on bottom. Down: 200 g bedding, covered type.

A comparison of heat loss of the polecat model with different nest constructions is illustrated in Fig. 2. Values for the model without nest are related to those measured for live animals (Korhonen et al. 1983). The nest reduced heat loss with a resulting shift of  $T_{lc}$ 's to lower  $T_a$ 's. Heat loss in a wooden nest tended to be higher than in a styrofoam one. Difference of  $T_{lc}$  values between these nest types 5° C without bedding. Use of bedding on nest bottom markedly reduced heat loss. Furthermore, a covered nest provided better thermal insulation in comparison to an open one;  $T_{lc}$  difference of these two nest forms was 16° C. Heat loss from a covered nest with wet bedding was of the same order of magnitude as that from the open one with dry bedding on the bottom only. Moreover, the cooling rate of the model was not influenced by the presence of styrofoam shell around the plastic center.

Nest and ambient air temperatures ( $T_a$ ) for polecat nests are presented in Figs. 3 and 4. An increase in the amount of bedding material led to an increase in temperature differences between nests and ambient air in both wooden and styrofoam nests. Highest temperature differences in the styrofoam nest were about 15° C whereas they were slightly less than 10° C in the wooden one. Nest temperatures tended to follow  $T_a$ 's especially when little bedding material was available.

RH of occupied polecat nests always reached 100% even though the bedding was dry initially. RH inside the styrofoam nest rose to 100% already in about three hours and stayed at this level after small fluctuations

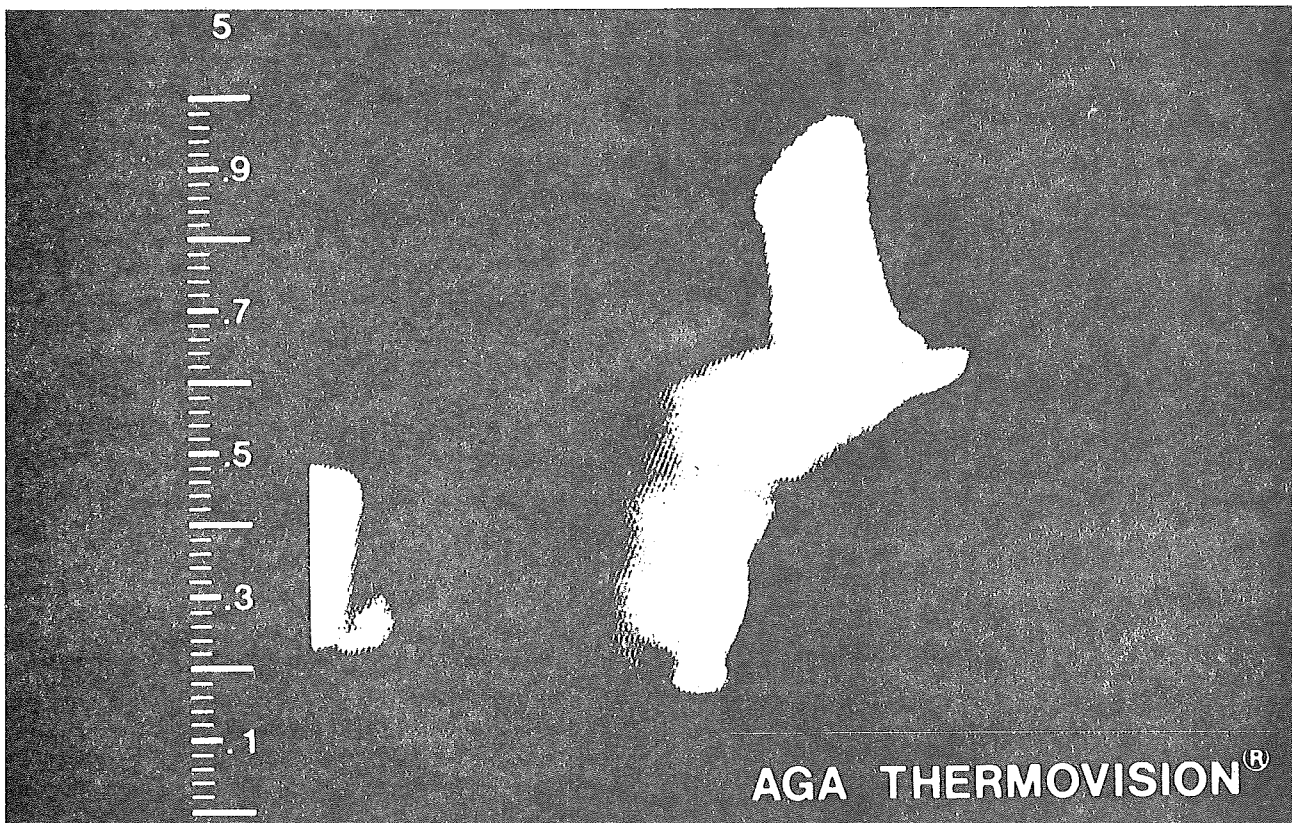


Fig. 5. A representative lateral thermograph of a male polecat exposed to a temperature of  $\pm 10^{\circ}\text{C}$ . The lighter shades of gray and white represent warm regions while the darker regions are cooler. The maximum temperature difference between dark and light regions is 5° C.

until the end of an experiment. Moisture content of 10 days old bedding varied from 11 to 13% in a wooden nest and from 17 to 20% in a styrofoam one.

Fig. 5 presents a representative infrared thermogram of a male polecat with winter fur. Thermal image of the body is light which indicates that heat loss in all regions of the body is rather high. This high rate of heat loss is further supported by the  $T_{bs}$  measurements; temperatures on dorsal back at  $T_a$ 's of +20, +5 and  $\div$ 18° C averaged  $37.7 \pm 0.6$ ,  $37.5 \pm 0.5$  and  $37.5 \pm 0.7$ ° C, respectively.

## Discussion

The  $T_{lc}$  is lowest temperature which an homeothermic animal is able to withstand without increasing its heat production. The  $T_{lc}$  can be shifted to lower values (1) by increasing heat production or (2) by increasing insulation. The former situation includes an increase in energy costs because extra heat cannot be produced without concomitant increase in energy expenditure. Furthermore, the  $T_{lc}$  at which a homeotherm may survive indefinitely is limited by the fact that the increase in metabolic heat production in response to cold stress cannot exceed a factor of about three (Cena and Clark 1979). A better insulation, however, can shift the  $T_{lc}$  to a lower value without the necessity of increasing energy cost. A minimization of energy expenditure is a strategy for survival in the nature, especially in winter when available energy is scarce (Casey et al 1979; Pauls 1981; Harri 1982). A minimization of energy expenditure is important also in animal production because an increase in energy expenditure leads to an increase in feeding costs.

In this study we have demonstrated the importance of the insulation of nests and nest bedding for reducing energy expenditure of farmed mustelids, the polecat and the mink. However, our findings should be inspected with certain reservations for the following reasons:

(1) The data are derived from measurements of the cooling rates of deceased animal bodies and from a cooling rates of a mustelid model. Thus, we could not assess the importance of behavioural thermoregulation and the effect of body movement, respiration etc.

(2) The measurements were performed in a climatic chamber in still air conditions. Therefore, the results do not include the effects of wind, rain and alterations in atmospheric humidity. Studies on these important factors are, however, in progress. However, the fact that the heat transfer attained a very similar value to that we have measured earlier for live animals (Korhonen et al. 1983), support the conclusion that the values presented here coincide, at least relatively, with the values for live animals.

(3) Our data do not allow us to quantify the importance of different heat loss routes for the thermal balance of the animals in each situation.

The nest shifted the  $T_{lc}$  of our mustelids to a significantly lower temperature range. In this respect the styro

foam nest was not substantially warmer than the wooden one. However, the bedding material seemed to offer a much more effective thermal protection than did the nest per se. As the  $T_{lc}$  values show, the nest without bedding is not warm enough to provide a sufficient insulation against cold in Finnish winter, where temperatures at and below  $\div$  20° C are not rare. Particularly in styrofoam nests, few farmers use nest bedding before the whelping time in spring. Our measurements showed, however, that in a styrofoam nest homeothermy is maintained only at the cost of extra energy expenditure.

Moisture content of bedding rose up to about 20% during a 10 day period. Furthermore, inside a styrofoam nest, RH tended to be about 100. Moisture in bedding impairs its insulative capacity by increasing heat conductance. This is apparent with the polecat model data; the  $T_{lc}$  of the model inside a styrofoam nest with dry bedding was over 15° C lower than that with wet bedding. On the other hand, we have no data on the effects of ventilation on the microclimate of nests. More information is needed concerning moisture conditions and ventilation of nests under field conditions.

Rate of heat loss for deceased mustelids inside the nests was markedly smaller than that for those without nests. Thus, nests apparently provide substantial energy savings for these animals. Our measurements, however, were performed with one animal at a time while a nest is often inhabited by a mated pair of animals. The animals could be expected to reduce their individual exposure to the environment by hudding effectively increasing body insulation (e.g. Christopherson and Young 1981; Vogt and Lynch 1982). Thus, it is apparent that our data underestimate actual energy savings of a couple.

Temperature difference between nest air and ambient air observed in present study are consistent with those reported by Sjögård and Moss (1982). According to them, those temperature differences at  $T_a$ 's of +2.2 and  $\div$ 12.1° C were about 10° C in styrofoam nests, and about 2 and 7° C, respectively, in wooden nests. However, Sjögård and Moss (1982) did not measure temperatures continuously for hours like we did but only occasionally.

The fact that temperature differences were higher in a styrofoam nest than in a wooden one is not necessarily the result of better insulative properties of styrofoam nests. It may be the result of the smaller volume of the styrofoam nest. Furthermore, our nest temperature data are more relative than absolute. If a thermocouple is inserted too deep inside the nest, the animals could touch it. Alternately, if it is not inserted deep enough, it actually measures the temperature of the nest wall rather than that of the air inside it. Furthermore, internal temperatures at different heights vary greatly depending on vertical height of the measuring point, amount of bedding, nest construction and position of animals. For instance, we found that internal wall

temperatures at a height of 18 cm can be slightly over zero while those on bottom exceeded +25° C at the same time.

Thermograph picture showed that heat loss from all parts of the polecat bodies is high which is a result of their high surface-to-volume-ratios and relatively short fur. Also  $T_{bs}$  measurements will illustrate that body surface temperatures of the polecat is high. This indicates that they have to maintain high metabolic rates to keep their body temperatures constant (C. F. Korhonen et al. 1983). Thus, it seems obvious that farmed mustelids, the polecat and the mink, cannot survive the Finnish winter without the thermal protection provided by the nest.

#### Acknowledgements

Financial support for this investigation was provided by the Finnish Research Council for Natural Sciences and by the Juankoski Commune. The authors wish to thank Mrs. Leila Venäläinen, Mr. Juha Asikainen, Mr. Toivo Korhonen and Mr. Risto Asikainen for their assistance in farming of the experimental animals. Special thanks are due to Professor Jay V. Hiner for revising the language of the manuscript.

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NOVEMBER 1984

## Scientifur

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GROWTH DYNAMICS OF TESTICLES AND ACCESSORY SEX GLANDS  
IN NUTRIA MALES DURING POSTNATAL DEVELOPMENT.

(Dynamika růstu varlat a přídatných pohlavních žláz nutrii  
v průběhu postnatálního vývoje).

Pavel Jelinek, CSc., katedra chovu skotu, koni a ovcí Vysoké školy  
zemědělské v Brně, Zemědělská 1, 662 65 Brno, CSSR.

This paper is concerned with description of the morphodynamical changes in testicles, prostate, seminal vesicles, and Cowper's glands in nutria males during the essential period of postnatal development (1 to 300 days of life). This period was divided into 10 time intervals. At individual intervals the items observed were the live weight of experimental animals, the weight and size of testicles and of accessory sex glands.

The results of study revealed the growth of accessory sex glands to proceed more slowly than that of gonads, the highest rate of growth being observed in seminal vesicles. Within the above period of postnatal development the relations between the weight of testicles and those of individual accessory sex glands were found to be very tight and at a level of high significance.

Acta Universitatis Agric., 31, 3, 193-202, 1983.

1 table, 2 figs., 22 references.

Author's summary.

In CZECH. Summaries in RUSS, ENGL, and GERM.

FUNCTIONAL STATE OF THE HYPOTHALAMO-PITUITARY NEUROSECRETORY  
SYSTEM IN THE SILVER FOX VULPES FULVUS AT THE BEGINNING  
AND END OF RUT.

M.N. YurisoVA, Inst. of Cytology and Genetics, Siberian Branch of the  
Academy of Sciences of the USSR, Novosibirsk, USSR.

A cytomorphological analysis of the hypothalamo-pituitary neurosecretory system (HPNS) in monoestrous domesticated male silver foxes in December, before the onset of rut, compared with the November period of dormancy,



revealed a reduction of the peptide neurosecretion in the entire HPNS, an increase in the frequency of pictures of neurovascular contacts in the medial eminence and in the posterior lobe of the pituitary, hypermia of the HPNS, and other signs of activation of the secretion of neurohormones into the blood stream. In March, at the end of rut for males, intensified synthesis of neurosecretion is accompanied by its active secretion and incipient deposition. The state of the neurosecretory, glial, and vascular elements reflects the end of the phase of activation of the HPNS. A coincidence of the rhythms of activity of the HPNS and of the sexual system was detected. The possibility of involvement of the neurosecretory nonapeptides in the mechanism of regulation of the functions of the reproductive system both by para- and by trans-adenohypophyseal pathways is discussed.

Translated from *Zhurnal Évolýutsionnoi Biokhímii i Fiziologii*, Vol. 19, No. 3, 256-261, 1983. (0022-0930/83/1903-0184\$07.50. 1984. Plenum Publ. Corporation).

1 table, 2 figs., 13 references.

Authors summary.

#### ACTIVITY OF ACID AND ALKALINE PHOSPHATASE IN TESTICLES AND ACCESSORY SEXUAL GLANDS OF NUTRIA DURING POSTNATAL DEVELOPMENT.

(Aktivita kysel  a alkalické fosfatazy varlat a pridaných pohlavních zlaz nutrii v průběhu postnatálního vyvoje).

P. Jelinek, M. Glásrová, G. Vlková, CSc, katedra chovu skotu, koní a ovcí Vysoké školy zemědělské v. Brne, Zemedelská 1, Brno, CSSR.

The objective of this paper was to study activity and location of both acid and alkaline phosphatases in the tissues of testicles, prostate, seminal vesicles, and Cowper's glands in nutria of the Standard breed during postnatal development (from 1st to 300 day of life).

Over the whole study period, which consisted of ten time intervals representing the division of experimental animals into following age groups: 1 day, 15, 30, 60, 90, 100-105, 115-130, 150, 180-210 and 240-300 days of life, the enzyme activity of alkaline phosphatase was higher in the tissues of testicles, whereas in accessory sexual glands a higher level

of acid phosphatase was registered.

Acta Universitatis Agric., Vol. 31, 3, 1983, 203-211.

2 figs., 3 tables, 21 references.

Authors' summary.

In CZEC. Summaries in RUSS, ENGL, and GERM.

#### STEROID METABOLISM IN THE CORPUS LUTEUM OF THE FERRET.

Peggy Jo Kintner, Rodney A. Mead\*, \* Dept. Biological Sciences, Univ. of Idaho, Moscow, ID 83843, USA.

Implantation in the ferret is believed to be induced by a luteal substance which acts in concert with progesterone ( $P_4$ ) and which is secreted sometimes between Days 6 and 8 of pregnancy. This experiment was designed to identify the steroid products synthesized by ferret corpora lutea (CL) on these 2 days of pregnancy.

CL were dissected from ferrets on Day 6 og 8 of pregnancy and incubated with ( $^3H$ ) pregnenolone ( $P_3$ )  $P_4$ , or ( $^3H$ ) dehydroepiandrosterone (DHEA). Controls with no tissue or with 50  $\mu$ l packed blood cells were incubated at the same time. After incubation of Day 6 CL with ( $^3H$ ) $P_3$  for 180 min, 39% of the added label was found incorporated into  $P_4$ , 3% into  $17\alpha$ -hydroxyprogesterone ( $17\alpha$ -OHP $_4$ ) and 1% into androstenedione (A). Incubation of Day 8 CL with the same precursor resulted in 35%, 1% and 0.65% of the label being incorporated into the previously mentioned products, respectively. Incubations of Days 6 and 8 ferret CL with ( $^3H$ ) $P_4$  or ( $^3H$ )DHEA confirmed these results, demonstrating activity of C21-steroid,  $17\alpha$ -hydroxylase and  $\Delta^5$ -isomerase,  $3\beta$ -hydroxysteroid dehydrogenase ( $3\beta$ -HSD).

These results suggest that ferret CL primarily accumulate steroids of the  $\Delta^4$  pathway on both Days 6 and 8 of pregnancy, with  $P_4$ ,  $17\alpha$ -OHP $_4$ , A and testosterone (T) being the most abundant products after in vitro incubation. Thus, ferret CL appear to metabolize steroids in a manner similar to that observed in rats, sows and mares.

Biology of Reproduction, 29, 1121-1127, 1983.

4 tables, 27 references.

Authors' summary.

### HEPATIC BIOTRANSFORMATION IN FARMED BLUE FOX AND RACCOON DOG.

M. Harri, O. Hänninen, Dept. of Applied Zoology and Physiology, University of Kuopio, P.O. Box 138, SF-70101 Kuopio 10, Finland.

In farmed raccoon dogs and blue foxes, the hepatic content of cytochrome P-450 and the activity of polysubstrate mono-oxygenase with bezo(a)pyrene and 7-etoxy coumarin as substrates, as well as activity of UDP glucuronosyl-transferase were of the same order of magnitude as those in the laboratory rat.

The amount of reduced glutathione tended to be higher in canids.

There existed differences in the biotransformation activities between raccoon dogs from different farms. These cannot, however, be systematically related to the quality of food, body composition and succinate dehydrogenase activity.

Comp. Biochem. Physiol., Vol. 76C, 81-84, 1982.

2 tables, 15 references.

Authors' abstract.

### ULTRASTRUCTURE OF MINK SUBMANDIBULAR GLAND.

B. Tandler, Dept. of Oral Biology, School of Dentistry, Case Western Reserve University, Cleveland, Ohio 44106, USA.

The submandibular gland of the North American mink, a strict carnivore, was studied by light and electron microscopy. The gland is mixed in nature, consisting of mucous tubules capped by mucous demilunes. Mucous droplets in the tubule cells are structureless, but those in the demilune cells contain a dense spherule. Intercalated ducts are extremely short. Striated duct cells contain numerous crystalloids, often rhomboidal, in their apical cytoplasm. These crystalloids are equally abundant in males and females. The presence of these structures lends credence to the supposition that in addition of their role in electrolyte transport, striated ducts may be actively engaged in secretion of organic products.

J. Submicrosc. Cytol., 15, 2, 519-530. 1983.

9 figs, 37 references.

Author's summary.

**INTERACTION BETWEEN HYPOPHYSEAL-ADRENAL AND GENITAL SYSTEM  
IN SILVER FOXES.**

N.M. Bazhan, P.M. Krass, L.V. Osadchuk, Lab. of Endocrinology, Inst. of Cytology and Genetics, Academy of Sciences of the USSR, Siberian Branch, Novosibirsk, USSR.

1. The decrease in the testosterone level as a result of castration of male silver foxes does not affect the activity of any component of the hypophyseal-adrenal system.

2. The decrease in the estrogen level as a result of a gonadectomy of female silver foxes is accompanied by differently directed changes in the activity of the components of the hypophyseal-adrenal system investigated: a tendency toward a decrease in the content of ACTH in the hypophysis, a sharp decrease in the level of glucocorticoids in the peripheral blood, and a considerable increase in the production of hydrocortisone in the adrenal cortex in vitro.

Translated from: Problemy Éndokrinologii, Vol. 24, No.3, 70-73, 1978.  
(Plenum Publ. Corporation, 0007-0549/80/1003-0219\$07.50)

1 table, 1 fig., 20 references.

Authors' conclusion.

**THE ACCELERATION IN THE MINK FUR MATURATION WITH THE AID OF  
THE PHOTOPERIODIC CONDITIONS.**

**УСКОРЕНИЕ СОЗРЕВАНИЯ МЕХА НОРОК  
ПРИ ПОМОЩИ ФОТОПЕРИОДИЧЕСКИХ УСЛОВИЙ**

D.K. Belyaev, D.V. Klochkov, L.A. Prasolova, Iu. D. Koveshnikov, L.G. Komarova, Iu. V. Ignatov, M.A. Geyshin, USSR.

Groups of Standard and Sapphire mink (about 100 pr. variety) were exposed to (1) continuous light from 20 June to 20 July, and 8-h light per day from 21 July to 10 Oct.; (2) as group 1, but without the continuous light period, and (3) the natural photoperiod (controls). Pelts of subgroups of 6-25 animals were examined at intervals from July to Dec. Mature pelts were obtained about 1 month earlier from groups 1 and 2 than from controls, for both varieties. No adverse effect on quality was found. Standard mink pelts were mature earlier than Sapphire pelts

and female pelts earlier than male pelts.

Vestnik Sel'skokhozyaistvennoi Nauki, Moscow, No. 1, 85-91, 1983.

4 tables, 3 figs., 10 references.

CAB-abstract.

In Russ. Summary in ENGL.



### INDUCTION OF WINTER FUR GROWTH IN MINK (MUSTELA VISON) WITH MELATONIN.

J. Rose, F. Stormshak, J. Oldfield, J. Adair, Oregon State University,  
Dept. of Animal Science, Corvallis 97331, USA.

Adult and kit standard dark male and female mink were treated with 0, 5 or 10 mg melatonin, or a reduced photoperiod of 6 h light: 18 h dark (6L:18D, initiated during the last week of June) to determine the effects of treatment on winter fur growth. Melatonin was administered in a Silastic implant inserted sc over the scapular region during the last week of June. Regardless of sex or age, mink treated with melatonin or a 6L:18D photoperiod molted the summer pelage and grew winter pelage earlier than controls ( $P < .001$ ). Winter pelage was fully prime by mid-October, 6 wk earlier than normal. Weight gain of mink, regardless of sex or age, was not affected by melatonin treatment. These findings indicate that photoperiodic effects on the growth of winter pelage in mink may be mediated through the pineal gland and its secretion of melatonin.

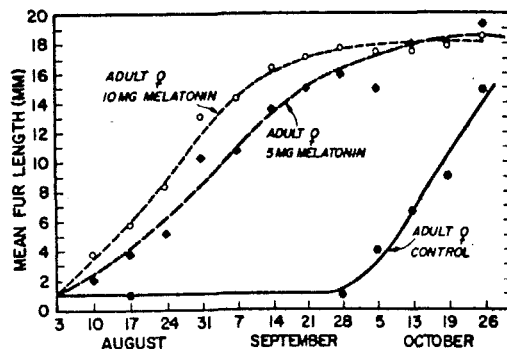


Figure 2. Fur growth of adult female mink treated with 0, 5 and 10 mg melatonin from June 29 to October 26, 1981. Measurement of fur was made at weekly intervals beginning on August 3. The common estimate of the standard error of the mean was  $\pm 2.08$  mm.

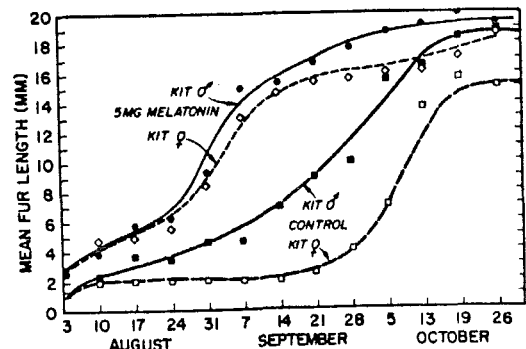


Figure 4. Fur growth of kit male and female standard dark mink treated with 0 and 5 mg melatonin from June 29 to October 26, 1981. Measurement of fur was made at weekly intervals beginning on August 3. The common estimate of the standard error of the mean was  $\pm 1.50$  mm.

Journ. of Animal Science, Vol. 58, No.1, 57-61, 1984.

1 table, 7 figs., 12 references.

Authors' summary.

THE GROWTH OF YOUNG ARCTIC FOXES AND DEVELOPMENT OF  
WINTER COAT IN ANIMALS BORN AT DIFFERENT PERIODS IN THE  
UKRAINE.

РОСТ МОЛОДНЯКА И СОЗРЕВАНИЕ ЗИМНЕГО  
ВОЛОСЯНОГО ПОКРОВА У ПЕСЦОВ РАЗНЫХ СРОКОВ  
РОЖДЕНИЯ В УСЛОВИЯХ УССР

V.V. Koshitskii, E.V. Terekhova, USSR.

For cubs born at the beginning, middle and end of May (7 litters in each group), and weaned at 30 days of age, body weight averaged 768, 765 and 685 g resp. at weaning, and 7075, 7170 and 6723 g for male and 6455, 6340 and 6288 g for female at cropping (176, 167 and 159 days of age). The differences in pelt quality were small.

Sbornik Nauchnykh Trudov. Moskovskaya Veterinarnaya Akademiya: NO. 119, 119-123, 1981.

4 tables.

CAB-abstract.

A FIELD TRIAL TO DETERMINE PELT SILKINESS.

(Feltundersøgelse for silkethed).

Hans Pedersen, Kr. Jensen, Svoldrupvej 130, Vognsild, DK 9600 Aars.  
Denmark.

Data on 182 female and 40 male mink and their progeny were analysed. Pelt silkiness, colour and overall quality scores were determined in Jan. In the adult mink, and in the following Nov. In the kits. For adult mink, scores were slightly higher for male than for female, whereas female kits had higher scores than male kits. The correlations of assessment of the live animal with subsequent assessment of the pelt were 0.10 for silkiness, 0.29 for pelt colour, and 0.13 for quality. There was no significant correlation between the scores of the sires and those of their offsprings.

Dansk Pelsdyravl, 45, 12, 653-655, 1982.

6 tables.

CAB-abstract.

In DANH.

## CLASSIFICATION OF MINK PELTS IN AUGUST.

(Inför augustigraderingen).

Gabrielle Lagerkvist, Jack Sevenius, Sveriges Lantbruksuniversitet, Uppsala, Sverige.

Pelts of approx. 500 standard mink were evaluated on the live animal in Aug. and Nov., and also after slaughter in Nov. Between the Aug. and Nov. evaluations on live mink, there were significant correlations of 0.23 for total score, 0.40 for pelt colour, 0.18 for purity of colour, 0.20 for pelt quality, 0.18 for pelt density and 0.15 for density of guard hairs. Appraisal on live mink in Aug. was significantly correlated ( $P < 0.001$ ) with pelt appraisal after slaughter in Nov. for total score (0.23), pelt colour (0.43), density of guard hairs (0.20) and pelt quality (0.25), the corresponding correlations between live appraisal in Nov. and appraisal after slaughter being 0.17, 0.59, 0.11 and 0.25. There were also correlations of 0.41 and 0.14 between live-animal and post-slaughter appraisal in Nov. for purity of pelt colour and pelt density, resp.

Våra Pälsdjur, 53, 7, 194-197, 1982.

1 table.

CAB-abstract.

In SWED.



## THE PROBLEM OF METALLIC SHEEN.

(Metallic-problemet).

Lars Elofson, Jack Sevenius, Inst. för husdjursförädling, Sveriges Lantbruksuniversitet, Uppsala, Sweden.

In Sweden, the percentage of pelts from male and female mink with the inherited Metallic sheen defect increased from 15.7 and 9.2 percent, resp. In 1977 to 29.8 and 15.2 percent in 1982. The effects of pelt size, pelt colour, fineness and shape of guard hairs, and sex on the incidence of Metallic sheen are reviewed. The bibliography is not printed in the journal.

Våra Pälsdjur, 53, 10, 249-251, 1982.

1 table.

CAB-abstract.

In SWED.

## RETRO-ORBITAL TECHNIQUE FOR BLOOD COLLECTION FROM THE FERRET (*MUSTELA PUTORIUS FURO*).

James G. Fox, Kristine Hewes, Steven M. Niemi, Div. of Comparative Med.,  
Massachusetts Inst. of Technology, Cambridge, MA 02139, USA.

Blood samples were obtained from anesthetized ferrets of various ages, by venipuncture of the retro-orbital plexus with a heparinized capillary pipette. It is recommended that a cumulative collection of 20% of total blood volume not be exceeded for any two week period. This technique, when carefully performed on alternate orbits and at a frequency dictated by body weight and volume of blood needed, has been used repeatedly for months without apparent harm or distress to the animal.

Laboratory Animal Science, Vol. 34, 2, 198-199, 1984.

1 fig., 5 references.

Authors' summary.

## CAGE EXPERIMENTS WITH BLUE FOXES.

(Burförsök med blåräv).

Stig Moss, Pb. 92, Farmarevägen 2, 65101 Vasa, Finland.

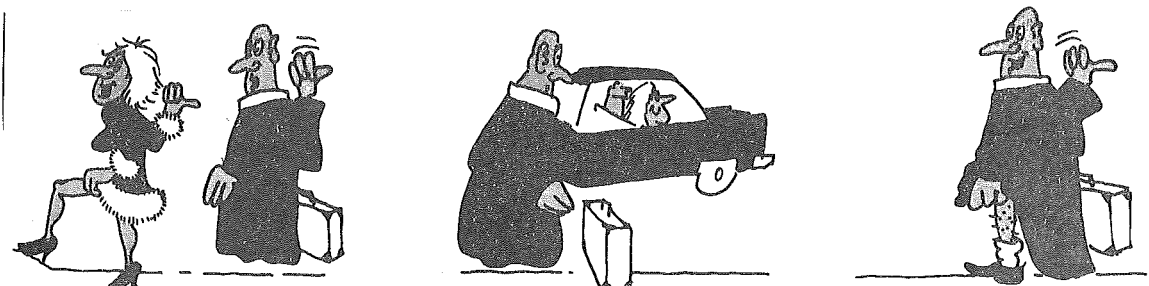
For 60 blue fox cubs, housed from 15. Sept. to pelting in groups of 4 in cages measuring 105 x 115 cm, and 60 animals housed in single cages measuring 105 x 55 cm, pelt length averaged 97.5 and 97.6 cm, respectively, fur density score (on a 10-point scale) 6.78 and 8.28, percentage of top-class pelts produced 13.3 and 49.1, and percentage of low-quality pelts 46.7 and 0.

Finsk Pälstidskrift, 17, 9, 479, 1983.

1 fig.

CAB-abstract.

In SWED.





## FLOORING FOR CHINCHILLAS.

(Auf welchen Gehegeböden hält man die Chinchillas).

Edmund Haferbeck, Universität Göttingen, Germany.

For an unspecified number of chinchilla female, housed on a wire floor with or without deep litter underneath, or on softwood or hardwood shavings, litter size at birth averaged 2.12, 3.00, 2.55 and 2.25 young resp., with 1.48, 2.63, 2.23 and 1.85 kits surviving.

Deutsche Pelztierzüchter, 57, 12, 201-203, 1983.

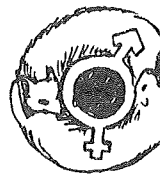
2 tables.

CAB-abstract.

In GERM.

# QUALITY





## GENETICS AND EVOLUTION OF THE MINK Lpm SYSTEM.

### 1. IDENTIFICATION AND GENETIC ANALYSIS OF THE Lpm6 ALLOTYPE.

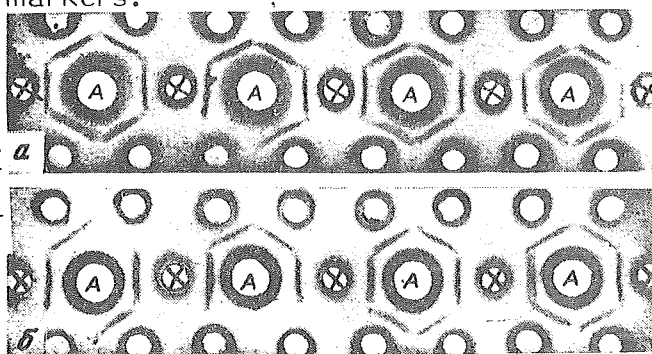
#### ГЕНЕТИКА И ЭВОЛЮЦИЯ Lpm-СИСТЕМЫ АМЕРИКАНСКОЙ НОРКИ

O.K. Baranov, D.K. Belyaev, M.A. Savina, V.I. Yermolaev, Inst. of Cytology and Genetics, Academy of Sciences of the USSR, Siberian Div. Novosibirsk, USSR.

A new allotype Lpm6 of the Lpm system of the domestic mink was identified. This antigenic marker is the most widespread (as compared to other Lpm allotypes) in mink populations, its frequency of occurrence amounting to 0.98. It was found that the gene controlling the Lpm6 is comprised in six out of eight previously reported haploid combinations of linked genes called haplotypes: Lpm<sup>6•8</sup>, Lpm<sup>4•6•8</sup>, Lpm<sup>4•6•7</sup>, Lpm<sup>1•6•8</sup>, Lpm<sup>3•4•6•8</sup>, Lpm<sup>1•2•6•7</sup>, Lpm<sup>4</sup> and Lpm<sup>2•4•5•7</sup>.

Since the number of the haplotypes remained unchanged, notwithstanding identification of Lpm6, the theoretically predicted and actually found (by means of hybridologic analysis) number of Lpm genotypes did not increase also, and remained equal to 36. Thus, the peculiarity of contribution of the Lpm<sup>6</sup> gene into polymorphism of the Lpm system is reflected by the fact that its identification did not help to reveal any additional (to already known) quantitative diversity, as it happened with previously reported genes (Lpm<sup>1</sup>, Lpm<sup>2</sup>, Lpm<sup>3</sup>, Lpm<sup>4</sup>, Lpm<sup>5</sup>, Lpm<sup>7</sup> and Lpm<sup>8</sup>). The possibility of differentiation between phenogroups 2, 4, 5, 7 and 1, 4, 5, 6, 7 by means of antiserum to Lpm6 permitted to reveal in mink population 22 phenotypes, instead of 21, which were found according to previously established allotypic markers.

Рис. 2. Тестирование аллотипов Lpm6 и Lpm8 в сыворотках норок с помощью моноспецифических аллоантисывороток. В лунках А — соответствующие аллоантисыворотки (а — анти-6, б — анти-8); в обозначенных крестами лунках — контрольные сыворотки норок, в остальных лунках — тестируемые норочьи сыворотки



Authors' summary.

Genetika. 20, 1, 114-127, 1984.

5 figs., 3 tables, 39 references.

In RUSS. Summary in ENGL.

GENETICS AND EVOLUTION OF THE MINK Lpm SYSTEM:  
 II. THE INSTANTANEOUS EMERGENCE OF Lpm ALLOTYPIC  
 POLYMORPHISM IN THE DOMESTIC MINK AS A POSSIBLE RESULT OF  
 PHYLOGENETIC ACTIVATION OF "SILENT" GENES.

**ГЕНЕТИКА И ЭВОЛЮЦИЯ Lpm-СИСТЕМЫ  
 АМЕРИКАНСКОЙ НОРКИ**

**СООБЩЕНИЕ II. ВЗРЫВООБРАЗНОЕ ВОЗНИКНОВЕНИЕ  
 Lpm-АЛЛОТИПИЧЕСКОГО ПОЛИМОРФИЗМА У АМЕРИКАНСКОЙ НОРКИ  
 КАК ВОЗМОЖНЫЙ РЕЗУЛЬТАТ АКТИВАЦИИ  
 В ФИЛОГЕНЕЗЕ «ДРЕМЛЮЩИХ» ГЕНОВ**

D.K. Belyaev, O.K. Baranov, V.I. Yermolaev, M.A. Savina, Inst. of Cyto-  
 logy and Genetics, Academy of Sciences of the USSR, Siberian Div.,  
 Novosibirsk, USSR.

Intraspecific polymorphism of serum proteins of the domestic mink is most pronounced (for immunogenicity and diversity of alloantigens) in the Lpm system of very high density lipoprotein. Eight allotypes of this lipoprotein are inherited by allogroups (for instance, Lpm1, 2, 6, 7) genetically determined by clusters of linked genes - haplotypes. Individual combinations of pairs of Lpm haplotypes result in wide phenotypic and genotypic diversity in mink populations.

Analysis of 646 individual serum samples from 10, most closely related to domestic mink species and interspecific hybrids of Mustelidae revealed: (i) the absence of immunochemical specificity of Lpm1, Lpm2, Lpm3, Lpm4, Lpm5, Lpm7 and Lpm8 allotypes of the domestic mink in alle the Mustelidae individuals; (ii) the presence of antigenic specificity of the Lpm6 allotype in all Mustelidae individuals without exception; (iii) the presence of a structurally similar homologue of the Lpm lipoprotein in the sera of the same Mustelidae individuals.

The data obtained are indicative of a rather limited phylogenetic age of allotypic Lpm polymorphism, the emergence of which is characteristic of species-specific evolution of the domestic mink. Phylogenetically old antigenic specificity of Lpm6 seems to be a marker of an ancestral gene which is probably manifested in a monomorphic form in all Mustelidae species, except for the domestic mink.

Hypothetic evolution-genetic mechanisms of instantaneous emergence of Lpm polymorphism are discussed. The most preference is given to the hypothesis of activation of a "silent" genetic information for the allo-

typic variants of the Lpm lipoprotein in phylogenesis of the domestic mink.

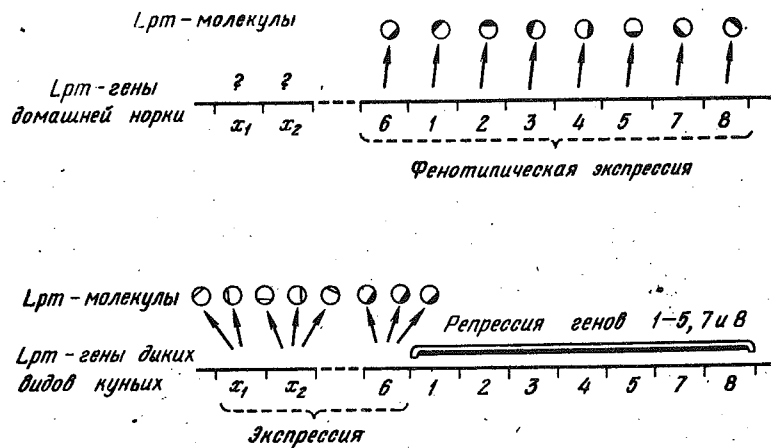


Рис. 4. Схема возникновения аллотипического полиморфизма Lpm у американской норки путем дерепрессии генов в филогенезе. Для упрощения все известные гены Lpm показаны в сцепленном состоянии

Genetika, USSR, 20, 1, 128-139, 1984.

2 tables, 4 figs., 50 references.

Authors' summary.

In RUSS. Summary in ENGL.

#### KARYOLOGICAL EXAMINATION OF EARLY MINK EMBRYOS.

#### КАРИОЛОГИЧЕСКИЙ АНАЛИЗ РАННИХ ЗАРОДЫШЕЙ НОРОК

G.K. Isakova, Inst. of Cytology and Genetics, Academy of Sciences of the USSR, Siberian Division, Novosibirsk, USSR.

6.5 to 7.5 days old mink embryos were examined morphologically, cytologically and karyologically. About 30% of all eggs were unfertilized or dead. Only 35% of embryos cultivated with colchicine for 2 hours had three or more metaphase plates, i.e. were karyologically informative. Karyological examination of 23 Standard dark and 35 Sapphire embryos revealed 6 heteroploids: pure triploid (1 embryo), 2n/3n mixoploids (3 embryos), and chimerae for sex chromosomes 2n,XX/1n,XY (2 embryos). One heteroploid (2n/3n) was found in Standard minks and other 5 were Sapphire. Unusually high frequency of chimerism was noted in mink, in comparison with other mammalian species.

Genetika, USSR, 19, 19, 1742-1744, 1983.

1 table, 5 references.

Author's summary.

In RUSS. Summary in ENGL.

**CHROMOSOME LOCALIZATION OF THE GENES OF ENO1, HK1, ADK,  
ACP2, MP1, ITPA, ACON1 and  $\alpha$ -GAL IN THE AMERICAN MINK  
(MUSTELA VISON).**

A.A. Gradov, N.B. Rubtsov, A.G. Shilov, M.N. Bochkarev, O.L. Serov, Inst. of Cytology and Genetics, Siberian Branch of the Academy of Sciences of the USSR, Novosibirsk 90, USSR.

Twenty-eight American mink x Chinese hamster somatic cell hybrids were analysed for the expression of mink enzymes and the segregation of mink chromosomes. The results demonstrated that the gene for enolase-1 is located on the long arm of mink chromosome 2, and those of hexokinase-1 and adenosine kinase, on its short arm. Segregation analysis of mink chromosomes and mink acid phosphatase-2, mannose phosphate isomerase, inosine triphosphatase and aconitase-1 provided data allowing us to assign the genes for these markers to mink chromosomes 7, 10, 11 and 12, respectively. The expression of mink  $\alpha$ -galactosidase was highly coincidental with mink X chromosome as well as with its markers: hypoxanthine-phosphoribosyltransferase, glucose-6-phosphate dehydrogenase and phosphoglycerate kinase-1. This result confirm the assignment of the gene for  $\alpha$ -galactosidase to the mink X chromosome.

Theor. Appl. Gent. 67, 59-65, 1983.

8 figs., 1 tables, 27 references.

Authors' summary.

**NOVELTIES IN FOX PRODUCTION.**

**(Nyheder i ræveproduktionen).**

O. Lohi, Dansk Pelsdyravlerforening, 60 Langagervej, DK 2600 Glostrup, Denmark.

An illustrated description is given of the Platinum, Gold Platinum, Gold, Golden Cross, Blue Silver, Shadow Silver and Golden Island mutations in Silver and Blue Foxes.

Dansk Pelsdyravl, 46, 2, 60-61, 1983.

10 colour pictures.

CAB-abstract.

In DANH.

## ARCTIC PEARL - A NEW NORWEGIAN BLUE FOX COLOUR MUTATION.

(Arctic Pearl - En ny norsk fargemutant hos blårev).

Norodd Nes, Jan A. Fougner, Norges Veterinærhøgskole, Ullevålsveien 72,  
Oslo 4, Norge.

The Arctic Pearl (ee) Blue fox mutation, which first appeared in 1978 at a farm in Norway, is described. Mating experiments, involving Arctic Pearl x Arctic Pearl, Arctic Pearl carrier (Ee) x Arctic Pearl, and carrier x carrier matings, revealed a simple recessive mode of inheritance.

Norsk Pelsdyrblad, 55, 8, 329-332, 1981.

4 photos, 2 tables.

CAB-abstract.

In NORG.

## THE GOLDEN ISLAND FOX.

(Golden Island Fox).

Outi Lohi, Dansk Pelsdyravlerforening, 60 Langagervej, DK 2600 Glostrup.

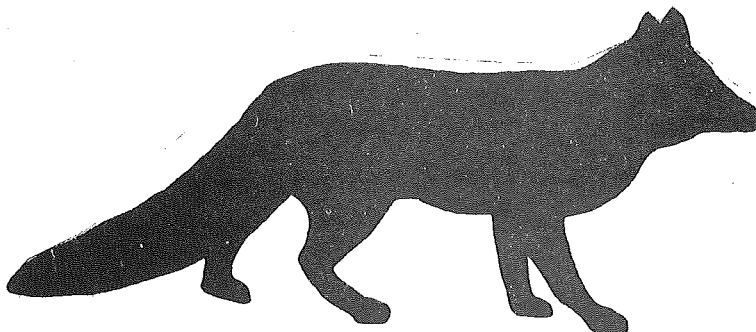
A description is given of the Golden Island fox mutation, which appeared in 1980 at a farm in Finland in the progeny of a white Arctic Fox (*Alopex Lagopus*) female mated with a Silver fox (*Vulpes vulpes*) male. Further matings at the same farm have produced 100 percent Golden Island offspring. Golden Island foxes resemble Arctic Foxes at birth, with a white belly and neck and a grey underfur. But in winter the guard hairs turn a golden red colour.

Dansk Pelsdyravl, 45,3,147-148 1982.

3 figs.

CAB-abstract.

In DANH.



## GENETICALLY INTERESTING RESULTS OF FOX MATINGS.

(Genetiskt intressanta rävparningsresultat).

Väinö Hernesniemi, Tapio Iso-Mustajärvi, Jaakko Lumme, Jouko Meriläinen,  
Seppo Pasanen, University of Joensuu, Finland.

Seven matings of (Red x Silver) X Platinum foxes in 1982 resulted in 6 litters totalling 33 cubs, of which 6 were Silver, 21 Red x Silver, 4 Platinum and 2 Gold Platinum. 18 matings of (Red x Silver) x Silver foxes resulted in 13 litters totalling 56 cubs, of which 36 were Silver and 20 Red x Silver. One Gold Platinum x (Red x Silver) mating resulted in 6 cubs, of which 1 was Silver, 3 Red x Silver, 1 Platinum and 1 Gold Platinum. 69 Platinum x Silver matings produced 57 litters with a total of 264 cubs, 145 of which were Silver and 119 Platinum. 39 Gold Platinum x Silver matings produced 27 litters totalling 124 cubs, of which 28 were Silver, 40 Red x Silver, 17 Platinum and 29 Gold Platinum. 133 Silver x Silver matings produced 104 litters with 457 Silver cubs. The results of crossbreeding are compared with those obtained in 1981.

Finsk Pälstidskrift, 15, 12, 549-551, 1982.

1 table, 3 figs.

CAB-abstract.

In SWED.



## RED AND SILVER FOX MUTATIONS.

(Mutationer af rød- og sølvræve).

H. Konnerup-Madsen, Agerledet, DK 9300 Sæby, Denmark.

An illustrated account is given of the matings required for producing the Alaska Silver, Albino Silver, Burgundy, Pearl and Radium recessive Silver fox mutations, the Whiteface, Platinum, Georgian White, Arctic Marble and Arctic Marble White dominant Silver fox mutations, the Pearl Platinum and Glacier Blue Silver fox mutations, and the Gold Platinum, Sun Glow White dominant Red fox mutations.

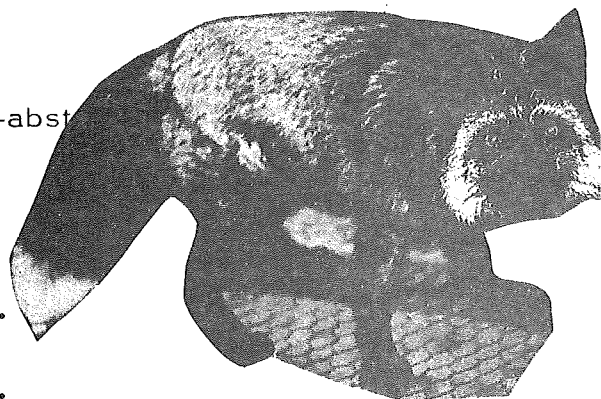
Data are tabulated for the gene symbols of the various mutations.

Dansk Pelsdyravl, 45, 11, 592-595, 1982.

1 table, 7 colour photos.

In DANH.

CAB-abst



### CROSSBREEDING OF FOXES.

(Korsningsavel med räv).

Lars Elofson, Claes Hoff, Avd. päls- och smådjursavel, Sveriges Lantbruksuniversitet, Uppsala, Sweden.

An account is given of the Shadow, Jotun, Haugen Platinum, Lapponia, Bothnia Pearl, Tundra and Sapphire blue fox mutations, and the Platinum, Gold Platinum, Arctic Marble and Sun Glow red fox mutations. Details are also given of crossbreeding between blue and silver foxes, resulting in the Golden Island Fox and Northern Light colour types, and of crossbreeding between Platinum and red foxes.

Våra Pälsdjur, 55, 1, 7-15, 1984.

5 figs., 2 tables.

In SWED.

CAB-abstract.

### A WHITE RACCOON DOG MUTATION.

(Vit mutation av mårhund).

Jaakko Mäkelä, Ulla Katajamäki, Finlands Pälsdjursuppfödarens Förbund, PB 5. 01601 Vanda 60, Finland.

An illustrated account is given of the mutation, which appeared in Finland. The white colour appears to be dominant, and matings between white and Standard raccoon dogs produced 50% white offspring. It is suggested that the white colour may be linked with a lethal factor similar to the shadow gene found in foxes.

Finsk Pälstidskrift, 17, 19, 508. 1983.

1 photo.

In SWED.

CAB-abstract.



**SELECTION OF BREEDING ANIMALS. BREEDING FOR IMPROVED FERTILITY.**

(Inför Avelsurvalet. Avel för bättre fruktsamhet).

Lars Elofson, Sveriges Lantbruksuniversitet, Uppsala, Sverige.

A review dealing with factors affecting the fertility of male and female mink and kit mortality, and the effects of litter size on growth and body size. Economic aspects are considered. The bibliography is not printed in the journal.

Våra Pälsdjur, 51, 10, 246-256, 1981.

4 tables, 5 figs.,

CAB-abstract.

In SWED.

**BREEDING WORK AT MINK-PRODUCING FARMS IN SWEDEN.**

(Avelsarbetet på svenska minkfarmer).

Karin Ericson, Sveriges Lantbruksuniversitet, Inst. for Husdjursförädling och Sjukdomsgenetik, Uppsala, Sweden.

In an attempt to map the breeding work at the minkproducing farms in Sweden, an inquiry was sent to 160 farmers from whom 99 replies were received. The result is fairly good considering the extent of the inquiry. Questions were asked about mating systems, selection criteria, registrations of the animals, skin prices, average litter size etc. The farms in the investigation were larger than the Swedish average farm. Scanblack was most commonly represented followed by pastel and Scanbrown. The sales prices were 5-10% lower compared to the country as a whole (in 1980-81). The average litter size was 4.1, which probably is 5-10% better than for the whole country, but it varied from 3.0 to 5.3 kits per mated female at 2-3 weeks of age.

The mating system 1+8 dominated over 1+8+1 and 1+1, although there were regional differences. One farm used 1+1-mating exclusively and managed to get 3.8 kits per mated female. The mating started in early March

in the south and a week later in the northern parts. As to different mutations, the lighter ones began their mating season 1/2 - 1 week later than Scanblack.

97 farms did in some way control the male fertility. The most common way was to examine the testis just before mating season. Other means were to control the number of barren females, the average litter size after one male or if the male was totally sterile.

Most of the farmers considered the number of kits while selecting their breeding stock, both when they decide whether to keep a producing female or not and at the selection among the kits.

At 15 farms the animals were graded in August. Peltquality, size, defects and colour were graded. The main selection takes part in November when the winter coat is ready. The most common gradingsystem was the overall impression.

3/4 of the farmers believed their animals are contaminated by plasmacytosis. Only two farms were free after elimination of the virus. Some of the fertility data were used in different analyses. There was no significant difference in the average litter size between mating systems.

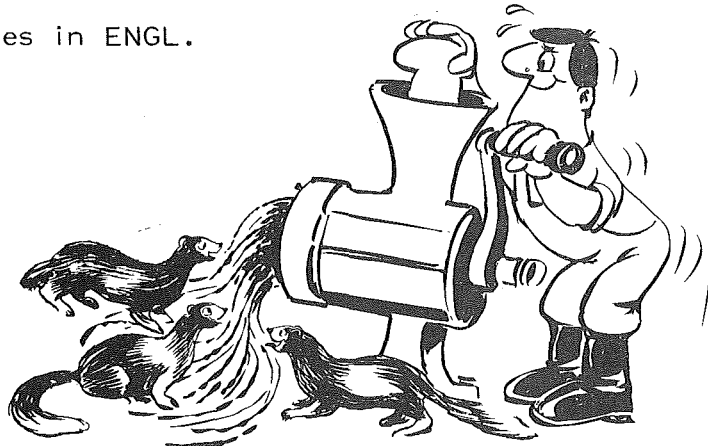
The effect of controlling male fertility showed to be great. The average litter size raised with the number of control means (which are mentioned above). Farms with no control at all had 2.9 kits per mated female and those who did all of the controls had 4.3 kits per mated female. No combinations of control means showed to be more efficient to any other. Due to a few number of observations it has been difficult and even impossible to make more complete analyses of the material.

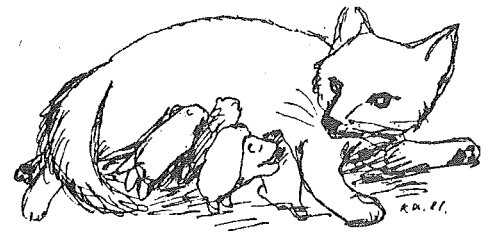
Uppsala (Sweden), 51 p, No. 111 (Eksamensarbete-Sverige Lantbruksuniv.) 1983.

42 pp, 34 tables, 4 references.

In SWED. Summaries in ENGL.

Author's summary.





## REPRODUCTION

### RELATIONSHIP BETWEEN SERUM TESTOSTERONE CONCENTRATIONS AND FERTILITY IN MALE MINK (*MUSTELA VISON*).

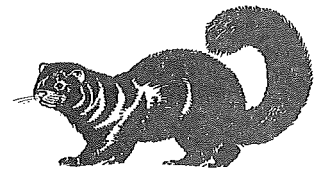
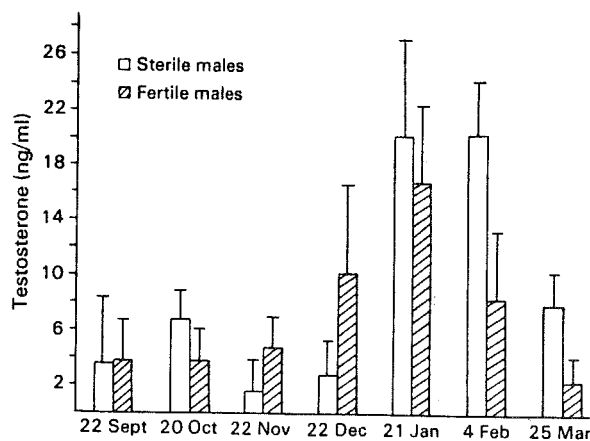
C. Sundqvist, A. Lukola, Maija Valtonen, Dept. of Biochemistry and Pharmacy, Åbo Akademi, Turku, Finland.

During 7 successive months in 1982 and 1983 blood and semen samples were taken from male mink. The patterns of testosterone development in sterile and fertile males were readily distinguishable from each other. Testosterone concentrations showed a clear correlation ( $r = 0.73$ ) with sperm quality of mink males. High testosterone levels (16.0–24.5 ng/ml) in early February were associated with defective sperm quality in March and low testosterone levels (2.0–13.3 ng/ml) with good sperm quality.

J. Reprod. Fert. 70, 409–412, 1984.

1 fig., 11 references.

Authors' summary.



**Text-fig. 1.** Serum testosterone concentrations (mean  $\pm$  s.d.) in blood samples taken from sterile and fertile male mink at different times. Five males in each group were used. In February, however, 6 sterile and 14 fertile males were analysed.



USE OF PROSTAGLANDINS FOR TREATMENT OF PROLONGED  
GESTATION IN BLUE FOX (ALOPEX LAGOPUS).

(Feltforsøk med cloprostenol (Estrumat<sup>R</sup>) til fødselsinduksjon  
hos blårev med forlenget drektighet).

Ordin Møller, Leif Homme, Adrian Smith, Norges Veterinærhøgskole, Postboks  
8146, Dep., Oslo 1, Norway.

An injection of 75 µg cloprostenol was given to 66 blue fox vixens; on or after day 53 of pregnancy. 52 (79%) of the vixens whelped within 24 hours, 13 (20%) within 24-48 hours, and one vixen whelped approximately 96 hours after treatment. It is concluded that cloprostenol may be used for induction of parturition in the blue fox and that prostaglandin preparations are suitable for the treatment of prolonged gestation in this species.

Nordisk Veterinærtidsskrift, 96, 1, 1984.

2 tables, 1 fig., 4 references.

In NORG. Summary in ENGL.

Authors' summary.



PRECOCIOUS INDUCTION OF LUTEAL ACTIVATION AND TERMINATION  
OF DELAYED IMPLANTATION IN MINK WITH THE DOPAMINE  
ANTAGONIST PIMOZIDE.

Bruce D. Murphy, Dept. of Biology, Univ. of Saskatchewan, Saskatoon,  
Saskatchewan, Canada S7N 0W0.

The effects of the dopamine antagonist pimozide on the preimplantation delay phase of mink gestation were investigated in field and laboratory trials. Three doses of 0.1 mg pimozide in acetic acid administered on the 7th, 9th and 11th days after mating abbreviated gestation in Pastel kit female mink to a mean (+/- SEM) of 45.5 +/- 0.5 days, 19 days less than that observed in mink treated with vehicle only (55.6 +/- 0.6 days). In laboratory trials, four doses of 0.1 mg pimozide on the 7th, 9th, 11th and 13th day after mating resulted in embryo implantation at a mean of 25 +/- 4.3 days after mating while vehicle-treated control ani-

mals had mean preimplantation delay of  $37 \pm 3.1$  days. Luteal activation in the pimozide-treated group, as indicated by a rapid increase in circulating progesterone, began within 2 days after the first pimozide injection. No increase was observed in vehicle-treated mink until 6 or more days after the initiation of injections or 13 days after mating. It was concluded that pimozide, presumably by permitting endogenous secretion of prolactin, can induce precocious luteal activation and embryo implantation in the mink.

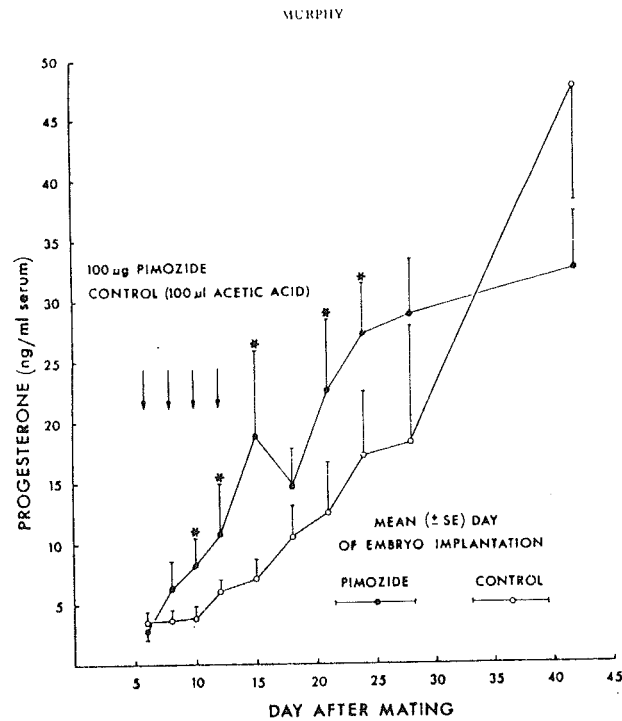
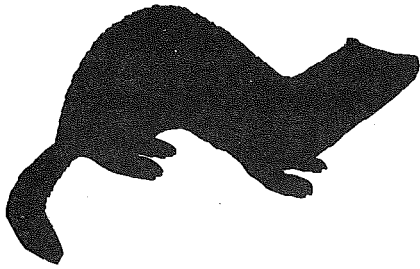


FIG. 1. Mean ( $\pm$  SEM) progesterone levels in Pearl variety female mink treated with four injections of 0.1 mg pimozide (●-●) or 0.1 ml acetic acid vehicle (○-○). Mean ( $\pm$  SEM) day of embryo implantation represented by (●) for pimozide treated and (○) for control mink. \*Significantly greater than vehicle-treated control the same day ( $P < 0.05$ ) by Duncan's new multiple range test.

Biology of Reproduction, 29, 658-662, 1983.

1 table, 1 fig., 15 references.

Author's summary.

#### EFFECTS OF SINGLE OR MULTIPLE INJECTIONS OF MEDOXY-PROGESTERONE ACETATE ON THE REPRODUCTIVE PERFORMANCE AND GESTATION LENGTH OF RANCH MINK.

Bruce D. Murphy, Dept. of Biology, Univ. of Saskatchewan, Saskatoon, Sask. S7N 0W0, Canada.

Single or multiple injections of 2 mg medroxyprogesterone acetate (MPA) given to pastel female mink during embryonic diapause had no effect

During pro-oestrus, baseline LH concentrations for 9 vixens (pooled data) ranged from 0.8 to 5.3 ng/ml. In each vixen, baseline levels were interrupted by elevations of LH ranging from 3.1 to 10.4 ng/ml. A major preovulatory LH surge was detected in all the vixens. The LH peak ranged from 13.5 to 27.8 ng/ml with an average of 27.8 +/- 18.8 (s.d.) ng/ml. Plasma LH concentrations declined to a basal level of 1.3 +/- 1.0 ng/ml within 48 h of the peak value. The duration of the LH surge was 1-3 days. The LH peak occurred 1 or 2 days before any sexual receptivity was observed. All the vixens were mated twice 2-5 days after the LH peak; 8 conceived. Plasma concentrations of oestradiol-17 $\beta$  increased gradually during the last 6-7 days before oestrus and reached maximum values (124-373 pg/ml) at the time of the preovulatory LH peak. The first significant increase in plasma progesterone concentration occurred simultaneously with the LH peak. During oestrus (normally 3-5 days), progesterone levels rose steeply, attaining a mean concentration of 57.0 +/- 17.5 ng/ml when the vixens went out of heat. Androstenedione and testosterone values changed similarly, both increasing at the beginning of pro-oestrus and reaching maximum values (805-1879 pg/ml and 328-501 pg/ml, respectively) 1 day before to 1 day after the oestradiol-17 $\beta$  peak.

O.M. Møller, M. Mondain-Monval, A. Smith, E. Metzger, R. Scholler, Dept. of Animal Husbandry and Genetics, Norwegian Coll. of Vet. Med., Postbox 8146 Dep., Oslo, Norway.

TEMPORAL RELATIONSHIPS BETWEEN HORMONAL CONCENTRATIONS AND THE ELECTRICAL RESISTANCE OF THE VAGINAL TRACT OF BLUE FOXES (ALOPEX LAGOPUS) AT PRO-OESTRUS AND OESTRUS.

Can. J. Amin. Sci., 63, 989-991, 1983.  
 1 table, 12 references.  
 Author's abstract.  
 In ENGL. Summary in FREN.  
 Further, frequency of handling may prolong gestation.  
 not shorten the duration of embryonic diapause as has been suggested.  
 11 days over that of controls. These results indicate that MPA does  
 on fertility or litter size. Multiple injections prolonged gestation by

The electrical resistance of the vaginal tract increased rapidly during the last 2-3 days of pro-oestrus, reaching a maximum value (300-640 $\Omega$ ) ~2 days after the oestradiol-17 $\beta$  peak that corresponded with the onset of sexual receptivity. Towards the end of oestrus, the values fell to 100-200  $\Omega$ .

J. Reprod. Fert. 70, 15-24, 1984.

4 figs., 1 tables, 32 references.

Authors' summary.

### EFFECT OF LITTER SIZE ON GESTATION LENGTH IN BLUE FOXES.

(Dräktighetstidens beroende av valpresultatet hos blårävar).

Outi Lohi, Kari Valkosalo, Dansk Pelsdyravlerforening, 60 Langagervej,  
DK 2600 Glostrup, Denmark.

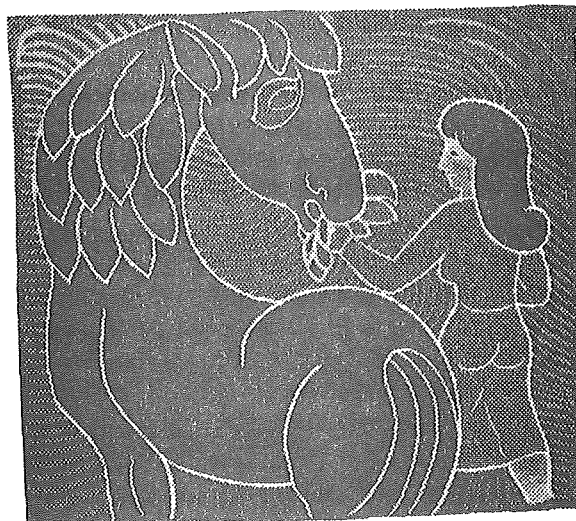
Data of 535 blue fox female were analysed. For female with litters of 1-5, 6-8, 9-10, 11-12 and  $\geq$ 13 young resp., gestation length averaged 53.0 plus or minus 2.0, 52.8 plus or minus 1.7, 52.5 plus or minus 1.7, 52.3 plus or minus 2.0 and 52.1 plus or minus 1.4 days resp., the difference between female with 1-5 young and those with 11-12 or  $\geq$ 13 being significant. The correlation between gestation length and litter size at 14 days post partum was 0.20 ( $P < 0.01$ ). Data are tabulated for the frequency of gestation lengths of 46-58 days in female with different litter sizes.

Finsk Pälstidskrift, 16, 9, 417-419, 1982.

2 tables, 1 fig.

CAB-abstract.

In SWED.





**MAKING CONSIDERATIONS.  
NEW FINDINGS ON REPRODUCTION IN MINK.**

(Inför parningen. Nya rön inom minkens fortplantning).

Lars Elofson, Avd. päls- och smådjursavel, Sveriges Lantbruksuniversitet,  
Uppsala, Sweden.

905 Standard and Pastel mink female were mated twice, with the 2nd mating taking place 1 or 9 days after the 1st mating. Of adult female mated on 7, 10 or 12 March and remated 9 days later, 2, 2 and 8% resp. were infertile vs. 13, 10, 0, 0 and 0% of female mated on 10, 13, 16, 19 or 22 March and remated 1 day later. The corresponding percentages for young female were 3, 70 and 6 vs 29, 79, 5, 5 and 0. For adult female in the 8 mating groups resp., the number of liveborn kits averaged 5.9, 5.6, 5.9, 4.0, 6.5, 6.1, 6.6 and 6.7 vs. 5.8, 5.4, 5.2, 5.0, 4.9, 4.7. 4.9 and 5.0 for young female, and litter size 3 weeks later averaged 5.3, 5.1, 5.1, 3.4, 5.5, 5.7, 6.0 and 6.4 vs. 5.2, 4.6, 4.4, 3.4, 3.9, 4.2, 4.2 and 4.2. It was concluded that young female should be mated early in the mating season, with a 9-day interval between matings, whereas adult female would benefit from matings at the end of March, with an interval of 1 day between matings.

Våra Pälsdjur, 55, 2, 40-46. 1984.

6 figs., 3 tables.

CAB-abstract.

In SWED.

**INFORMATION ON CURRENT MATING SYSTEMS AND  
DATE OF MATING SYSTEMS.**

(Information om pågående försök med parningssystem - parningsdatum).

Lars Elofson, Gabrielle Lagerkvist, avd. päls- och smådjursavel, Inst. för husdjursförädling och sjukdomsgenetik, Sveriges Landbruksuniv., Uppsala, Sweden.

A brief account is given of some mating experiments carried out at an experimental farm in Sweden. Young mink female mated twice, with an interval of 8 days between matings, or mated a 3rd time on the day

following the 2nd mating, had significantly higher CRS than those mated once only or mated a 2nd time on the day following the 1st mating. However, of older female mated twice after 16 March, with 24 h between matings, a significantly lower percentage were infertile and litter size averaged 1 kit more compared with older female mated twice or thrice at an earlier date, with an interval of 8 days between matings.

Våra Pälsdjur, 54, 2, 42-45.

1 fig.

CAB-abstract.

In SWED.

### SPERM TEST - A USEFUL TOOL IN BREEDING WORK OF MINK.

Christer Sundqvist, Margaretha Gustafsson, Inst. of Biology, Åbo Akademi, SF-20500 Åbo 50, Finland.

A sperm test was performed over a period of five consecutive years as a fertility check on a mink farm. As a result of the test sterile males were eliminated from breeding, which led to a distinct increase in the number of kits per female. Results of a histological and stereological analysis of testicular tissue from sterile, sub-fertile males showed clear agreement with the results of the sperm test.

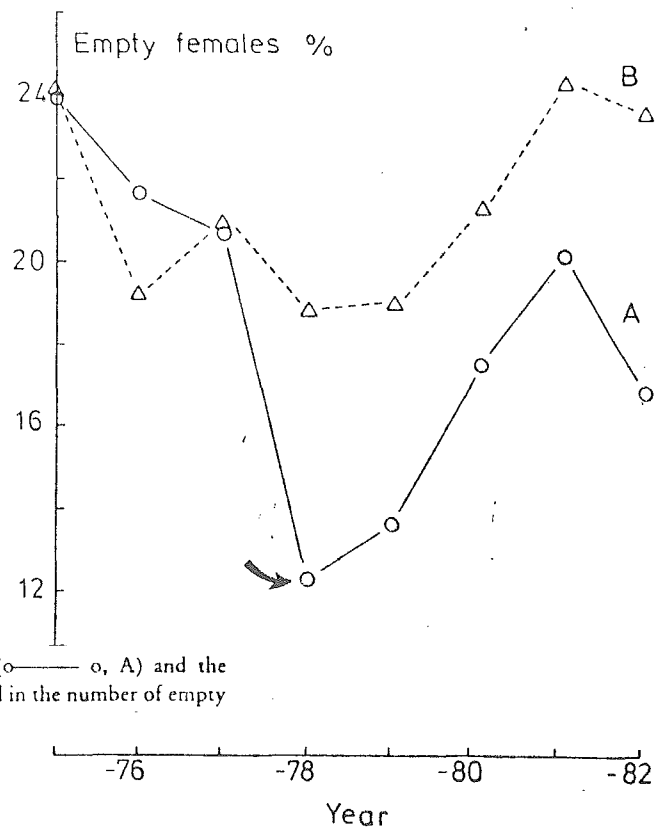
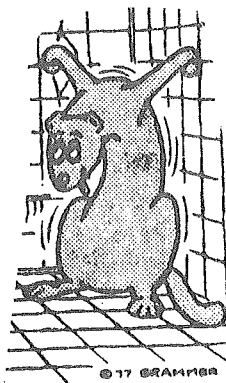


Fig. 3. Graph showing the proportion of empty females on the test farm (o—o, A) and the corresponding value for Finland ( $\Delta$  - - -  $\Delta$ , B). Note the drastic fall in the number of empty females in 1978 (arrow), i.e. at the introduction of the sperm test.

In testes taken from sterile males serious disorders were observed in the seminiferous epithelium. The value of the sperm test method as a fertility test is emphasized.

Journ. of the Scientific Agric. Soc. of Finland.  
Vol. 55, 119-131, 1983.

1 table, 9 figs., 16 references.

Authors abstract.

#### COLLECTION OF SEMEN FOR INSEMINATION OF FOXES.

(Insamling av sperma för inseminering av rävar).

Väinö Hernesniemi, Jaakko Lumme, Jouko Meriläinen, Seppo Pasanen,  
University of Joensuu, Finland.

From the end of January until the middle of May, semen was collected from 11 Silver foxes and from Gold Platinum, Platinum, Tundra, Arctic and crossbred male (1 of each type). The number of ejaculates suitable for insemination (containing at least 200 million spermatozoa) ranged from 0 to 66 per male. Contrary to previous reports, male from which collections had been made could also be used for natural mating.

Finsk Pälstidskrift, 16, 7-8, 374-375, 1982.

2 figs.

CAB-abstract.

In SWED.

#### INSEMINATION OF FOXES IN 1983.

(Inseminering av rev i forsøkssesongen 1983).

Jan Fougner, Norges Pelsdyrslag, PB 145, Økern, 0509 Oslo 5, Norway.

Data on 4425 inseminations carried out in Norway in 1982 were analyzed. For blue fox female inseminated with fresh semen from blue fox male, the CR was 65.50 percent, litter size at birth averaged 8.23, and litter size at weaning 5.39 vs. 66.25 percent, 7.53 and 5.23 for blue fox female

inseminated with silver fox semen, and 70.26 percent, 4.50 and 3.55 for silver fox female inseminated with semen from silver fox male. For the 3 groups resp., the number of cubs weaned per mated female averaged 2.90, 2.93 and 1.73. For 43 blue fox female inseminated with blue fox frozen semen, the CR was 58.14 percent, litter size at birth 5.88, litter size at weaning 4.75, and the number of cubs weaned per mated female 1.77.

Norsk Pelsdyrblad. 57, 3, 126-130, 1983.

3 tables.

CAB-abstract.

In NORG.

### RESULTS OF INSEMINATING FOXES IN 1983.

(Resultat av rävinseminationsvirksamheten år 1983).

Maija Valtonen, Finlands Pälsdjuruppfödarens Förbund r.f., PB 5, 01601  
Vanda 60, Finland.

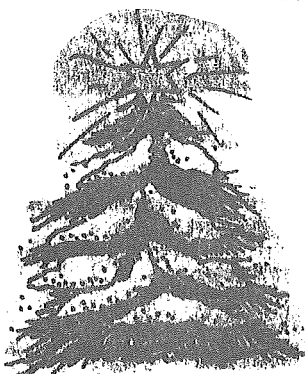
In 1983, in Finland, 5007 fox female were inseminated, 83% of which were blue foxes and 7% silver foxes. Of 3227 female inseminated once, 38% conceived vs. 61% of 200 female inseminated twice, and 71% of female inseminated and then mated naturally. In the 3 groups, the number of cubs produced per inseminated female averaged 2.38, 3.66 and 5.70, and that per female whelping averaged 6.31, 6.04 and 8.11. Of an unspecified number of fox female mated naturally, approx. 80% conceived, and the number of cubs produced per mated female averaged 5.9 for blue foxes and 3.0 for silver foxes.

Finsk Pälstidskrift, 17, 10, 504. 1983.

2 tables.

CAB-abstract.

In SWED.



REPRODUCTIVE CHARACTERS OF RED FOXES AT THE SALTYKOV FUR FARM.

ОСОБЕННОСТИ РАЗМНОЖЕНИЯ КРАСНЫХ ЛИСИЦ  
САЛТЫКОВСКОГО ЗВЕРОСОВХОЗА

T.M. Chekalova, O.N. Chupeeva, USSR.

For 9 adult and 5 young red female mated with silver-black male, 70 adult and 30 young silver-black female mated with red male, and 46 silver-black female mated with similar male, litter size averaged 5.41, 4.62, 5.76, 5.35 and 5.60, resp., and the number of cubs weaned per female 4.10, 4.40, 5.30, 3.87 and 5.40.

Sbornik Nauchnyk Trudov, Moskovskaya Veterinarnaya Akademiya, No. 119, 123-125, 1981.

2 tables.

CAB-abstract.

In RUSS.

RED FOX (*VULPES VULPES*) REPRODUCTION IN FRANCE.

SEASONAL VARIATIONS AND FERTILITY OF VIXENS.

(Reproduction du renard roux (*Vulpes vulpes*) en France.

Rythme saisonnier et fécondité des femelles).

M. Artois, M.F.A. Aubert, Y. Gérard, Min. de l'Agric., Direction de la Qualité, Services Vétérinaires, Ctr. Natl. d'Etudes sur la Rage et la Pathologie des Animaux Sauvages, B.P. 9, 54220 Malzéville, France.

453 vixens have been examined for reproduction study in France between 1976 and 1980.

Most vixens give birth during the last fortnight of March, the mean number of dark placental scars representing live births is 4.3. The proportion of barren vixens is low, at 3.8% for the five years studied. Age does not appear to influence reproductive activity of the females.

Acta Aecologica, Aecol Applic. Vol. 3, 1, 205-216, 1982.

1 table, 5 figs., 25 references.

Authors' summary.

In FREN. Summary in ENGL.

# Vitamin Distribution in the Organism of Minks and Polar Foxes.

## Communication I. Deposition of Vitamin A.

V. A. Berestov, G. G. Petrova, S. P. Izotova, Institute of Biology, The Academy of Sciences of the USSR. Karelian Branch, Pushkinskaya, 11, 185610, Petrozavodsk, USSR.

### Summary

The distribution of vitamin A in mink and polar foxes is examined during measuring the concentration of retinol in the liver, kidneys, heart, muscles, brain, lungs, hypodermic fat, testis and colostrum different times during the year cycle.

A great variation in concentrations between the different organs depending on, among others, age and supply was found. The retinol level in the depositing organs of minks was generally higher than in polar foxes. That seems to be due to the more intensive metabolic level of the organism as compared with that of the canine.

To achieve high productivity of farm-bred predatory mammals it is necessary to satisfy their demands in vitamins most of which are not synthesized in the organism but must be supplied with food. In this connection it is essential to control the vitaminous full value of the ration.

One of the important vitamins in carnivore feeding is fat-soluble vitamin A. Its concentration in the liver shows how the organism is provided with the vitamin.

It is also interesting to study its distribution in other organs and tissues depending upon the level of feeding, animal species and other factors. In this context the study was made on liver, kidneys, heart, muscles, brain, lungs hypodermic fat, testis obtained in the period spring and autumn slaughters. The colorimetry method was employed to determine vitamin A (Berestov, 1981).

Non-working mink males were found to have the highest content of retinol in their liver, kidneys, testis and hypodermic fat (Table 1). Only traces of the vitamin were found in other organs. The vitamin concentration in the liver was fairly high corresponding to literature data and our earlier investigations (Slugin, 1973; Zafren, 1976 and others; Petrova et al., 1979; Berestov and Petrova, 1981). It is interesting to note that the vitamin level in the liver was 3-times higher than that in the kidneys and 30-times greater as compared with that in the testis, and in the kidneys retinol content was 10-times as high as that in the testis. Such supplies of retinol in the organism were enough to provide high fertility of minks.

Table 1. Distribution of vitamin A in the organism of minks and polar foxes, I.U/g( $M \pm m$ )

Organs and tissues	Minks		Polar foxes
	spring	autumn	autumn
Liver	3433 ± 555	427.7 ± 47.5	42.5 ± 7.1
Kidneys	1107 ± 217	2530 ± 415	734 ± 94.8
Heart	2.9 ± 0.6	-	2.7 ± 0.6
Lungs	11.5 ± 1.7	0.47 ± 0.04	1.3 ± 0.6
Stomach	10.2 ± 3.2	0.25 ± 0.06	3.7 ± 2.0
Intestine	22.5 ± 5.1	1.3 ± 0.3	15.6 ± 2.4
Brain	0.9 ± 0.1	-	1.3 ± 0.3
Muscles	0.7 ± 0.07	0.18 ± 0.03	2.6 ± 0.3
Hypodermic fat	68 ± 13.8	17.4 ± 4.3	59.5 ± 9.5
Testis	118 ± 9.6	53.5 ± 2.9	21.5 ± 12.8

The period of mass autumn slaughters was characterized by marked redistribution and decreased concentration of vitamin A in mink organs. It is characteristic that in autumn retinol content in the kidneys was 6-times higher than that in the liver. Besides, in comparing to the spring period its concentration in the kidneys has increased by a factor of two, and in other organs and tissues it decreased: in the liver - by 8-folds, in the testis - by 2- and in the fat - by 4-folds because of the poor vitaminous provision of the animals in that period.

In autumn retinol distribution in the organism of polar foxes was almost the same, i. e. the highest level was recorded in the kidneys (17-times greater than that in the liver), then in the hypodermic fat, liver.

In the fat and in the liver the vitamin content was similar. The amount of retinol in the testis was 2-times and in the intestine almost 3-times lower than that in liver. Only traces of retinol were registered in other organs of polar foxes.

In the autumn the deposition of large amounts of the vitamin in mink and polar fox kidneys (which is 6- and 17-times higher than that in the liver) seems to be accounted for by the low level of retinol in the ration. It is known (Natanson, 1974; Morita Akihito, Nakano Kiwao, 1982) that when vitamin A is limited or lacking in the food its content in the kidneys is higher than that in the liver.

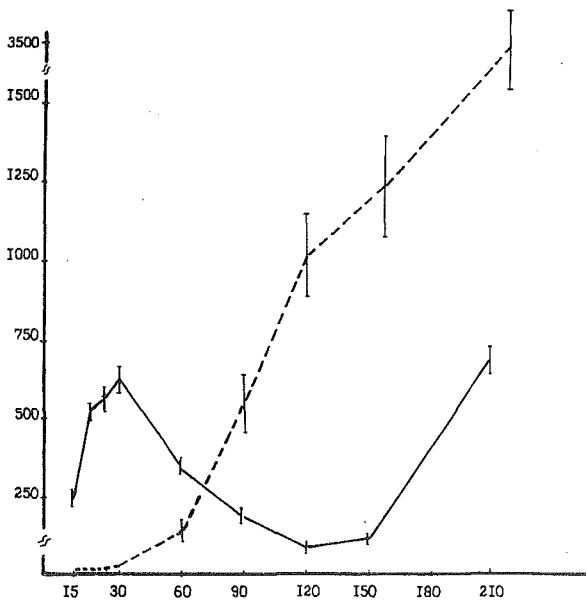


Fig. 1. Dynamics of vitamin A content in the liver and kidneys of minks in the postnatal ontogenesis. The abscissa shows the age in days; the ordinate - vitamin A concentration (I.U./g of tissue). A solid line denotes the vitamin content in the liver; a discontinuous line - in the kidneys.

These studies were continued with the aim of determining vitamin A content in the liver and kidneys in the postnatal ontogenesis (Fig. 1, 2). In minks, the representatives of the marten family, the level of retinol in the lactation period (15-day-old animals) was found to be 229 I.U./g in the liver. More than 500 I.U./g were deposited when mixed food was used (20, 25, 30 days). In the kidneys its concentration was low (only 9-14 I.U.). After the kits were taken from their mothers and started to feed independently, redistribution of the vitamin began. In comparing to one-month-old kits retinol content in the liver of two-month-old minks decreased by a factor of two, and in the kidneys, on the contrary, increased by a factor of ten but still it was two-times lower than that in the liver. In three-month-old animals retinol concentration in the kidneys was 3-times and at the age of 4-5 month 12-times higher than

that in the liver. As compared with the previous ages it gradually and significantly decreased in the liver while in the kidneys it, on the contrary, increased that seemed to be due to gradual impoverishment of the ration with the vitamin and age metabolic characteristics. In the period of mass slaughter (November) the retinol level in the organism seemed to be higher than that at the age of 5 months, but in the liver it was, however, 5-times lower than in the kidneys showing the inadequate supply of retinol in the food (vitamin A was not added in the ration).

Polar foxes, the representatives of the canine family, were characterized almost the same regularity (Fig. 2), i. e. the high level of the vitamin in the liver of the sucklings and its low level in the kidneys (45-times lower as compared with the liver), practically similar content in the liver and the kidneys of 2-month-old kits and low concentration in the liver of 6-month-old kits and its high concentration in the kidneys (54-times). In adult polar foxes the deposition in the liver was higher than that in young animals, but it was 6-times lower than in the kidneys. It is noteworthy that minks and polar foxes are characterized by different capability to deposit retinol. In polar fox sucklings aged 15 days the level of vitamin A in the liver (366 I.U./g) was higher than that in minks (229 I.U.). The colostrum of polar foxes seems to be richer in the vitamin than that of minks.

But from the age of 25 days the vitamin concentration in the liver of minks begins to exceed its level in polar foxes. It is manifested most noticeably in the period of mass slaughter (Table 1). Retinol concentration in the liver of minks was 10-times and in the kidneys 3-times higher than that in polar foxes.

Thus, in the organism of carnivora vitamin A is deposited mostly in their liver and kidneys with its redistribution between these organs depending on the vitaminous full value of the ration. When the vitamin content in the food is high it is mainly concentrated in the liver and when it is limited the vitamin is accumulated in the kidneys.

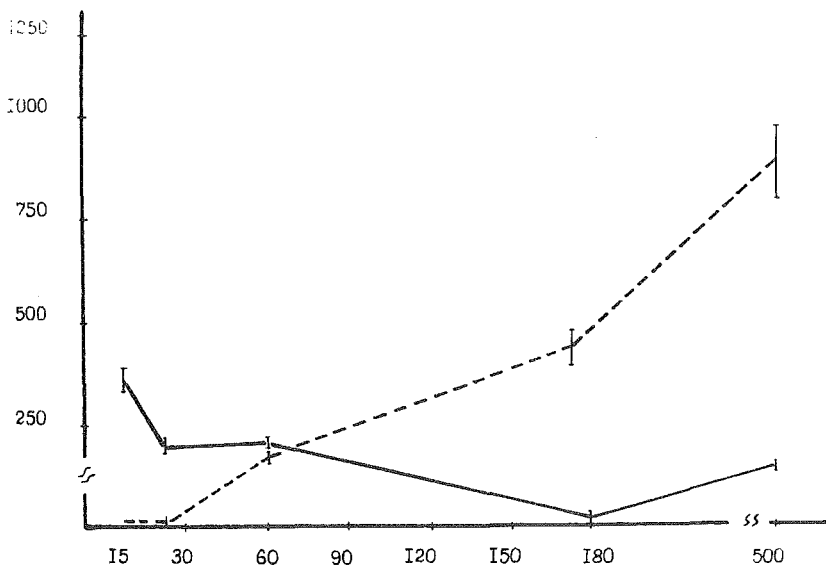


Fig. 2. Dynamics of vitamin A content in the liver and kidneys of polar foxes in the postnatal ontogenesis. The same symbols.

Providing of the organism with the vitamin in spring (in the reproductive period) is fairly higher than in autumn (in the period of mass slaughter).

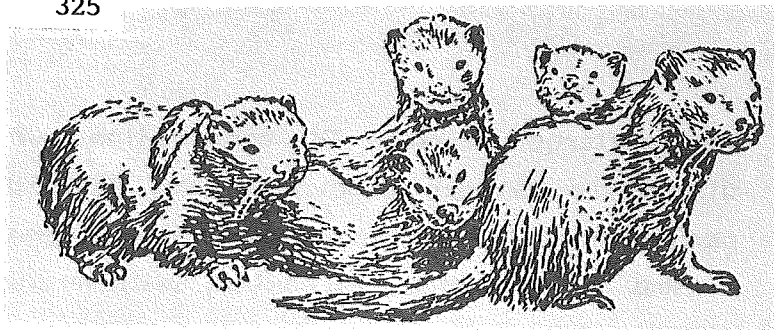
In the liver of growing kits retinol concentration decreased while in the kidneys it increased almost in parallel to the vitamin decreases supply in the ration.

The retinol level in the depositing organs of minks is generally higher than that in polar foxes that seems to be due to the more intensive metabolic level of the marten organism as compared with that of the canine.

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- Morita Akihito, Nakano Kiwao.* Change in vitamin A contents in tissues of rats fed on a vitamin A-free diet. *J. Nutr. Sci and Vitaminol.*, 1982, 28, No4, p. 343-350.





## NUTRITIONAL STATUS OF ADULT MALE MINK DURING THE YEAR.

### II. HEAT PRODUCTION AND MAINTENANCE REQUIREMENTS.

(Variation au cours du cycle annuel de l'état nutritionnel du  
vison mâle adulte.

#### II. - Production de chaleur et besoins d'entretien).

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

During 14 consecutive months and in the course of the week following one of the nutritional balances studied in part I (Charlet-Lery et al., 1984). The 4 minks of group A, fed ad libitum the same pelleted diet stayed together 13 times in respiratory chamber during 3 days (3 x 23 h).

The level of intake was always lower during the stay in chamber. The respiratory quotients were below 1 (0.76-0.91). The daily heat productions (CN balance) were relatively constant. But when they were calculated on the basis of live weight or of metabolic size, we observed that heat production was lower in winter, from November till February, than in summer, from April till September ( $149 \text{ kcal/Wkg}^{0.75}$  and  $167 \text{ kcal/Wkg}^{0.75}$ , respectively).

An attempt was made to estimate the energy requirement for maintenance:  $155 \text{ kcal ME/Wkg}^{0.75}$ . Taking into account this value, metabolizable energy for production was calculated individually for the six periods of the weight cycle observed in part I. The comparison with the live weight change during these periods made evident the accuracy of this value for animals staying in experimental room but showed that in mink farm (group V), requirement was higher ( $195 \text{ kcal/Wkg}^{0.75}$ ) owing probably to outdoors conditions (larger changes in temperature).

The patterns of mean  $O^2$  consumption during a day pointed out high differences between short and long day-night. The influence of photoperiodism on these animals was also suggested by evolutions of hornomal plasma concentration (thyroxine, testosterone) shown by several authors.

TABLEAU 4

*Production de chaleur des visons  
au cours des différents mois de l'année (kcal/kg).*

*Heat production of minks during months around the year.*

	PEREL'DICK et TITOVA (1950)	Résultats obtenus <i>Our results</i>
Mars - Avril .....	149	154 (1)
Mai - Juin - Juillet .....	170	144 (2)
Août - Septembre - Octobre .....	151	140 (2)
Novembre - Décembre .....	129	126 (3)
Janvier - Février .....	140	120 (4)

( ) Nombre de mesures - *Number of measurements.*

Ann. Zootech., 33, 2, 131-148, 1984.

3 figs., 4 tables, 25 references.

Authors' summary.

In FREN. Summaries in ENGL and FREN.

#### THE OPTIMUM CONDITION OF FEMALE MINK BEFORE MATING.

#### ОПТИМАЛЬНАЯ УПИТАННОСТЬ САМОК НОРОК ПЕРЕД ГОНОМ

A.P. Maksimov, A.A. Shkol'naya, USSR.

For 20, 44, 40 and 15 one-year-old Standard female with body condition index values of 22.1-24.0, 24.1-26.0, 26.1-28.0, 28.1-30.0, resp., and 26, 63, 89 and 54 four-year-old Standard female with the same ranges of index values, litter size averaged 6.16, 6.75, 6.35, 6.55, 6.66, 6.23, 6.33 and 5.90, and the percentage of female not whelping 5, 0.0, 20, 4, 3, 9 and 9.

Sbornik Nauchnyk Trudov, Moskovskaya Veterinarnaya Akademiya, no.119 117-119, 1981.

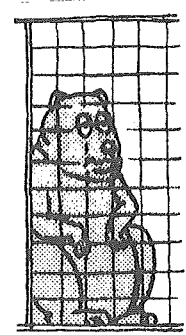
3 tables.

CAB-abstract.

In RUSS.

## FLUSHING OF MINK.

(Flushing av mink).



Maria Neil, Sveriges Lantbruksuniversitet, Uppsala, Sweden.

An account is given of some flushing experiments carried out in Denmark and Finland. For mink female at the Swedish College of Agriculture, fed rations 14, 62 and 13 percent higher than standard rations from Jan.-Feb. until mating, litter size averaged 5.02, 5.23 and 5.05 kits, resp., and for female fed rations 50, 17 and 0 percent higher than standard rations, litter size averaged 5.28, 5.08 and 4.93.

Våra Pälsdjur, 54, 2, 47-48, 1983.

1 table, 2 references.

CAB-abstract.

In SWED.

## GROWTH AND MAINTENANCE OF THE RACCOON DOG (NYCTEREUTES PROCYONOIDES GRAY 1834) ON VARIOUS BREWERS' MASH AND BASAL DIETS.

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

The experiments were undertaken to evaluate growth and maintenance of the growing juvenile and adult raccoon dogs (*Nyctereutes procyonoides* Gray 1834) on various Brewers' mash and basal diet. The growing raccoon dogs did well on the diet containing 25% (w/w) Brewers' mash while juvenile and adult raccoon dogs on the diet containing 40% (w/w) Brewers' mash gained weight at a slightly lower rate than the controls. Feed spillage, the amount of faeces and faeces/feed intake ratios tended to increase as the amount of mash in the diet increased.

Apparent digestibility (AD) of protein and carbohydrates clearly decreased with the increase of mash content in the diet. Weight gain of whelps fed the basal diet with one day of fast weekly from mid-September onwards resembled that of controls. There were no significant differences in haemoglobin values between feeding groups. In addition,

no significant differences were found in liver and kidney weights. The results showed that Brewers' mash is a rather suitable diet component in raccoon dog feed.

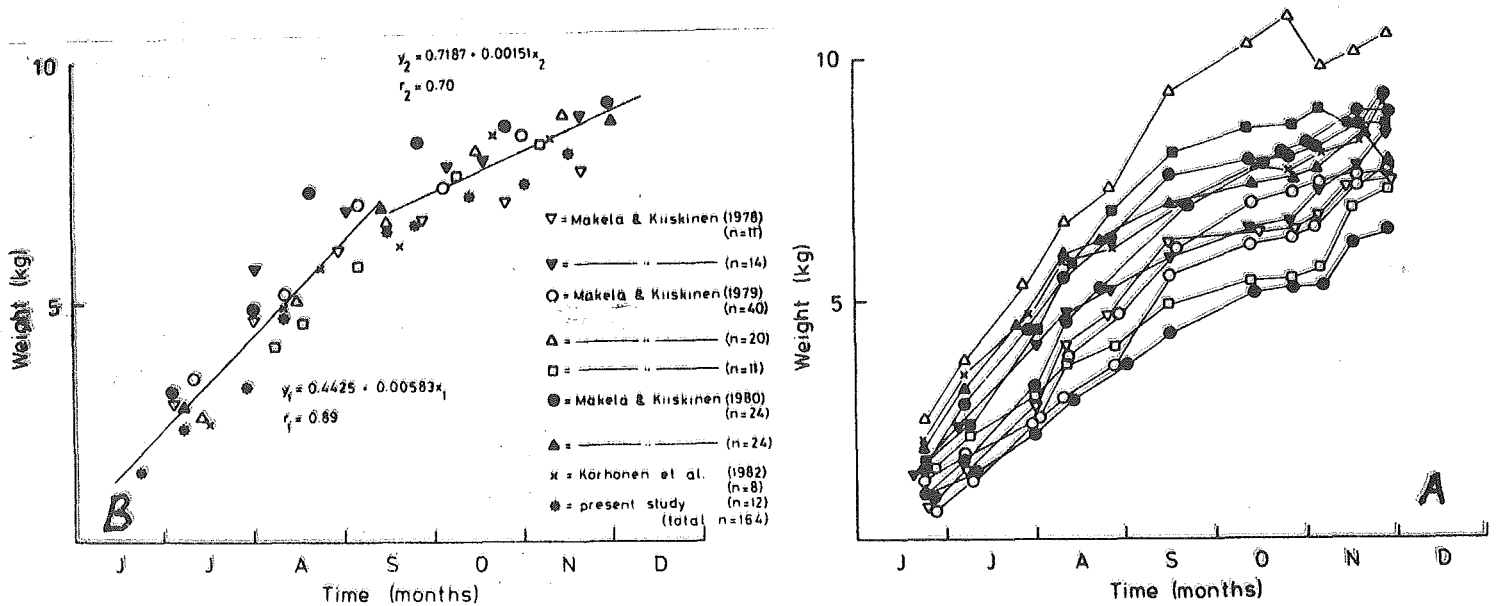


Fig. 3. Individual live weight curves of the control group during the period of June-December (A figure), and the general growth rate of the raccoon dog (B figure) as judged from the data of the present and previous studies. Weight gain rates prior to and after cessation of length growth (September 15th) are depicted by different regression lines.

Z. Tierphysiol., Tierernährg.u.Futtermittelkde. 50, 275-287, 1983.

3 figs., 7 tables, 40 references.

Authors' summary.

In ENGL. Summaries in ENGL and GERM.

#### TRUE DIGESTIBILITY OF AMINO ACIDS IN HIGH TEMPERATURE TREATED BARLEY IN FEEDING TRIALS WITH MINKS.

(Den sande fordøjelighed af aminosyrer i højtemperaturbehandlet byg målt i forsøg med mink).

N. Glem-Hansen, Dansk Pelsdyravlerforening, 60 Langagervej, DK 2600 Glostrup.

Barley is in much minkfeed the main carbohydrate source which results in the fact that up to 15% of the total feed protein can be of barley origin.

The true digestibility of the amino acids in high temperature treated

barley varied from 70 to 89% which indicate that the digestibility of the single amino acid has to be taken in consideration with use of considerable amounts of barley in the mink feed.

Meddelelse Statens Husdyrbrugsforsøg, No. 406, 5. March 1982. 2 pp.  
ISSN: 0106-8857.

2 tables.  
In DANH.

Author's summary translated  
by G. Jørgensen

THE SPECIFICITY OF ACTION OF DIFFERENT ALKYL COMPOUNDS ON  
THE PERFORMANCE OF FUR BEARING ANIMALS.

**ИЗУЧЕНИЕ СПЕЦИФИЧНОСТИ ДЕЙСТВИЯ  
РАЗЛИЧНЫХ АЛКИЛСОЕДИНЕНИИ  
НА ХОЗЯЙСТВЕННО-ПОЛЕЗНЫЕ ПРИЗНАКИ  
ПУШНЫХ ЗВЕРЕЙ**

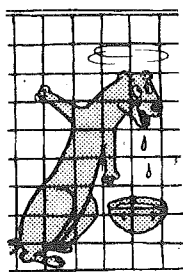
Yu A. Perchikhin, USSR.

For 15, 10 and 8 arctic fox female given nitrosodimethylurea, nitroso-methylurea and nitrosoethylurea resp., and 18 untreated controls, and for 17 and 17 female given diethylsulphate and dimethylsulphate resp., and 31 untreated controls, the percentage mated was 93.3, 90.0, 87.5, 94.4, 88.2, 100 and 96.8, the percentage whelping 80.0, 90.0, 87.5, 77.8, 88.2, 94.1 and 87.1, and litter size averaged 11.2, 11.4, 11.6, 10.4, 12.4, 12.4 and 10.7. For 14, 12, 15, 14 and 15 mink female given the 5 compounds resp., and for 102 untreated controls, the percentage whelping was 100, 91.7, 66.7, 71.4, 80.0 and 52.9, litter size averaged 5.0, 7.3, 4.2, 6.2, 6.7 and 5.5, and survival rate to weaning was 87.1, 51.3, 83.3, 91.9, 97.5 and 64.0.

Sbornik Nauchnykh Trudov. Moskovskaya Veterinarnaya Akademiya, No. 126, 106-115, 1982.

7 tables.  
In RUSS.

CAB-abstract.



What ethylene compound did  
I get today !

## EFFECT OF NITROSODIMETHYL UREA ON DEVELOPMENT OF POLAR FOXES.

ДЕЙСТВИЕ НИТРОЗОДИМЕТИЛМОЧЕВИНЫ  
НА ПОКАЗАТЕЛИ РАЗВИТИЯ ПЕСЦОВ

V. Ya. Adamov, USSR.

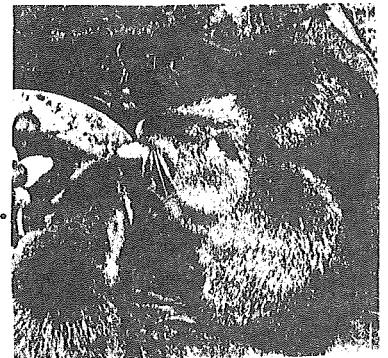
Young polar foxes obtained from dams treated with nitrosodimethyl urea (NDMU) before parturition compared favourably with their counterparts from dams not given NDMU in liveweight at 3.5 months old, weights of the liver, heart, lungs, kidneys, testes and ovaries, activity of transaminating enzymes and muscular tissue acidity.

Sbornik Nauchnykh Trudov Moskovskoi Veterinarnoi Akademii, 125, 99-105, 1982.

5 tables.

CAB-abstract.

In RUSS.



## INTOXICATIONS OF THE NUTRIA BY NITRO-COMPOUNDS.

(Zatrucia nutrii zwiqzkami azotowymi).

Jerzy Kulczycki, Andrzej Malinowski, Arnold Wasniewski, ul. Lansjerów  
1 bl 1/60, 85-617 Bydgoszcz, Poland.

The purpose of the examinations was to establish the LD values for nitrates and nitries, clinical signs, and anatomopathological, and histopathological lesions in the course of intoxications of the nutria by nitro-compounds.

The examinations were performed on 96 nutrias divided into 16 groups, 6 animal in each. The animals of the six groups were given the increasing dosis of sodium nitrate (from 30 to 80 mg per kg of body weight), the animals of ten groups were given sodium nitrite at increasing doses from 100 to 1000 mg per kg of body weight. The LD100 for sodium nitrite was 60 mg per kg of body weight. However the value of LD100 for sodium nitrate was not established because the animals tested survived even a single dose of 1000 mg of sodium nitrate per kg of body weight. It was noted a high resistance of the nutria against nitrates and lower resistance than in other species of animals against nitrites. Diagnostic of the intoxications may be based on food analysis, histopathological

and anatomopathological lesions, and supravivally on the determinations of the level of methaemoglobin in red blood cells. The determinations of the level of nitrates and nitrites in the liver does not have any diagnostic value.

Medycyna Weterynaryjna, 39, 6, 333-336, 1983.

2 tables, 14 references.

Authors' summary.

In POLH. Summary in ENGL.

#### STABILITY OF VITAMINS IN MOIST MINK FEEDS.

(Vitaminernes stabilitet i vådt minkfoder).

Niels Glem-Hansen, Dansk Pelsdyravlerforening, 60 Langagervej, DK 2600 Glostrup, Denmark.

Danish, Norwegian and Finnish studies are reviewed.

Dansk Pelsdyravl, 45, 12, 643-644, 1982.

4 tables, 5 references.

CAB-abstract.

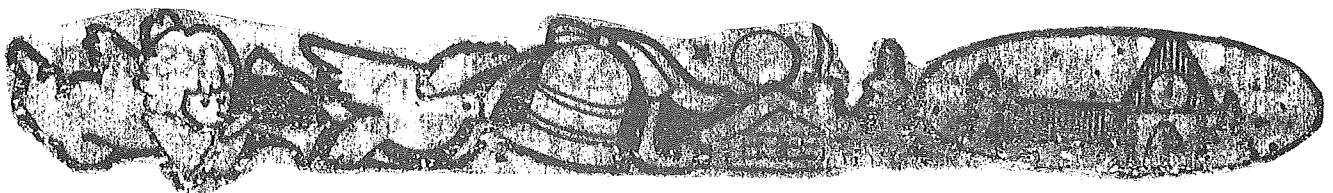
In DANH.

#### TRIALS WITH FROZEN INDUSTRIAL FISH IN THE GROWTH PERIOD.

(Forsøg med frosset industrifisk i vækstperioden).

G. Hillemann, 8 Sitkagranvej, DK 9800 Hjørring, Denmark.

Use of frozen industrial fish, comprising 25 or 50 percent of the diet of 200 mink pups, was assessed in a trial during the growth period. Pelt quality was not affected by the test diets, but the diets had an adverse effect on pelt dimensions. The standard colours appeared lighter, while pastel colours were purer with increasing amounts of industrial fish in the diet. It was concluded that industrial fish may be used



with advantage on mink farms, significantly reducing feed costs.

Dansk Pelsdyravl, 45, 7, 333-334, 1982.

4 tables.

CAB-abstract.

In DANH.

#### TRIALS WITH DRY FEED PELLETS FOR MINK.

(Forsøg med tørfoderpiller til mink).

G. Hillemann, 8 Sitkagranvej, DK 9800 Hjørring, Denmark.

Groups of 200 young mink were given dry feed pellets (Ewos A/S, Silkeborg, Denmark) or traditional feeds. Weight gains and size of pelts were greater but quality and colour of pelts were poorer on traditional feeds.

Dansk Pelsdyravl, 46, 3, 147, 1983.

4 tables.

CAB-abstract.

In DANH.

#### TRIALS WITH DRY FEED PELLETS FOR MINK.

(Forsøg med tørfoderpiller til mink).

G. Hillemann, 8 Sitkagranvej, DK 9800 Hjørring, Denmark.

Pelts of mink given dry feed pellets (Kemovit A/S, Copenhagen) were of better quality and gave a more attractive overall impression than did pelts produced with traditional feeds, but size and colour of pelts were poorer and pelts obtained a lower price.

Dansk Pelsdyravl, 46, 2, 62-63, 1983.

4 tables.

CAB-abstract.

In DANH.





### TRIALS WITH COOKED, FROZEN POULTRY WASTE FOR MINK.

(Forsøg med kogt, frosset fjerkræaffald til mink).

G. Hillemann, 8 Sitkagranvej, DK 9800 Hjørring, Denmark.

Starting the middle of August 200 mink pups, standard and pastel, were given cooked frozen poultry waste at Northjutland Expt. Farm. There were no problems with the diet. Both quality and colour as well as purity and price at auction were positively improved, and on one farm pelt "silkeness" was improved in both types of mink.

Dansk Pelsdyravl, 45, 11, 577-578, 1982.

4 tables.

CAB-abstract.

In DANH.



### TRIALS WITH DRY PELLETS FOR MINK.

(Forsøg med tørfoderpiller til mink).

G. Hillemann, Heddie Mejborn, 8 Sitkagranvej, DK 9800 Hjørring, Denmark.

From summer till pelting, groups of 100 young mink, male or female standard or pastel, had freely dry pellets as Ewomink 2 or 3 and 200 controls had conventional feed. Water supply was automatic. The experimental pellets were well accepted and yielded normal or, with Ewomink 3, loose faeces, but bodyweight was considerably less than in the control group, especially with Ewomink 3. For mink given pellets the pelts, assessed in males, were smaller but tended to be of better quality and, in standard mink were of better colour than with conventional feed. Breeding results on mink from the previous trial tested with Ewomink 2 and conventional feed prepared at the farm, were excellent. It was concluded that, if water supply functioned perfectly and feeding instructions were followed, the dry provided a satisfactory alternative diet.

Dansk Pelsdyravl, 45, 5, 236, 238, 1982.

6 tables.

CAB-abstract.

In DANH.

## TRIALS WITH LINCO-SPECTIN<sup>R</sup> FOR MINK.

(Forsøg med Linco-Spectin<sup>R</sup> til mink).

G. Hillemann, Heddie Mejborn, 8 Sitkagranvej, DK 9800 Hjørring, Denmark.

During 4 months 2 groups of 200 young mink, half each standard and pastel, had freely water and a diet of cod waste (55 percent), fish and poultry silages, protein and vitamin mixtures, wheat germ, heat-treated barley and pig fat, alone or with the antibiotic Linco-Spectin Premix at 1 g/kg. Appetite and growth were good. Mink given Linco-Spectin ate about 7 percent less feed and were slightly heavier than controls and general appearance and faecal conformation were improved. Pelt quality, assessed in males, was adversely affected, but size, colour and purity of pelt were improved by Linco-Spectin. The medicated feed was unfermented and had a much lower bacterial content than had the control feed.

Dansk Pelsdyravl, 45, 5, 243, 245. 1982.

6 tables.

CAB-abstract.

In DANH.

## TRIALS WITH SUPPLEMENT OF EASILY DIGESTIBLE FEEDS FOR MINK IN THE EARLY PERIOD OF GROWTH.

(Forsøg med tilskud af letfordøjelige fodermidler til mink  
i den tidlige vækstperiode.

N. Glem-Hansen, 60 Langagervej, DK 2600 Glostrup, Denmark.

Young mink were fed on either a conventional diet, or one of 2 diets regarded as being easily digestible, and comprising the following, (the first test diet and the second test diet in parentheses): Best quality fish meal 28 (22); dry casein 28 (23); blood meal 5 (3); Maize 12 (15); fructose 5 (5); sucrose 4 (4); vitamin mixture 5 (6); best quality fish oil 8 (14); soya oil 5 percent (8 percent). The conventional diet included fish offal 57.0, herring 10, poultry offal 3.0, slaughterhouse waste 5, wheat meal 1, sucrose 0.5, barley (heat-treated) 6, pancreas meal (Nordisk Insulin) 2, protein mixture 2, vitamin mixture 2, fat 2, acetic acid 0.1 percent and water 9.4 percent.

The test diets were mixed 1:1 with the conventional diet. When the young were weighted at day 42, there was no difference in bodyweights, and all males were in the range 192 to 209 g, and all females in the range 180 to 186 g. The daily weight gain of males in all 3 treatment groups was 18 g, and of females 12 to 13 g. It was concluded that the 2 mixtures gave no advantage over the conventional mixture.

Dansk Pelsdyravl, 44, 11, 543-544, 1981.

3 tables-

CAB-abstract.

In DANH.

### FEEDING TRIALS WITH BLUE FOXES IN 1982.

(Fodringsforsøg med blåårve 1982).

H. Konnerup-Madsen, Agerledet, DK 9300 Sæby, Denmark.

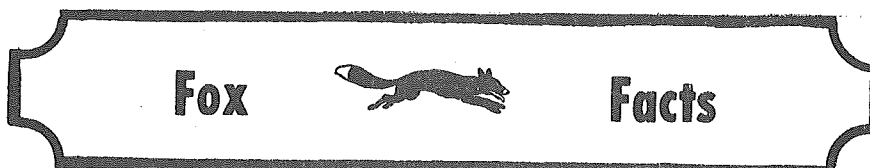
For about 12 weeks groups of 80 young blue foxes were given a control feed similar to normal mink feed with protein 10.2 g/100 kcal and with protein supplying 45, fat 37 and carbohydrate 18% of energy or were given the control feed with 6% cereals or 30% silage or 30% fish or 30% poultry waste to give protein 9.0 g/100 kcal and with 41% of energy from protein, 20 to 24% from carbohydrate and the remainder from fat. Another group was given Ewos dry pellets with protein 9.4 g/100 kcal. Final weights were 7.74, 7.93, 7.94, 7.93, 8.12 and 7.46 kg and total feed intakes were 70.8, 73.5, 65.6, 70.9, 70.8 and 31.3 kg. Proportion of pelts of "Saga selected" and "Saga" quality was greatest, 90%, with 6% cereals and smallest, 73%, in controls.

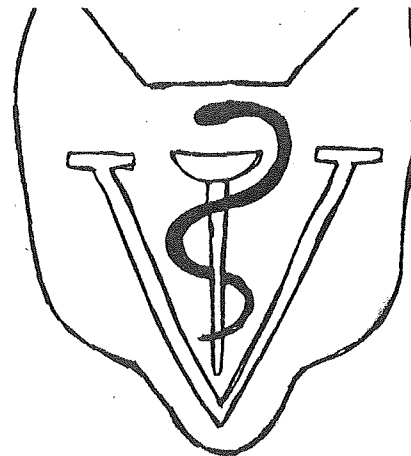
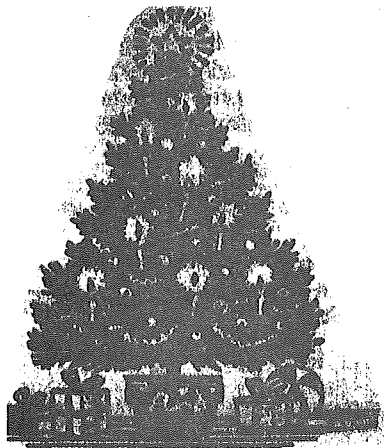
Dansk Pelsdyravl, 46, 6, 329-330. 1983.

2 tables.

CAB-abstract.

In DANH.





### MUSCULAR AND MYOCARDIAL DEGENERATION IN RAPIDLY GROWING MALE MINK KITS.

K. Nordstoga, Dept. of Pathology, Norwegian College of Vet. Med., P.O. Box. 8146, Dep., Oslo 1, Norway.

Muscular degeneration (without yellow fat pigmentation) has been identified in young mink in Norway since 1969. It was accompanied by haemorrhages due to a vascular disorder, not a coagulation disorder. Cardiac lesions were similar to those of mulberry heart disease of swine. Tissues contained normal amounts of selenium, but the vitamin E content was low sometimes. Since the diet contained adequate amounts of selenium and vitamin E, it seemed that poor intestinal absorption of vitamin E (a feature which distinguishes mink from other mammals) was responsible for this form of vitamin E deficiency.

Acta Vet. Scand., 24, 3, 321-324, 1983.

9 figs., 5 references.

CAB-abstract.

### STUDIES ON THE PATHOGENESIS OF ALEUTIAN DISEASE OF MINK. XII. IMMUNOPATHOLOGICAL DETERMINANTS OF IMMUNE COMPLEX GLOMERULONEPHRITIS.

R. Müller-Peddinghaus, G. Trautwein, Kali-Chemie Pharma, Exp. Pathologie, Hans-Böckler-Allee 20, D-3000 Hannover 1, Germany.

In mink with experimental and spontaneous Aleutian disease (AD), a persistent virus infection, four different glomerulopathies (GN; n=105) were defined; i.e. mesangial sclerosing GN (MesSGN; 62%), mesangioproliferative GN (MesPGN; 18%), exudative GN (ExudGN; 13%) and membranous GN (MemGN; 7%). The appearance of immune complex glomerulonephritis

is statistically significantly correlated with the increase of the relative amount of serum gamma globulins, serum IgG, glomerular deposited IgG, the antibody titer against AD virus, and the amount of serum immune complexes determined by the  $^{125}\text{I}$ -C1q binding test employing human C1q. Changes of total serum complement (CH50 U/ml) and C3 (%) signal additionally a poor prognosis. The most severe proteinuria is found in mink with MemGN. Distinct macroproteinuria determined by SDS-polyacrylamide gel electrophoresis characterizes MemGN and ExudGN. The immunopathogenesis of AD is determined by an excessive but ineffective humoral immune response raised by AD virus infection leading to an IgG response which does not facilitate virus elimination. The possibilities of individual longitudinal studies in combination with up to now unemployed methods and the resemblance of AD of mink as a systemic immune complex disease characterized by arteritis and glomerulonephritis to systemic lupus erythematosus in man is considered to be a special advantage of this experimental model.

Zbl.Vet.Med. B. 30. 487-501, 1983.

1 table, 6 figs., 37 references.

Authors' summary.

In ENGL. Summaries in GERM, FREN, SPAN.

#### STUDIES ON THE PREVALENCE AND SPECIFIC PREVENTION AGAINST TRYCHOPHYTOSIS IN BREEDING FOXES.

(Badania nad występowaniem oraz swoistym zapobieganiem  
trychofitozie lisów hodowlanych).

Stanislaw Woloszyn, Jacek Andrychiewicz, Krzysztof Kostro, Zbigniew Gradzki,  
Klinika Chorób Zakaźnych Zwierząt Wydziału Weterynaryjnego AR,  
Al. PKWN 30, 20-033 Lublin. Poland.

The observations performed in 1977-79 revealed that skin trychophytosis caused by *T. mentagrophytes* appears mainly in summer. This seasonal appearance of the disease is connected with an increased susceptibility of young animals. Indices of morbidity in relation to thickening and sanitary conditions were from 12.3 to 76.5% in small and from 21.8 to 47.7% in large farms. Taking into consideration the fact of a stationary occurrence of the diseases, in spite of treatment, disinfection of cages and utensils and selection of healed animals from a basal

breed, in 1980 was introduced a prophylactic vaccination of foxes in two large farms using inactivated and live vaccines. Inactivated vaccine was based on two strains pathogenic for guinea-pigs and foxes, that live was based on nonpathogenic strain which stimulated allergy in guinea-pigs and foxes. Prophylactic vaccination of mothers significantly decreased trichophytosis in their progeny. Indices of morbidity in groups of young foxes from vaccinated mothers were 5-8 times lower in comparison to controls. A little better results were noted in groups of foxes vaccinated with alive vaccine. As a matter of fact in progeny of unvaccinated mothers the first cases of the disease appeared at the age of 3-4 weeks, in which the treatment is difficult and generalized changes and secondary bacterial infections appear. The obtained results point to a necessity of the continuation of studies on specific prophylaxis of trichophytosis in foxes.

Medycyna Weterynaryjna, 39, 7, 387-391, 1983.

3 tables, 17 references.

Authors' summary.

In POLH. Summaries in RUSS and ENGL.

#### COMPARISON OF SUBCUTANEOUS AND INTRAMUSCULAR ADMINISTRATION OF A LIVE ATTENUATED DISTEMPER VIRUS VACCINE IN FERRETS.

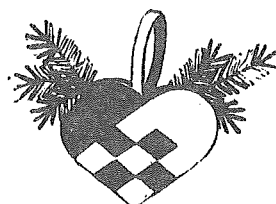
D.T. Shen, J.R. Gorham, J.F. Evermann, A.J. McKeirnan, Agricultural Research Service, US Dept. of Agric. and Dept. of Vet. Microbiol. and Pathol., Washington State University, Pullman, Washington 99164, USA.

There was no difference in the immunogenic potential of a live vaccine prepared with the rockborn strain whether it was given by the subcutaneous or intramuscular route to 7-month-old ferrets. This finding could be extrapolated to mink and perhaps dogs.

Veterinary Record, 114, 1, 42-43, 1984.

1 table, 5 references.

CAB-abstract.



## LYMPHATIC LEUKOSIS IN THE POLECAT.

(Lymphatische Leukose beim Iltis (*Mustela putorius*)).

G. Loupal, Christine Dreier, Inst. für Pathologie und Gerichtliche Veterinärmedizin, Linke Bahngasse 11, A-1030 Wien.

Two clinically diseased polecats from the same farm were killed. PM examination revealed enlarged spleen, liver and lymph nodes, a duck-egg-sized tumor in the mediastinum, atelectasis and cardiac dilatation. Histologically massive infiltration of the affected tissues with large round cells was seen. These cells were well defined, contained very little protoplasm, and large, round or oval nuclei with little chromatin, prominent nucleoli and numerous mitotic forms. The tumor was diagnosed as lymphoblastic lymphosarcoma.

Kleintierpraxis, 28, 6, 325-328, 1983.

4 photos, 4 references.

CAB-abstract.

In GERM. Summaries in ENGL, FREN, SPAN.

## MASTITIS CAUSED BY HEMOLYTIC ESCHERICHIA COLI IN THE FERRET.

A.J. Liberson, C.E. Newcomer, J.I. Ackerman, J.C. Murphy, J.G. Fox,  
Dept. of Pathology, Angell Memorial Animal Hospital, Boston,  
MA 02130, USA.

Hemolytic *Escherichia coli* was isolated from the mammary glands of 8 ferrets with gangrenous mastitis. Clinical signs included firm swelling from one or more mammary glands and discoloration of the overlying skin. Peracute disease and acute septicemia were observed, and in some cases the animals rapidly became moribund. Antibiotic therapy alone did not alter the course of the disease. Wide surgical resection of the involved glands in combination with systemic antibiotic therapy (ampicillin 10 mg/kg, BID, and gentamicin 5 mg/kg, SID) was the most successful treatment. Histopathologic changes included extensive edema, hemorrhage, and necrosis, with a mixed leukocytic infiltrate and large numbers of bacteria. The agent of this disease

was isolated from rectal swab specimens from clinically normal ferrets as well as ferrets that had mastetis.

JAVMA, 183, 11, 1179-1183, 1983.

2 figs., 11 references.

Authors' summary.

**ROYAL PASTEL MINK RESPOND VARIOUSLY TO INOCULATION  
WITH ALEUTIAN DISEASE VIRUS OF LOW VIRULENCE.**

William J. Hadlow, Richard E. Race, Richard C. Kennedy, Rocky Mountain Laboratories, Epidemiology Branch, Natl. Inst. of Allergy and Infectious Diseases, Hamilton, Montana 59840, USA.

Information was sought on the varied responses of royal pastel mink (a non-Aleutian genotype) to Aleutian disease virus of low virulence. Thus, of 20 yearling female pastel mink inoculated subcutaneously with a large amount of the Pullman strain of Aleutian disease virus, only 3 succumbed to the disease. Of the other 17 mink, 3 had neither viremia nor a rise in level of serum gamma globulin during the 24 weeks after inoculation. The other 14 mink were viremic for variable period during the first 12 weeks. In only five mink was the viremia accompanied by elevated levels of serum gamma globulin, usually from week 8 on. Of the 15 subclinically infected mink that did not succumb to intercurrent disease and otherwise remained healthy, 9 were examined at 19 to 31 months for persisting virus. In only one mink, small amounts were detected in the mesenteric lymph node and spleen nearly 28 months after inoculation. The other seven mink that survived the infection were not protected when challenged 31 months later with a small amount of the highly virulent Utah-1 strain. Even though still poorly understood, these varied responses of the royal pastel mink to infection with Aleutian disease virus of low virulence have important pathogenic and epidemiological implications.

J. of Virology, 50, 1, 38-41, 1984.

3 tables, 15 references.

Authors' summary.





CONTACT INFECTION OF MINK WITH 5 SUBTYPES OF  
AVIAN INFLUENZA VIRUS.

K. Okazaki, R. Yanagawa\*, H. Kida,\*Dept. of Hygiene and Microbiology,  
Fac. of Vet. Med., Hokkaido University, Sapporo 060, Japan.

Avian influenza viruses of H3N8, H11N4, H7N7, H8N4, and H5N3 infected  
mink by contact.

Archives of Virology, 77, 2/4, 265-269, 1983.

2 tables, 1 fig., 20 references.

Authors' summary.

REPORT ON THE TRIAL OF CLOSTRIDIUM BOTULINUM TYPE C  
VACCINE AGAINST BOTULISM IN MINK (IN CHINA).

C型肉毒杆菌苗抗水貂肉毒中毒的试验\*

Kong Qing-song, China.

The result of this trial shows that Clostridium botulinum type C vaccine  
made in China is a safe and efficacious vaccine against botulism in mink.  
21 days after inoculation with this vaccine, the mink can at least resist  
to the challenge of 100 mink MID Clostridium botulinum type C toxin.

Journ. of North-Eastern Forestry Institute, June 1981, 2, 103-108.

3 tables, 13 references.

Author's abstract.

In CHIN. Summary in ENGL.



**PREVALENCE OF ANTIBODIES AGAINST CANINE PARVOVIRUS IN FOXES.**

(Recherche d'anticorps envers le parvovirus canin dans des sérums de renards en France).

A. Schwens, J. Barrat, J. Blancou, M. Maenhoudt, P.-P. Pastoret,  
 Serv. de Virologie, Fac. de Médecine Vétérinaire, U.Lg., Rue des  
 Vétérinaires 45, B-1070 Bruxelles, Belgique.

A serological survey was performed in order to determine the prevalence of canine parvovirus infection in a wild population of foxes (*Vulpes vulpes*). Four of the 142 sera tested contained antibodies against that virus, showing that the infection is uncommon in this species. Foxes are therefore not a vector of the canine disease and are not at the origin of that new infection of dogs in Europe.

Ann. Méd.Vét. 127, 544-546, 1983.

12 references.

Authors' summary.

In FREN. Summary in ENGL.

**STUDIES ON EXPERIMENTAL REPRODUCTION OF WELCHIOSIS IN MINK.**

(Cercetari privind reproducerea experimentală a welchiozei la nurca).

V. Secasiu, N. Pastirnac, R. Zabava, Inst. Cercetari Veterinare, 333 Sosea  
 Giulesti, Bucharest, Romania.

Attempts to infect mink orally with types A, B, C and D of *C. Perfringens* succeeded only after the feed or drinking water had been rendered alkaline by adding sodium carbonate. Even then the infection was mild. A more severe infection was produced by concomitant infection with *C. Perfringens* type B and *Escherichia coli* of group 0144.

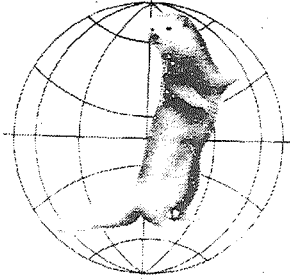
Societatea de Medicina Veterinara, Bucharest, Romania.  
 Lucrarile simpozionului: Probleme actuale ale diagnosticului si profilaxiei  
 in sistemul de crestere intensiva a animalelor. Bucuresti, 23-24 Oct.  
 1981. Part of collective document. pp. 71-78, 1983.

4 tables.

CAB-abstract.

In ROMN. Summary in ENGL.

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RESUME DES COMMUNICATIONS  
ABSTRACTS OF PAPERS

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

VERSAILLES

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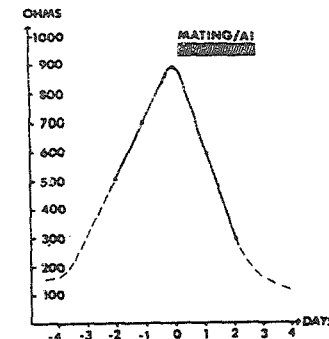
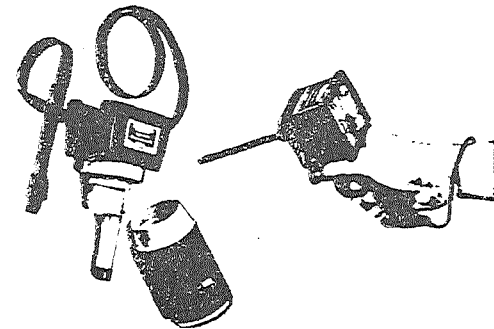
Poster

HEAT DETECTION IN FOXES AND OPTIMAL TIME FOR MATING AND AI :  
PRESENTATION OF A "RUT GAUGE" WITH DESINFECTION SYSTEM

Jan A. Fougner

Norwegian Fur Breeders Ass., N-Oslo 5, Norway

The female fox is a seasonal and monoestrous species with spontaneous ovulation. It is also a multiparous animal and at least the bluefox (*Alopex lagopus*) has a high fecundity potential. We try to keep the number of males in fox farming as low as possible by using polygamous mating or artificial insemination (AI) to reduce costs and extend the use of the very best males. It is therefore of the greatest importance to know when to mate or artificially inseminate to get all the eggs fertilized by only one or two matings/inseminations. This poster article presents a heat detector (rut-gauge) produced in Norway ; it is handy to use, allows effective desinfection between each measurement, and can be operated by only one person. It works as an ohm-meter, showing the electrical resistance of the vaginal mucus/-wall (Metzger, 1972 ; Klötzer, 1974 ; Møller, 1980). The characteristic changes in the electrical resistance of the vagina during oestrus in foxes can be easily followed and the peak value is found by 3-5 measurements, starting when the vulva is marked or maximally swollen. By comparing results obtained in field trials with matings and inseminations in untested vixens or those tested with the rut gauge, the right time for mating/AI in both blue and silverfox was accurately determined in an empiric way. The best results on pregnancy rate and the number of whelps born are achieved when silverfox types are inseminated during the first 24 hours after peak value and bluefox types 24-48 hours after peak. This method has proved to be of great help to both inexperienced and experienced farmers and is a reliable method for finding optimal mating time as well as being an invaluable part of the work with AI in foxes.



IMPROVED SPERM COUNTS IN MINK MALES TREATED WITH CLOMIPHENE CITRATE.

Altti Lukola\* and Christer Sundqvist\*\*

Dept. Biochemistry and Pharmacy\*\* and Dept. Biology, Abo Akademi, Abo, Finland.

A group of 12 sterile, aspermic mink males of Fastel breed were given 10 mg/kg/day clomiphene citrate, an antiestrogenic and antiandrogenic agent, for 10 days during the breeding season. A control group of 10 sterile males was used. The sperm count was tested as described by Sundqvist and Gustafsson (1983), J. Sci. Agric. Soc. Finland, 55, 119-131.

Table 1. Sperm counts ( $\times 10^6$  spermatozoa/ml) of sterile mink males.

Male	Dates sampled							
	7.3	8.3	9.3	10.3	12.3	14.3	16.3	18.3
316-82	0.0		0.0					0.0
229-83		0.0	0.0				0.0	
235-83		0.0	0.0				0.0	
286-83			12.4	8.1			0.3	
256-83	0.0	0.0						
238-83	0.0	0.0						0.0
212-83		0.0	0.0		0.0			
171-83		0.0						0.0
151-83		0.0		0.0				

Table 2. Sperm counts ( $\times 10^6$  spermatozoa/ml) of sterile mink males treated with clomiphene citrate.

Male	Dates sampled							
	7.3	8.3	9.3	10.3	12.3	14.3	16.3	18.3
109-81			0.0	26.8	66.8	23.3		10.0
32-83	0.0		11.5		15.6		7.4	4.1
38-83		0.6	15.3		22.8		25.2	11.1
412-82		1.3	0.5		5.9			0.0
53-83		0.0	0.0		89.3	105.7		53.6
43-83		0.6	0.9	1.2	4.0	6.9	5.9	
45-83				0.8		0.0	0.4	
44-83			0.0	0.0		0.0		0.0
395-82		0.0	5.3	66.6			32.4	16.7
36-83			0.0	0.0			0.0	0.0
33-83			2.7	15.9	10.2	11.5		0.6
32-83	4.7			5.9				0.0

The clomiphene treatment started 8.3

The sperm counts of sterile mink males throughout the breeding season are listed in Table 1. Table 2 shows, that 50% of the sterile males that received clomiphene citrate showed improved sperm counts already after 1-2 days of treatment. Histological analysis of testicular tissues from sterile males revealed that in many cases of sterility spermiogenesis was completed but the spermatozoa were not released from the seminiferous tubules and transported to cauda epididymis. We suggest that in these cases of sterility clomiphene citrate interacts directly with Sertoli cells and, by some yet unknown mechanism, causes the release of the spermatozoa.

Poster

THE ARTICOP-INSTRUMENT AS A MEANS OF AMELIORATING SEMEN TRANSPORTATION IN THE ARTIFICIAL INSEMINATION OF THE FOX

J. Meriläinen and S. Pasanen

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A new device called the Articop-instrument has been developed for the artificial insemination of foxes. It consists of an inflatable phallus with a delivery nozzle for the inseminating dose. This rubber instrument resembles the penis of the fox, stimulates the female and isolates a limited space around the papilla from the rest of the vagina. Semen is delivered into this space through the nozzle of the syringe and then transported by peristalsis into the body of the uterus and oviducts. The apparatus has been tested on over 300 females. Intraspecific AI (Vulpes x Vulpes) led to a pregnancy rate of about 40% and to 6.0 cubs per litter for the real arctic fox (with white winterfur) and to 6.3 cubs per litter for the carrier bluefox (hybrid between bluefox and arctic fox). In order to investigate this low pregnancy rate ten carriers who had not produced litters were examined histologically. Nine of these had become pregnant and developed 53 embryos which had miscarried. It is suggested that amelioration of semen transport allows smaller numbers of spermatozoa per dose than is usually reported in the literature. This easy and effective method can be used in genetic research and the production of fur bearing animals. The principle of the Articop-instrument may also be used for the intrauterine insemination of other mammals as well as for those which are reflex ovulators.

ON THE STRATEGY OF THE USE OF MALE FOXES  
IN ARTIFICIAL INSEMINATION

Seppo Pasanen\* and Jouko Meriläinen\*\*

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In the years 1982-83, a total of 170 male foxes was manipulated for semen collection. Inseminations were performed with fresh semen which was kept alive in IVT-liquid. Storage experiments were also made using different mixtures of IVT and prostata liquids at + 20°C. Microscopical observations indicated that IVT maintained semen in good condition for at least 24 hours. This period, however, could be prolonged at least up to two days by using the mixture of IVT and prostate liquid at a ratio of 1 : 1. Only the best males (110 animals) were used for insemination. The manipulation interval of 2-3 days gave the best results and prolonged the active period of male semen collection up to 2.5 months. The females were inseminated with large doses of semen (up to 400-600 million spermatozoa) and the most productive males produced enough semen at one time to inseminate 20-30 females. Alternative insemination strategies would be based on the selection of genetically qualified animals, and the possibility of prolonging the storage of fresh semen and decreasing the number of spermatozoa in semen doses by use of the new Articop-instrument. Due to these improvements, 150-200 females can easily be inseminated with the semen of one fox.

POSTER

DISTURBANCES IN THE APPEARANCE OF SEXUAL  
MATURITY IN MINK MALES

Christer Sundqvist\*, Altti Lukola\*\* and Maija Valtonen\*\*\*

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Seasonal changes in the photoperiod are important in timing of the onset and termination of reproductive functions in most species. Harmful effects result when breeding animals are transported from one environment to another. Such disturbances have appeared when mink males have been imported from U.S.A. to Finland. An investigation of males born from collections imported in 1980, 1981 and 1982 was undertaken. Imported males born in 1982 occasionally failed to mate and produced semen of unsatisfying quality. The testicles developed later than in the local breeding stock ( $p < 0.05$ ). Imported males born in 1980 showed as good testicular development and sperm quality as the local breeding stock. Results of serum testosterone analysis (RIA) showed that imported males born in 1982 reached peak levels of testosterone ( $15.17 \pm 2.08$  ng/ml) in early February, after which these concentrations slowly decreased. The corresponding value for imported males born in 1981 was  $7.96 \pm 1.10$  ng/ml which was consistent with the value for the local breeding stock. Highest values of testosterone in local males were reached in late January ( $10.13 \pm 1.45$  ng/ml). From the results it is evident that the testosterone profile reaches normal levels in imported males after 2-3 years in Finland. Certain similarities were observed between sterile local males and imported males born in 1982 (SUNDQVIST & GUSTAFSSON, 1983 ; SUNDQVIST, LUKOLA & VALTONEN, 1983), a factor which could explain the decreased productivity of the youngest generation of imported mink males.

SUNDQVIST C. & GUSTAFSSON M., 1983. Sperm test - a useful tool in breeding work of mink. J. Scient. Agric. Soc. Fin. 55(2), 119-131.

SUNDQVIST C., LUKOLA A. & VALTONEN M., 1983. Relationship between serum testosterone and fertility in mink males. J. Reprod. Fert. (in press).

## SODIUM CITRATE AS FOX SEMEN EXTENDER AT VARIOUS TEMPERATURES

Liisa Tang<sup>o</sup> and Maija Valtonen

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Illini Variable Temperature (IVT) diluter is commonly used to artificially inseminate foxes with fresh semen. In order to find a more convenient extender for field work, 3.2% sodium citrate solution buffered with citric acid to pH 7.0 was tested. Comparative motility was studied using blue and silver fox semen from the same ejaculate after dilution with IVT-, Na-citrate and Na-citrate containing 1.0 I.U of penicillin and 1 µg of dihydrostreptomycin per ml. The effect of different diluters on sperm motility was estimated microscopically according to the type and intensity of movement after preservation of the semen at various temperatures. The temperatures used were + 22° C, + 10° C and + 4° C, and the observation time was 9 hours. During the whole observation time sperm motility was best when IVT was used at + 22° C. At + 10° C IVT was superior to Na-citrate for 7 h. At + 4° C, sperm motility was equally reduced during the observation time in all extenders. At all temperatures, sperm motility in Na-citrate was satisfactory for insemination for least 3 h. Addition of antibiotic did not change the usability of Na-citrate. When Na-citrate-diluted semen was insiminated within 3 h after semen collection, field trials showed equal conception rates (about 60%) with IVT and Na-citrate.

FOSTER

## EMBRYONIC DEVELOPMENT IN THE BLUE FOX

Maija Valtonen\* - W.A. King\*\* - I. Gustavsson\*\*\* and Auli Mäkinen\*\*\*\*

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Observations of ovulation, maturation and fertilization in the silver fox (*Vulpes vulpes*) have been reported, but no information concerning early embryonic development in the blue fox (*Alopes lagopus*) is available. However, there is a great variation in the litter size of the blue fox, and embryonic loss is considerable. To describe the growth and development of blue fox embryos, 189 embryos were collected from 15 vixens at different stages of gestation. The vixens were mostly mated twice and slaughtered 2/4, 4/6, 6/8, 9/10, 12, 13/15, 16/18, 18/20, 20/22, 22/24, 25/27, 29/30 and 48 days later. The number of corpora lutea was estimated and the embryos measured and photographed. The fertilized eggs recovered 2/4 days after mating were still at the 1-cell stage while those recovered at 4/6 days were at the 1-4 cell stage. Cumulus cells were still present at the 4-8 cell stage. Morulae were found in the uterus 6/8 days after mating. At 13/15 days of gestation the blastocysts were expanded, being 1 mm in diameter at 16/18 days. Implantation was observed 16/18 days after breeding when approximately one-third of the gestation period (52 days) was over. The embryo progressed between days 18 and 24 from less than 5 to 10 mm in length. Embryos at 25/27 days measured 11 to 13 mm and at 29/31 days 19 to 22 mm. Within and between-litter embryonic size varied greatly at a given time after mating. Differentiation and characteristic features of the fox embryos were better related to length than to postcoital age. Embryonic loss was studied in relation to the number of corpora lutea. At the preimplantation stage, embryonic loss was 18%. After implantation, the difference between the number of corpora lutea and recovered embryos was 28%.

NUTRITIONAL MUSCULAR DEGENERATION SYNDROME IN MINK.

CLINICAL CHEMICAL STUDIES.

Asbjørn Brandt

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4  
Pathology

Yellow-fat disease has been recognized as a classical manifestation of the ill-interaction of nutritional factors such as PUFA, their oxidative products and vitamin-E deficiency. Despite radical improvements in feed production and supplementation, an increasing number of cases of sudden-death syndrome (somewhat similar to vitamin-E/selenium deficiency syndrome in other domestic animals) has been observed. The epidemiology and ethiology of this disease are unclear. Based on observations from field studies, hypotheses propose a multifactor relationship in which growth rate, feed PUFA content, vitamin C, vitamin E, selenium, metal ions, feed energy concentration, and management are the most obvious putative factors. A succession of elaborate factorial experiments have been initiated : 1) to define methods of the clinical chemical monitoring of the inter-relationship of the these factors, 2) and to measure the interaction of the factors on the membrane physiology of mink, for example. Some experimental results have been discussed.

347

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ANTIBODY DEVELOPMENT, DURATION AND PROTECTION FOLLOWING A SINGLE DOSE

OF VACCINE AGAINST *Pseudomonas pneumonia* OF MINK

Laila Elsading-Elsheik\* - Rune Bergman\*\* - Christer Walter\*\* - Kenneth Janzon\*\* - Torbjörn Mejerland\*.

\*National Veterinary Institute, S-750 07 Uppsala - \*\*Nordvacc Corp, Bergiusvägen 50, S-104 05 Stockholm, Sweden.

Protection of mink against *Pseudomonas* hemorrhagic pneumonia was studied after a single dose with a formalin-killed whole-cell vaccine. Development and duration of antibody response was monitored by ELISA using a sonicated whole culture and purified elastase as antigen. Protection after challenge exposure was serotype-specific and was absent against a heterologous serotype. ELISA and challenge results determined a period of one year of protection with measurable antibody level. The protection percentage was 66.6 and 92.8% with challenge inoculum doses of  $2.8 \times 10^{10}$  and  $4.85 \times 10^9$  cell/ml, respectively.

INTESTINAL ADENOMATOSIS IN THE BLUE FOX

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Diarrhea associated with adenomatous intestinal changes has been recognized as a disease in blue fox pups in Norway. In an outbreak, 3/4 of 400 weanling blue fox pups in a farm were affected by diarrhea; some also showed partial prolapse of the rectum. About 40 pups died a few days after the onset of symptoms. At autopsy (8 pups), changes found in the colon and rectum occasionally extended to the ileum. The intestinal mucosa was thickened, wrinkled and ulcerated. Histologically, the mucosa had tortuous branching crypts outlined by a high, pseudostratified epithelium which lacked goblet cell differentiation. Penetration of the muscularis mucosae by the crypts was frequent, as were crypt abscesses and pyogranulomatous foci in the lamina propria and submucosa. Silver impregnation of sections showed curved rod-shaped organisms in the altered epithelial cells. Transmission electron microscopy revealed organisms with a morphology resembling Campylobacter spp. in the apical cytoplasm of the altered epithelial cells. No hostcell-derived enveloping membrane was seen. An examination of 23 pups with typical symptoms and pelted 3 months after the outbreak of diarrhea revealed slight adenomatous changes in only one animal. This condition in blue fox pups resembles a disease in several other species, including pig, hamster, guinea pig, ferret and Dalmatian pups where Campylobacter spp. was suspected of being the cause.



## CONTRIBUTION TO THE CONTROL OF ALEUTIAN DISEASE

Jan Haagsma

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This report gives the results of research on the horizontal transmission of Aleutian Disease. In four experimentally infected mink the excretion of AD virus in saliva and faeces was examined from three days post infection until death. ADV was demonstrated for the first time 15 days after infection. In all positive samples the ADV titre was determined. The results show that the excretion was influenced by the virulence of the ADV-strain, the dose of infection and the genetic type of the infected mink. The susceptibility of mink to oral infection was examined in order to be able to interpret the significance of the excretion for the spreading of AD on mink farms. Finally, the susceptibility to ADV and the excretion of virus after experimental infection was examined in blue foxes and fitches because these animals are often bred with mink on the same farm.

## NUTRITIONAL MUSCULAR DEGENERATION SYNDROME IN MINK

(Clinical and pathological observations)

Per Henriksen

Danish Fur Breeders Assoc. DK-2600 Glostrup. DENMARK

In the last decade loss of mink kits has been noticed from mid-August to pelting time. The disease is largely located in farms with a high feed consumption/kit/day and usually hits the fast-growing male kits; female kits are only rarely affected. At least 2 forms of the disease can be distinguished by their symptoms. The most frequent form is sudden death without any previous signs of disease ; occasionally, slight bleeding from the nostrils is observed. The more infrequent form lasts for over 2-4 days. The symptoms are paresis of the hindquarters, dyspnoea, bleeding from the urethral orifice ; diarrhoea is rare. At autopsy the main gross findings are : hydro-haemothorax, aseptic fibrinous pericarditis, white to reddish foci in the myocardium, bladder dilatation (myoglobinuria), large amounts of subcutaneous and abdominal fat usually with small haemorrhages. Fatty liver and haemorrhagic enteritis are observed in some cases. No steatitis has been observed. The main histopathological findings are : a Zenker-type of muscular degeneration in the heart and skeletal muscles, proliferation of megakaryocytes in the spleen, sinusoidal dilatation and haemorrhage in the liver and renal tubular nephrosis. The histopathology indicates an aetiology similar to the NMD described in cattle and pigs, i.e. relative/absolute deficiency of vit. E and/or selenium. The therapeutic approach with large amounts of vit. E/Se in the diet has apparently no effect, but parenteral application of vit. E/Se cures most cases. The proliferation of megakaryocytes could indicate a disturbance in platelet production.

CAMPYLOBACTER JEJUNI INFECTION IN RANCH MINK IN CANADA

Bruce Hunter\* - J. Prescott\*\* - J.R. Pettit\*\*\* - and D. Hoover\*\*\*

THE EFFECT OF MATERNAL IMMUNITY ON SPECIFIC DISEASES  
AS IT RELATES TO THE OPTIMUM TIME OF MINK KIT VACCINATION

Keith Hulsebos, Pamela Miller and Herbert Kammer

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Protection against disease is frequently dependent on the use of vaccines. These, in turn, should be used in healthy, susceptible animals. Passive immunity acquired by young animals from their mother can interfere with effective immunization. This report describes the initial results of a continuing study of the relationship of the immune status of the mother to the passive immunity conferred on her offspring. This, in turn, may influence (1) the age which the young become susceptible to specific diseases, and (2) the optimum age of vaccination. The vaccines under study include distemper, mink virus enteritis, botulism, and Pseudomonas.

An outbreak of abortion caused by Campylobacter jejuni resulted in 189 abortions out of a total of 1059 bred female mink on a commercial mink ranch in Ontario, Canada in the spring of 1982. Abortions were confirmed by finding dead feti, portions of placentae and blood-stained bedding within nest boxes and pure cultures of C. jejuni (Penner serotype 37, Lior serotype 17,28) were recovered from the liver of the feti and placentae. During the spring of 1983, two outbreaks of diarrhea occurred in three to four-week old mink kits on two separate mink ranches. Affected kits were feverish and developed a mucoid yellow/white, often blood-flecked, diarrhea. Several kits developed rectal prolapses due to tenesmus. Morbidity ranged from 20-25% of the litters but mortality was low due to the nursing care provided by the ranchers. Post-mortem lesions were restricted to the proximal colon and were characterized by a mild to severe ulcerative colitis. Campylobacter jejuni was isolated from affected mink but isolation attempts for other pathogens (bacterial, viral) were negative. Attempts were made to experimentally reproduce the disease by infecting mink with C. jejuni. This paper describes the epidemiological and pathological (gross, light and electron microscopic) features of the naturally occurring disease and the experimental infection trials.

EUTHANASIA OF FUR-BEARING ANIMALS FOR PELTING

Hans-Christoph Löliger

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

Methods for euthanasia of fur-bearing animals at pelting time have to take into account animal welfare rules for painless killing as well as the conditions of farm practice. The following have been considered : 1) painless killing : the procedure should be as brief as possible causing a minimum of excitation and pain to the captured animals ; 2) facility of application without danger to the operator under conditions of normal, careful handling ; 3) practicality and economy of killing large numbers of animals within a limited time ; 4) the harmlessness of the method to protect fur quality. In practice, the following methods of euthanasia are used : 1) injection (intracardial, intrapulmonal) of barbiturates, ebutramid/mebezoniumjodide (T 61 Hoechst), chloralhydrates, magnesiumsulfate, organic or inorganic poisons (minks, polecats, foxes and chinchilla) ; 2) inhalation of CO, CO<sub>2</sub>, chloroformium, ethylether (minks, polecats, chinchilla) ; 3) electrocution by electrotraps or sondes (foxes, minks, polecats) ; 4) killing by club blows on skull or neck (foxes, Myocastor spec. -nutria) ; 5) killing by neck fracture (minks, polecats, chinchilla) ; 6) anesthetization by club blow or by shooting before exsanguination (slaughtering), if the carcasses are used for food (Myocastor spec. -nutria). Individual methods of euthanasia and their application are discussed in view of animal welfare rules for painless killing.

In August 1983 about 30 well nourished and developed young mink of both sexes and about 25 adults in a fur animal farm with about 7 000 mink (adults and kits) and 2 000 polecats showed symptoms of increasing paresis in the hind legs, apathy and inappetence. All diseased animals were kept in the same shed in adjacent cages and fed allmash feed of the same processing lot. Most of them died within two days from collapse. No other cases with the same or similar symptoms were observed. The postmortem gave no significant results. The carcasses of the dead mink were in good nutritional condition. The perineal region was polluted by fecal fluid. The stomach was filled, lungs and liver were congested. The mesenterial venous blood vessels and capillaries were filled by agonal stasis. Except for capillary and venous hyperemia, the microstructure of the parenchyma showed no lesions. Microscopic investigation of stomach and intestinal contents as well as of the parenchyma revealed many short thick rods, which were identified as Clostridium perfringens. Cl. perfringens was also found in the allmash feed and in porc offals which were a component of the feed given that day. A single contaminated clump in the daily prepared allmash feed might have caused this infection which showed no tendency to spread.

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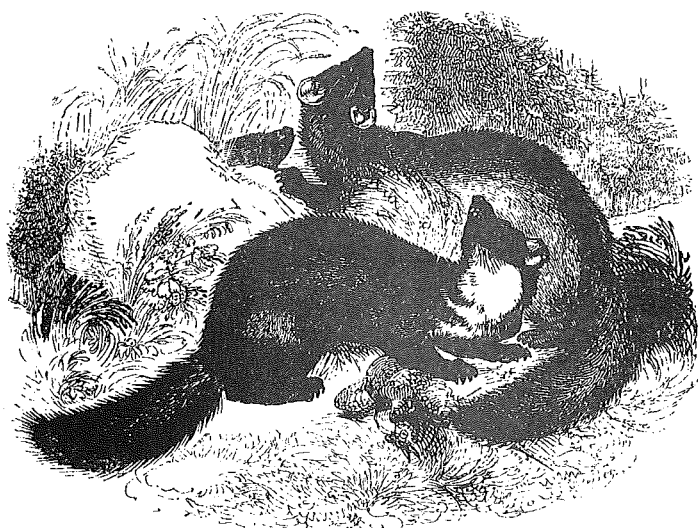
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The book EDEL PELZTIERE is dealing with all aspects in mink- and fox production. At the same time the book is a comprehensive sourcebook, the international author team has been able to describe all facets of the mink- and fox production in such a way that it will be an indispensable handbook for the practical farmers.

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