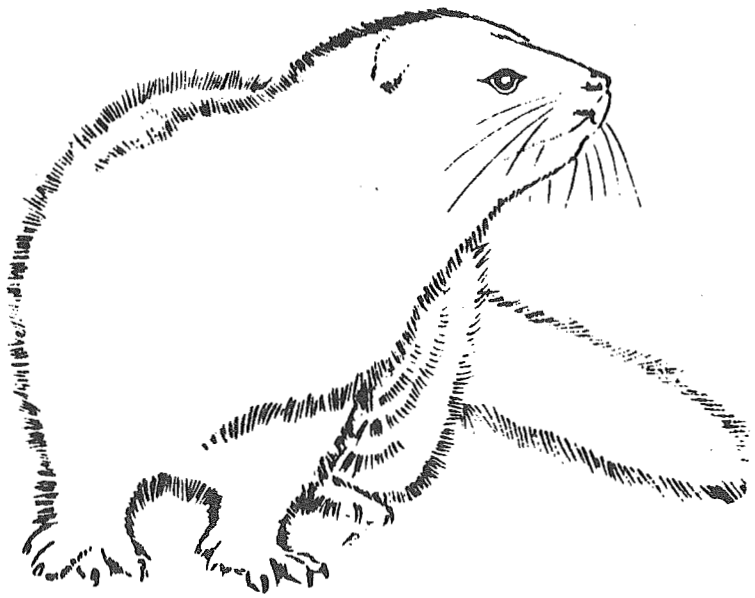
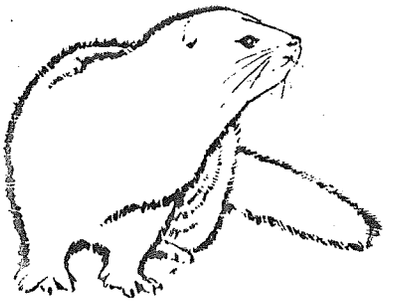
SCIENTIFUR

No. 1, February 1980.

Contents.



SCIENTIFUR
ISSN 0105-2403
Vol. 4. no. 1.
February 1980.



Scientifur

48 H ROSKILDEVEJ DK-3400 HILLEROED
DENMARK Tel. (03) 26 14 10

February 198o.

Kære modtager af SCIENTIFUR.

Nogle af Dem har tidligere modtaget SCIENTIFUR enten gennem speciel overenskomst eller som direkte abonnent.

For at sikre SCIENTIFURs fortsatte eksistens har de 4 nordiske opdrætterorganisationer besluttet at tegne 4o abonnementer hver. Det har i forbindelse hermed været nærliggende, at man har ønsket at udnytte dette ved at få SCIENTIFUR sendt til personer og institutioner, som man på den ene eller anden måde har samarbejde med. Dette gøres både som en påskønnelse af samarbejdet og for at gøre det lettere for Dem at følge med i den videnskabelige litteratur vedrørende pelsdyrproduktion.

Vi har nu den overenskomst med opdrætterorganisationerne, at SCIENTIFUR sendes til de på en udarbejdet liste anførte personer/ institutioner, og at denne liste ved udgangen af hvert kalenderår evt. revideres af den pågældende opdrætterorganisation.

De vil således uden betaling modtage SCIENTIFUR 4 gange årligt så længe opdrætterorganisationen ønsker det.

Vi er glade for på denne måde at kunne kvittere for opdrætterorganisationernes velvilje og håber, at initiativet også vil blive til glæde for dem, der herefter modtager SCIENTIFUR.

Det er indlysende, at vi også håber, at dette initiativ vil skabe kontakt til videre kredse, så der bliver endnu større mulighed for at få rapporter eller abstracts sendt til SCIENTIFUR, og vi håber også, at De finder publikationen så værdifuld, at De animerer andre til at abonnere og sende rapporter.

Med venlig hilsen

Gunnar Jørgensen

redaktør af SCIENTIFUR

Subscription is 2oo danish crown per volume (yearly). Subscriptions should be paid to:

Andelsbanken - DANEBANK
DK-3400 Hilleroed, Denmark
Account no. 3004219

NOTES

SCIENTIFUR

Vol. 4, no. 1. February 1980.

Nowadays I think that many parents are worried about their children and ask to themselves:"Have our children a really chance to grow up and be happy like ourselves and will they be able to overcome all the problems which we not only are seeing in the horizon, but also what we are going to be confronted to every morning we open our eyes. Will our children survive?".

Dear readers, do not close your eyes for the realities in your life and in the future , but learn to be happy for the good things you meet every day in spite of the global importance of these.

From that point of view many of you, as parents of SCIENTIFUR established on basis of suggestions at the First International Scientific Congress in Fur Animal Production in Helsinki 1976, ought to be happy for the child - SCIENTIFUR - which not only is growing in volume and number og subscribers, but also is serving an industry which is growing and going to play an increasing role in the animal production.

SCIENTIFUR is a happy child - and all its parents should also be happy.

However, we are sure that not all its parents are happy, because they are not able to attend The Second International Scientific Congress in Fur Animal Production. Why? Maybe, because of lack of money for this trip or because of lack of understanding of the importance of such kind of communication from the governments and the industry.

At the same time we regret this lack of understanding from several of the worlds leading countries - and fur producers, we are happy to thank the Scandinavian Fur Farmers Organizations for their sponsorship of SCIENTIFUR and of the Second International Scientific Congress in Fur Animal Production. This positive attitude to the scientific part of the industry not only enable us in a position to do what we want, but it also brings happiness to us every morning we open our eyes to serve this very facinating industry.

In this issue of SCIENTIFUR we only bring summaries of reports which will be given at the Second International Scientific Congress in Fur Animal Production in Denmark, April 1980.

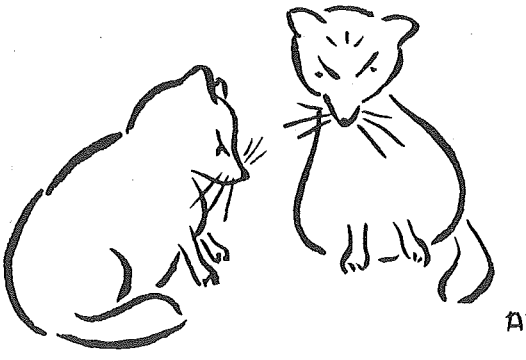
Those who are not able to participate the congress have the possibilities to receive the reports by direct contact to the authors or to buy the complete congress map at US $ 3o.- (Dkr. 18o.-). The map can be ordered from the congress secretariate:

2nd Int. Scientific Congress 1980
SCIENTIFUR, 48 H Roskildevej
DK-34oo Hilleroed, Denmark.
Phone: o3. 261410.

Finally we are happy to be able to welcome more than 1oo scientists to the congress. We are looking forward to meet all of you, listen to about 45 reports, and build up a friendship based on our common interest in the fur animal production.

Looking forward to see you.

Gunnar Jørgensen
editor



Why could we not get money to participate The Second International Scientific Congress in Fur Animal Production ?

CHROMOSOME VARIABILITY IN THE BLUE FOX.

Auli Mäkinen, Ingemar Gustavsson, Dept. of Animal Breeding and Genetics, Swedish University of Agricultural Sciences, S-750 07 Uppsala 7, Sweden.

The chromosomes of the arctic fox as well as its domesticated form, the blue fox (Alopex lagopus), have previously been discribed in a few reports based on studies of small numbers of animals.

The results obtained in the present investigation are based on totally 82 blue foxes; 27 males and 55 females, sampled randomly from four different farms in Sweden and Finland. Detailed studies and definite identification of individual chromosome pairs were possible by application of the G-, R-, C- and Ag-I banding techniques.

Two different types of interindividual variability were found: Centric fusion polymorphism. The modal chromosome number varied between 48 and 50 due to a centric fusion translocation of two acrocentrics into one metacentric chromosome. The incidences of the different chromosome numbers appeared to vary between the two sexes as well as between different farms.

It is possible that the occurrence of centric fusion in different farms of the present investigation is due to recurrent mutation but it is believed that all cases of translocation have been derived from a common ancestor. The effects of the centric fusion translocation on fertility are not known.

Variability in the amount of heterochromatin. Some individuals, both males and females, demonstrated variability in the amount of heterochromatin. Normally there are ten autosomal pairs demonstrating large blocks of heterochromatin. The individuals concerned demonstrated dimorphism in presumably one pair; besides the normal amount of heterochromatin in one chromosome, its homologue demonstrated a decreased amount. Homozygous carriers of this variability

have not yet been found.

It is suggested that future research should be more actively directed to understanding the effects of chromosome variations in the blue fox. This can not only be done by direct studies of the developing zygote but also indirectly by the study of different parameters particularly those concerning fertility used in artificial selection.

7 references, 1 table, 3 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark, 8-1o/4 198o.

Abstract: G. Jørgensen

GENETIC SYSTEMS OF SERUM PROTEIN ALLOTYPES IN DOMESTIC MINK.

O.K. Baranov, V.I. Yermolaev, M.A. Savina, I.I. Fomicheva,
Institute of Cytology and Genetics, Academy of Sciences,
Siberian Branch, Novosibirsk 63oo9o, U.S.S.R.

This report presents a brief characterization of the systems of serum protein allotypes in the domestic mink. These allotypes were identified in this laboratory. Their major features are as follows.

1. The Ld-system of low density lipoproteins. The two allotypes identified are Ld1 and Ld2. They are coded for by allelic genes at the autosomal locus Ld. In two mink populations studied, the frequency of the gene Ld^1 was much higher than that of its allele Ld^2, o.9 and o.1, respectively. The Ld-locus is most probably involved in the genetic control of the entire serum pool of low density lipoprotein.

The mink Ld-system seems to differ from the allotype system of low density lipoproteins of man (Morganti et al., 1975) rabbit (Albers and Dray, 1969) and pig (Rapacz, 1977) an its simpler organization.

2. The Lpm-system of allotypes of very high density lipoproteins. This system is a case of complex immunogenetic organization. This Lpm-system has eight allotypes. Lpm molecules with different allotypic specificities have the same α_2-electrophoretic mobility in agar gel. Their molecular weight is about 8oo ooo, and they have a subunit composition. Lpm allotypes are inherited as allogroups. Eight allogroups are known: Lpm 4; Lpm 6,8; Lpm 4,6,8; Lpm 4,6,7; Lpm 1,6,8; Lpm 3,4,6,8; Lpm 1,2,6,7 and Lpm 2,4,5,7. Each group is, probably, controlled by haplotypes, a group of closely linked genes. The 22 phenotypes and 36 genotypes in the domestic mink are the result of individual pair combinations of eight known Lpm haplotypes.

Lpm allotypy was not identified in Mustelidae species closely related to the domestic mink. Thus, Lpm polymorphism has emerged instantaneously in evolving Mustelidae. It is a specific evolutionary feature of the domestic mink. This makes it different from the mink Ld system and the allotypic polymorphic system of other mammals (for example primates) which have evolved smoothly.

3. The IgG allotypes. At present, there is indubitable evidence for the existance of six IgG allotypes in the domestic mink, 1,2,3,4,5,6. According to preliminary data, allotypic specificities 2,3,4 and 6 are located in the heavy chains and allotype 1 is located in light ones. Although mink IgG allotypes are inherited, no conclusive genetic data was obtained allowing us to distinguish allelic groups.

Thus, our Laboratory now has antisera against sixteen allotypes of three different proteins (Baranov et al. 1978;:Baranov and Yermolaev, 1978; Baranov and Savina, 1979). The detection of other Lpm and IgG allotypes will increase this number. The allotypic gene markers available may be used in genetic and evolutionary studies. They may also be applied to the genetic control of mink breeding.

6 references, 4 pages.

2nd Internat. Congress in Fur Animal Production,
Denmark, 8-1o/4 198o.

Abstract: G. Jørgensen

Objectivisation of Methods of Exterior Evaluation of Standard Mink

Maciejowski Janusz, Sławoń Jerzy
Wyzsza Szkola Rolnicze, Pedagogiczna o8-11o Siedlce ul.Prusa 12, Poland.

Subjective evaluation of many traits of fur-bearing animals is a source of error which affects low accuracy of selection and consequently decreases selection progress. To determine the value of this error, the authors made an experiment which consisted in several evaluations of 20 standard minks carried out by 5 judges. They evaluated the same animals 4 times in sequence unknown to them. Four traits were evaluated on the scale of 0 /zero/ to 6 points which are presented in. tab. 1. The analysis of variance revealed great significant differences between the evaluated animals and only in evaluation of colour great significant differences were found to exist between evaluation of the same judges /see tab. 1/. Thus, point estimation can differentiate better animals from estimation is satisfactory. Moreover, the analysis showed great significant differences between judges and significant interactions - animals x judges. Both phenomena prove that individual judges give significantly different evaluations for the same traits in a given animal. The highest variation between judges was in the case of colour evaluation.

In further experiments a number of attempts were made at objectivisation of colour evaluation, length of hair and choice of judges in respect of their abilities to differentiate worse and better animals and repeatability of these evaluations. In colour evaluation the comparative method was used, as well as evaluation on different background and at daylight and artificial light. Attempts at colour evaluation of standard minks by comparison with hair samples of different colour intensity did not give satisfactory results.

Experiments on the effect of background on accuracy of colour evaluation were started with a laboratory experiment. 21 hair samples of different colour intensity were prepared. Thise samples were arranged twice by 5 judges in order of decreasing colour inten-

sity on white, blue and black background. In regression of the second result to the first one the repeatability coefficient of sample arrangment on each background was determined. On white background: $r' = 0,52$, on blue background $r' = 0,89$ and on black one $r' = 0,95$ /see tab.2/. The results show that it is the black background that hair colour of standard minks can be most accurately evaluated The authors transfered the results of this experiment to the evaluation of alive animals, so for this purpose the table-tops were painted black and blue. The evaluation was carried out in 2 phases in which different animals were used and different judges made the evaluation. In spite of expectations no significant differences were found between the evaluation of animals made on black tables and that on blue tables /see tab. 3/. The authors suppose that lack of background influence on the evaluation results was caused by the distance the caged animal was from the background.

Comparison of the evaluation results was also carried out at daylight and artificial light of standardized colour and intensity. At artificial light a slightly lower variation of evaluation was obtained, but their repeatability was not satisfactory. Length or rather height of each kind of hair layers /guard hair, intermediate hair and underfur/ was measured with the help of an instrument constructed by the authors. Results of the measurments enabled them to determine the extent of this trait in livestock and evaluate heritability of length of each kind of hair /see tab. 4/. Measurments with the help of this instrument are somwhat laborious, this it is less useful in mass evaluation but in can be used for experimental purposes and in self-correcting of judges.

Results of the experiments gave some information pointing to possibilities of error decrease in hairy coat evaluation on alive animals, but at the same time showed that in mass selection it is organoleptic evaluation which is basic and its accuracy depends on the qualifications of a judge. To determine the qualifications of judges the following experiment was carried out: 14 judges in 2 series 7 people each evaluated 15 minks repeating the evaluation of the sa-

me animals 3 times in sequence unknown to them. Variation components resulting from the difference between animals, between judges and judge x animals interactions were determined as well as differences in evaluation of the same animal by the same judge.

Mean repeatability of evaluations was in serie's I $r' = 0,643$ and in serie's II $r' = 0,648$. Checking, to what extent each judge can repeat previous evaluation, for each of them individual repeatability was calculated according to formula:

$$r' = \frac{\sigma^2 \text{ between animals}}{\sigma^2 \text{ total}}$$

Repeatability calculated in this way depends not only on the uniformity of evaluations by the same judge but also on the scale of marks used by him. This makes it possible to choose judges differentiating animals distinctly and at the same time repeating their evaluations of the same animal /see tab.5/. After elimination of judges who did not reach $r = 0,7$ satisfactory uniformity of evaluations among judges can be obtained.

5 references, 9 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark, 8-1o/4 198o.

Authors summary.

GENETIC PARAMETERS OF SOME TRAITS IN MINK AND THE OPPORTUNITY TO USE THEM IN FUR IMPROVEMENT.

N. Pastirnac, Departamentul Agriculturii de Stat, I.A.S. Prejmer, judetul Brasov, R.S. Romania.

Genetic parameters for litter size, mothering ability, body weight at slaughter age and pelt length are estimated in Standard mink, in field conditions. The values of heritabilities for these four characters, as well as the values of phenotypic, genotypic and evvironmental coefficients of correlation, are given.

The opportunity of the construction of a selection index including these characters is suggested.

9 tables, 4 references, 7 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark, 8-1o/4 198o.

Authors summary.

SYNDROME OF HEREDITARY TYROSINEMIA IN MINK.

K. Christensen[1], O. Venge[1] and H. Sørensen[2],
1) Dept. og Animals Genetics, and 2) Chemistry Dept.,
Royal Veterinary and Agricultural University, Bülowsvej 13,
DK-187o Copenhagen, Denmark.

During the last few years some Danish mink farmers have observed a rather high frequency of death among kits of the Standard type. The deaths occur usually when the kits are about 6 weeks old, i.e. about the weaning age. The state of health of the kits appears quite normal during sucking period. The affected kits die within two-three days after the first symptoms have been observed. Watery eyes are the first sign of the disease, followed by the sticking eyelids. Pathologic-anatomical observations have been carried out. The most remarkable signs were oedematic kidneys. Cytological examinations showed no difference from the normal caryotype.

Biochemical investigations were performed on serum samples from normal and affected kits. These results demonstrated that the affected kits had 20-100 times higher plasma tyrosine concentrations than those found for normal kits. Also unusual high concentrations of the carboxylic acids derived from tyrosine were observed, corresponding to a defect in the enzyme 4-hydroxyphenylpyruvate dioxygenase. The plasma concentrations of the other protein amino acids were less, but significantly altered whereas this was not the case for Na, K, Ca, and Mg. It should be mentioned that the concentration of urea and creatinine was found 2-5 times higher in affected kits compared to normals.

Investigation concerning the genetics of the disease confirmed the hypothesis of a simple (Mendelian) recessive inheritance.

In conclusion the disorder is inherited as a recessive character, due to homozygosity at a single locus. No indication of pleiotropic effect, coupling between genes, etc. has been observed.

These results concerning the hereditary disease among mink show a parallelism to the hereditary disease in man known as hereditary tyrosinemia or hereditary tyrosinosis.

5 tables, 4 figures.

2nd Internat. Congress in Fur Animal Production, Denmark 1980.

Authors summary.

THE TYROSINEMIA SYNDROME IN MINK.

Per Henriksen, Dept. Vet. Path., Royal Veterinary and Agricultural University, Bülowsvej 13, DK-1870 Copenhagen V, Denmark.

For about 4 years ago a high mortality-rate occured among kits in several litters in the Standard type mink. After a couple of years work Christensen, Fischer, Knudsen, Larsen, Sørensen & Venge described the symptom-complex as: "Syndrome of Hereditary Tyrosinemia in mink" (Can J Comparative Med, Vol 43, N° 3, July 1979).

In spring 1979 there were born litters where the parents were known as conductors of the tyrosinemia-gene. From the previous work it was obvious, that the disease would breake out in the middle of June, when the kits were 6-7 weeks old. The 6. of June blood-samples were taken from all kits with conductor-parents and analysed for the amount of serum-tyrosine. At this time 9 kits showed elevated serum-tyrosine to about 20-50 times the normal value (0.01-0.03 mM). The disease started a week later and only the 9 kits with elevated serum-tyrosine the 6. of June got diseased.

Necropsies were performed on all 9 kits and 3 normal litterbrother/sisters. The Pathology was similar to the changes in the report from Christensen et. al. 1979 except that the cornea was investigated, too. The gross changes of the cornea was limited to a little paleness and opacity; the histopathological changes were necrosis and desquamation of greater parts of the stratified squamous epithelium and migra-

tion of neutrophilic granulocytes into damaged epithelium, into Bowman's membrane and substantia propria corneae. Several tissue (e.g. cornea, kidney) have been taken out for later ultrastructural research.

Serum-samples and the liver from the affected kits were frozen and kept at respectively -18°C and -40°C untill use. The same technics as Christensen et al 1979 were used for measuring the serum-tyrosine amount; The liver was investigated with regards to the 2 enzymes in the tyrosine-catabolism: tyrosine aminotransferase and 4-hydroxyphenylpyruvat dioxygenase. Serum-tyrosine showed quite the same elevation as found by Christensen et al. With special routine enzyme-assays there were shown a lack of activity of the tyrosine aminotransferase in the diseased liver, while the control-kits had activity of this enzyme; the 4-hydroxyphenylpyruvat dioxygenase had activity at the same level both in the diseased and normal liver (all results will be published later in all details).

The human type II of Hereditary Tyrosinemia consists of the same changes, except that the renal papilla-necrosis has not been reported; The mink tyrosinemia shows most conformity with this human type with regards to the present work.

In late August & September a peculiar disease occured among kits. Only 1-2 kits in the affected litters were diseased with these symptoms: bleeding ulcera at all pads and at the nose; the kits were loosing weight, but most of the affected kits were alive at the normal time of killing in November/December. All the affected kits were slightly inbred. The disease occured for the third time in 1979 and with increasing number of sick kits. Necropsies were performed on 4 diseased kits; the gross changes and the histopathology were nearly similar to the "normal" type of tyrosinemia in mink. Serum-samples taken from 2 sick kits showed elevated serum-tyrosine and phenylalanin to a minor extend. At this mont we are working with measuring the activity of tyrosine aminotransferase and 4-hydroxyphenylpyruvat dioxygenase.

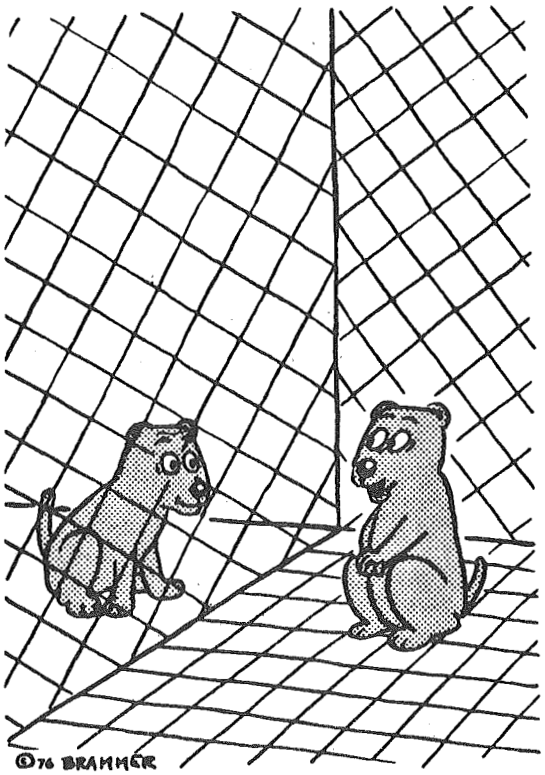
The kits with this special kind of tyrosinemia must have a unknown to handle the elevated tyrosine content in the blood.

A diet with low content of phenylalanin & tyrosine are used to the diseased kits of this new type of tyrosinemia, and at this time the ulcers of the pads and nose are in some healing.

I would be interested to hear about similar symptoms from other countries as far as they have been observed.

2nd Internat. Congress in Fur Animal Production,
Denmark 1980.

Authors summary.



The new diet are helping me untill the doctors find out how to eliminate my tyrosinemia!

EVALUATION OF REPRODUCTION PERFORMANCE OF MALES OF SILVER FOXES/VULPES VULPES L.

doc. dr. hab. Andrzej Frindt, SGGW-AR Warszawa, Poland.

The main factor influencing on farm production effects is reproductive performance of animals, dependent on males as well on females.

The higher influence of males on reproduction is connected with polygamous system of mating, being in common use to date. In breeding of silver foxes particular note has been taken of the female influence on reproductive performance. Therefore the attempt of estimation of male reproductive performance seems to be interesting. The informations obtained in this study will have not only cognitive value, but they will be useful for practise too.

In Poland investigations of reproductive performance of foxes were made by Bednarz, Woliński, Slawoń. The foreign literature they can be cited Demmol, Richter, Kostroń, Schmidt, Iljina, Bojcow.

There were used in regard of male reproductive performance, the date, in 197o-1979 years from 2 state farms in central region of Poland.621 males of silver foxes were investigated. In each year the male to female ratio was 1:4. Animals were the same origin, they were almost the same in respect to exterior and they were reared in the equal conditions, typical for Polish breeding. The estimated population was divided into groups, depending on length of period of reproductive utilization of male.

The date were examined for:
- the length of copulation season
- rhythm of copulation/length of intervals in season/
- relative effectiveness of mating, estimated on base of index "s", s = number of kitted females/number of mated females.
- useful reproductive value of males "Wrs", where Wrs = number of matings by male x 100%xp/length of reproductive season of male in days

p/correction/=length of reproductive season of male/mean length of reproductive season in that season.

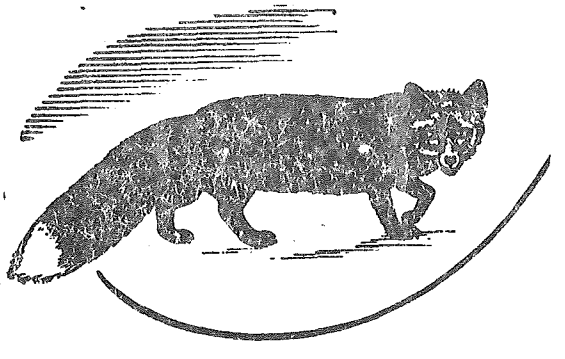
1) The shorter reproductive season/13,5 days, characterized the 1-year old males.
2) The length of interval in older males prolongated imperceptibly/ average interval for all the males-18,8 days/.
3) The higher number of matings in season/over 1o pairings/characterized the males from 3 to 5 years/21,7%-14,9%-14,7% of total population/.
4) 3 and 4-year old males characterized the highest index "s"/3-year old-o,88 4-year old-o,9o, average index for population was o,86/.
5) The index "Wrs" increased in older males/2-year old-34,9%, 5-year old-42,5%/.

1. Culling level used in breeding was high/2-year old males made up 56% of population, 6-year old-ca. 5%.
2. The obtained results indicate the best reproductive performance, characterized males in age from 3 to 5 years.
3. The estimation of older males was difficult owing to small number of evaluated animals.
4. The 5-year period of reproductive utilization of males may be recommended in practice.

1o references, 3 pages.

2nd Internat.Congress in Fur Animal Production.
Denmark 198o.

Authors summary.



REPRODUCTION AND BREEDING OF THE RACCOON DOG

Valtonen, M. and Mäkelä, J.
Department of Physiology, College of Veterinary Medicine, 00550 Helsinki 55 and Helve Research Farm, 02880 Veikkola, Finland.

First trials to farm raccoon dogs (Nyctereutes procyonoides) in Finland were performed in 1971 and 1972. Since then, the farming of this fur-bearing species has increased marcedly, the number of animals in breeding being now about 10,000. Studies in the reproductive features and polygamous mating has been undertaken since 1974. As a canid species, the raccoon dog is seasonally monoestrous and naturally monogamous. The heat can be detected by alterations in external genitalia and temperament. Vulval swelling during the proestrus is only moderate, but the discharge, mucopurulent in character, may be quite abundant. During estrus the vulva lips are often seen separated. In our study of 35 estrous cycles, proestrus lasted about 8 days ranging from 2 days to 2 weeks. Estrus lasted for 4 days, ranging from 2 to 6 days. The mean duration of the gestation period was 61 days and ranged from 58 to 64 days. The cornification of vaginal epithelium in estrus was weak and leucocytes were present in the vaginal smear troughout the proestrus and estrus (Fig. 1). The levels of ovarian steroid hormones in the plasma of the raccoon dog showed the same concentration profile during estrus and pregnancy as in the dog and fox. The plasma level of estradiol-17β reached its maximum in proestrus and fell rapidly to a low level after coitus. The progesterone level was low during proestrus, increased then rapidly after coitus and rose to the maximum during the first half of pregnancy (Fig. 2).

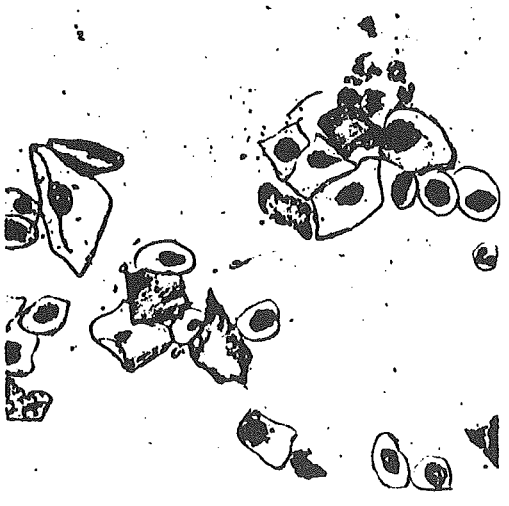


Fig. 1. Vaginal smear of raccoon dog in estrus. Anuclear, superficial, intermediate and parabasal cells are present as well as leucocytes and spermatozoa. (Valtonen et al. J. Reprod. Fert. 51, 519, 1977.)

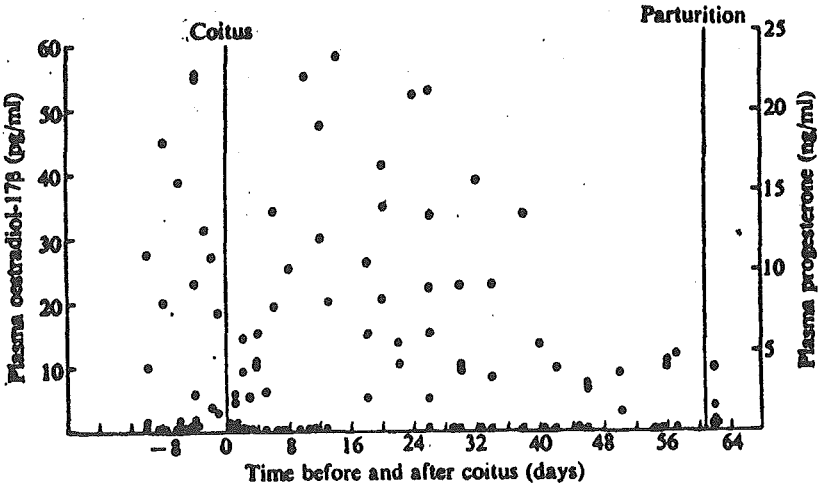


Fig. 2. The concentrations of estradiol-173 (•) and progesterone (o) in the plasma of six raccoon dogs during estrus and pregnancy. (Valtonen et al. J. Endocrinology 76, 89, 1979.)

Fig. 3

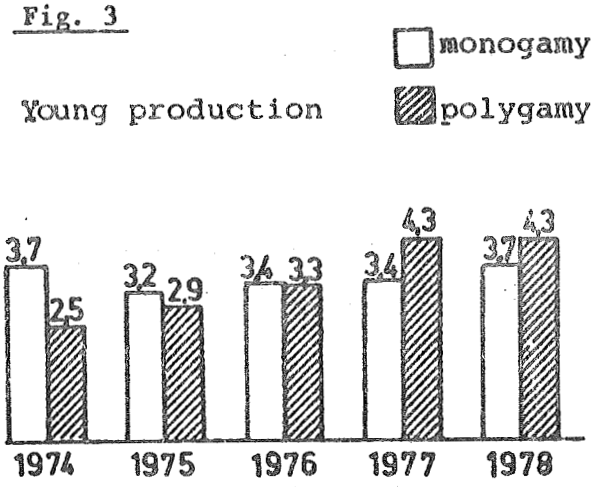


Fig. 4

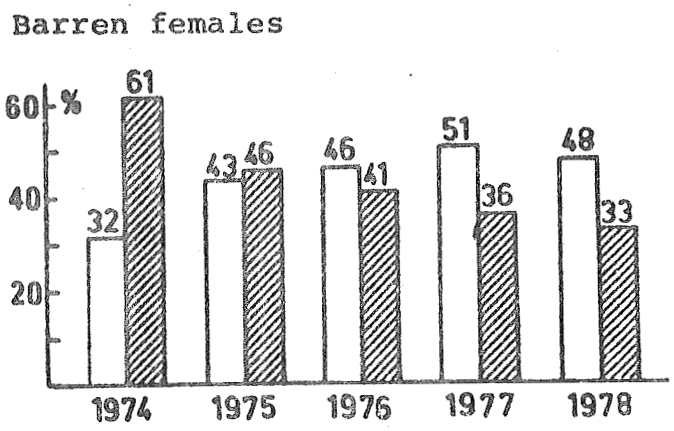


Fig. 5

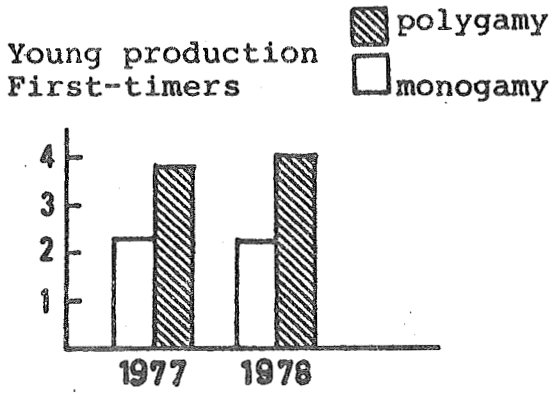
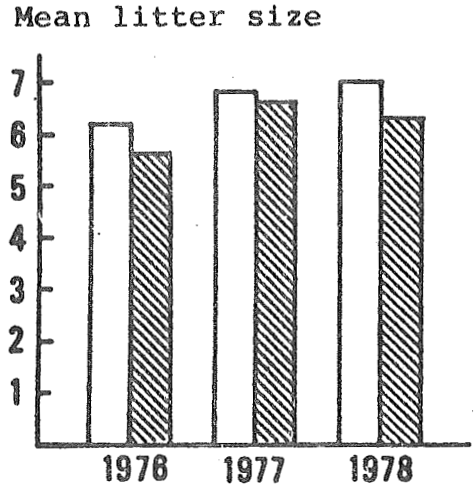


Fig. 6



The follow-up study of breeding results in Finland has revealed the advantages of polygamous mating also in raccoon dog production. (Valtonen & Mäkelä) Turkistalous 51, 89, 1979).

Fig. 3. Young production in polygamy, counted as the ratio of young to the total number of females, exceeded the production in monogamy already in 1977.

Fig. 4. Number of barren females has decreased continously in polygamous breeding.

Fig. 5. Success of the young females, first-timers, in polygamy indicate an exceptionally good adaptive capacity of the raccoon dog.

Fig. 6. Mean litter size is higher in monogamy than polygamy indicating that the polygamous breeding performance is not yet optimal.

Increasing the litter size and decreasing the number of barren females are objectives of precent and further studies.

2nd Internat. Congress in Fur Animal Production,
Denmark 198o.

Authors summary.

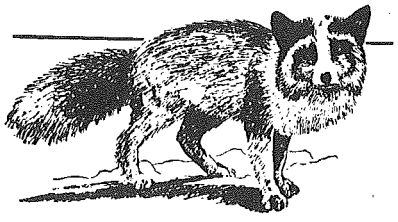
SEASONAL CHANGE IN FINE STRUCTURE AND FUNCTION OF LEYDIG CELLS IN THE BLUE FOX (ALOPEX LAGOPUS).

Kjell Andersen, Inst. of Reproductive Physiology and Pathology, Vet. College of Norway, Postbox 8146, Oslo-Dep., Oslo 1, Norway.

The correlation between ultrastructural alterations and presumptive change in endocrine activity was studied in the Leydig cells of 17 blue foxes castrated at different times of the year.

In the reproductive season (March and April),with high concentrations of plasma testosterone and very active spermatogenesis the Leydig cells had large and leight nuclei, few lipid droplets, ovoid mitochondria with tubular cristae, and a well developed agranular endoplasmic reticulum (AER). During early regression the mitochondria became large and pleomorphic, and the AER was arranged in concentric whorls. Later, when the activity seemed to have reached basal levels, the nuclei were small and dark, the number of lipid droplets increased, the mitochondria were rod-shaped with lamellar cristae, and the whorls of AER decreased. During the period of increasing activity the nuclei enlarged, the endoplasmic reticulum displayed both granular and agranular profiles, the mitochondria were sometimes dark and cup-shaped, and the number of lipid droplets decreased gradually.

23 references, 1 table, 1o figurs.
Internat. Journal of Andrology, 1, 1978, 424-439.
Authors summary.



MEASUREMENT OF ELECTRICAL RESISTANCE OF THE VAGINAL SMEAR/MUCOUS MEMBRANE IN THE BLUE FOX (Alopex lagopus) AND THE SILVER FOX (Vulpes argenteus) AS AN AID FOR HEAT DETECTION

D. Møller & K. Frøysedal
The Research Farm for Furbearing Animals,
Veterinary College of Norway.

In the present report an attempt is made to present new data concerning repeated measurements of the electrical resistance of the vaginal smear/mucous membrane in farm foxes during the oestrous period.

In both blue fox and silver fox the measurement of the electrical resistance seems to be a useful method to determine the optimum time for conception during oestrus.

Blue fox:

Table 1 shows that the resistance values were fairly constant up to about 5 days before male acceptance. As determined with our instrument (1) the values ranged between 50 and 150 Ohms during this part of the pro-oestrous period. Towards the end of the pro-oestrus (i.e. 3 to 4 days before sexual receptivity) significant elevations of the electrical resistance were observed; reaching its maximum (range 250 - 900 Ohms) around the 1st day of sexual receptivity.

A rather pronounced individual differences were observed concerning the duration of the peak ranging from 2 to 6 days.

Towards the end of oestrus the electrical resistance always decreased rather quickly. Coinciding with the day the vixens went out of heat the resistance values declined to about 200 Ohms (range 125 - 250 Ohms).

Table 2 shows clearly that a significant decline in the electrical resistance began about 53 days before parturition. Bearing in mind that the gestation lenght in blue fox is 52-53 days, the observation suggest that the decrease of the resistance values corresponds with the estimated time of ovulation.

Silver fox:

Table 3 shows the vaginal electrical resistance values in 18 silver fox vixens examined. In these animals the electrical resistance profile shows nearly the same pattern as in the blue fox vixens (cf. Table 1).

General comments:

The day-to-day changes of the electrical resistance during the late pro-oestrous phase are presumeably initiated by the rise in oestrogens. Beginning a few day before sexual reseptivity an increase in peripheral plasma oestradiol levels is observed reaching its maximum 1 or 2 days before the 1st day of male acceptance (2). It is assumed that the electrical resistance values reflect the plasma oestrogen profile during oestrus.

To what extent the vaginal electrical resistance peak value corresponds with the LH-peak is unknown. There seems to be no informations about this hormone in the blue fox or in the silver fox.

A single measurement in a individual animal only allows for a limited evaluation, since individuals differ in their resistance levels. Through repeated measurements in a given animal, a characteristic increase of resistance during oestrus kan be detected independent of the absolute values.

Table 4 shows that in the blue fox vixens the method has been useful in correlating high conception rate with high resistance of the vaginal smear/mucous membrane during oestrus.

It is reasonable to assume that exact measurements of the electrical resistance by itself may allow indirect conclusion about the ovulatory phase. Thus, the intravaginal measurement of the farm foxes seems to be a useful method to determine the optimum time for conception during oestrus. The method offers opportunities for determining oestrus objektively in large populations under field conditions. This would be especially useful as an aid to diagnose oestrus and optimal time for breeding by artifical insemination.

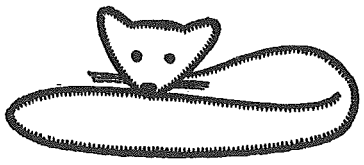
(1) The instrument (Ohmmeter) is developed by dr. E. Metzger, W. Germany

(2) To be published in Acta Vet. Scand.

4 tables, 6 pages.

2nd Internat. Congress in Fur Animal Production,
Denmark 1980.

Authors summary.



VAGINAL CYTOLOGY AND HISTOLOGICAL PICTURE OF THE OVARIES DURING HORMONAL INDUCTION OF OVULATION IN POLAR FOXES

S.Jarosz and W.R. Dukelow
Institute of Animal Nutrition, Agricultural Academy in Krakow

Summary

Studies were carried out on cytohormonal changes in the vaginal epithelium of polar vixens during natural sexual cycle and after hormonal induction of estrus and ovulation. Changes in the ovarias of the hormonally induced vixens were also studied.

In 24 vixeus during natural sexual cycle an occurrence of superficial cells was stated as well as of basophilic ones in the vaginal smears about 6 days before estrus.At 1-2 days before copulation superficial acidophilic cells were found to dominate /60-30%/ in the cytological picture and among them it was possible to distingnish those with picnotic nucleus as well as cornified cells charakteristic of estrus stage.

After inducing estrus by means of hormonal sequences: Gr.I - progesterone + FSH + HCG, Gr.III - HCG alone /both in the periods of 6 dasy injections/ on 6-th day of hormonal administration,in the vaginal smears were found superficial acidophilic cells with vesicular nucleus as well as cornified and with picnotic nucleus typical of estrus stage. In Gr.II /hormonal sequence FSH + HCG/ were only observed in this period superficial cells with vesicular nucleus typical of early estrus stage. In the control only basal and parabasal cells, mostly basophilic, were found.

Thirty-six hours after the last injection of HCG ovulation occurred only/average 4,7 on both ovaries/ in females of Gr.III where during 6 days 4 doses of HCG of 100 and one of 500 i.u. In the hormonally induced females the number of Graafian follicles with a diameter of over 2 mm was on an average per ovaries from 4,4 in Gr.II to 30,1 in Gr. III. In control no Graafian follicles were observed which would appear above ovarian surface. Luteinization of granulosa cells was very clear in the preovulatory follicles only in the Gr.III/females treated HCG alone/

14 references, 3 tables, 1o pages.

2nd Internat. Congress in Fur Animal Production, Denmark 198o. Authors summary.

PRENATAL AND EARLY POSTNATAL MORTALITY IN MINK

by
EINAR J. EINARSSON
Department of Poultry and Fur Animal Science
Agricultural University of Norway, 1432 Ås-NLH, Norway

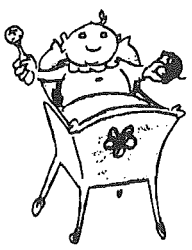
The number of kits produced is of great importance for the economical results in the mink farm. Two of the most important factors affecting this trait is fertility and vitality. The latter will influence prenatal and eraly postnatal mortality in mink. This may in different ways be affected by the individual itself, the dam and the sire.

The number of kits at weaning time is a product of different factors starting with the number of ovulated eggs. These factors and the losses at different stages are discussed. The loss from ovulation to birth for single mated females is 50-65 per cent. The number of stillborn kits may vary, depending on the accuracy of observation and proportion of 1 year old females, but will be up to 10 per cent. About 50 per cent of these kits were alive at birth. The loss from birth to 6 weeks of age, excluding stillborn kits, may be about 15 per cent.

Some possible causes for the prenatal and early postnatal mortality in mink is summerized and some investigations of these causes are reviewed.

28 references, 3 tables, 1 figure, 14 pages
2nd Internat. Congress in Fur Animal Production,
Denmark, 8-10/4 1980.

Authors summary.



THE CONTROL OF PROGESTERONE SECRETION IN THE PREGNANT MINK

Lise MARTINET, Catherine ALLAIS, D. ALLAIN*
Station centrale de Physiologie animale and * Laboratoire des Pelages, Toisons et Fourrures, Institut National de la Recherche Agronomique, 78350 Jouy-en-Josas, France

In the Mink (Mustela Vison) pregnancy length depends on the date of mating ; the later mating occurs in the breeding season, the shorter the length of pregnancy. Artificially increasing the day light ratio decreases the length of pregnancy.

The termination of embryonic diapause responsable of the large variation in pregnancy length is associated with the secretion of progesterone by the corpora lutea.

In a study on the factors triggering the progesterone secretion the following results were obtained.

1) In females kept under natural day light concentrations of plasma progesterone begin to rise between 20 and 30 March whatever the date of mating (Fig. 1).

2) Artificially increasing or decreasing the day light ratio has a stimulatory or delaying effect on progesterone secretion (Fig. 2).

3) Prolactin is the main luteotrophic hormone in the Mink , daily injection of prolactin induced earlier progesterone secretion leading to earlier blastocyst implantation and shortening of pregnancy (Fig. 3). On the opposite daily injection of 2-Bromo-α-ergocriptin, a prolactin inhibitor delayed progesterone secretion as long as it was given (Fig. 4).

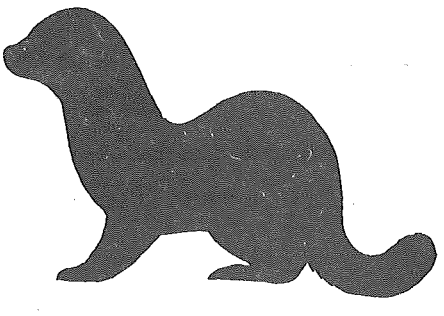
4) Mating procedures also regulate the length of pregnancy which is always shorter in females mated twice at 7-10 day intervals than in female mated only one (Fig. 5).

5. LH may also play a luteotrophic role : in females mated twice at 7-8 day intervals or mated once and treated with HCG 7 days later, plasma progesterone began to rise earlier as compared to the control females which were mated once (Fig. 6).

Therefore prolactin and LH are involved in the luteotrophic process before implantation in the Mink.

6 figures, 1 page.

2nd Internat. Congress in Fur Animal Production,
Denmark 1980. Authors summary.



EFFECT OF PHOTOPERIOD ON THE DEVELOPMENT OF REPRODUCTIVE FUNCTION IN YOUNG MINKS.

D.V. Klotchkov, Institute of Cytology & Genetics, Academy of Sciences of the USSR, Novosibirsk, U.S.S.R.

In the course of 1973-1978 we studied the development of reproductive function of young Standard and Sapphire minks which were maintained under different photoperiodic conditions:

I. Daylight schedule shortened to 8 hours from 1st July to 1oth October.

II. Continuous illumination from 2oth June to 2oth July following by daylight shortened to 8 hours from 21st July to 1oth October.

The photoperiodic conditions affects the reproductive function of animals. This effect is realized by means of special optico-neuro-endocrine mechanism. The scheme of this mechanism is following: the light is perceived by eyes and light-information by means of special optico-vegetative pathways attains the central nervous system, where the data of external and internal conditions are integrated. Recently the role of the pineal gland in evaluation of photoperiodic information was demonstrated. The function of the pineal is connected with hypothalmus, hypophysis and gonads. There is no information of how the pineal, or other neuro-endocrine system control long term adaptation of reproductive function to environmental conditions; but it was shown that maintenance of mink in shortened daylight enhanged significantly the function of hypothalamo-hypophyseal neurosecretory system (HHNS) and increases its reactivity to subsequent illumination. The role of summer longdays in determination of the level of reproductive processes in breeding season was not clear. The result of this work respond on this point positively. It seems that HHNS, which controls the reproductive function reacts by activisation of its function to changes in light conditions (continuous light - shortened daylight). Continuous illumination without subsequent shortening of daylight did not affect the reproductive function (unpublished).

In nature, long days of summer produced favourable conditions for subsequent seasonal shortening of daylight (autumn, winter). Spring increasing daylight, brings the sexual system function to maximum level.

Thus, at least for the young minks the preparatory phase, described by Wolfson consists not only of the phase of shortened daylight, but also includes the long days preceding.

The experiments have shown that photoperiodic programming may brings the function of sexual system of minks to higher level of productivity.

In early postnatal period the development of the sexual system in mutant Sapphire mink is delayed in comparison to Standard animals, which is expressed in decreased weights of gonads and uteri in the mutants in October. In November, genetic differences are expressed not as clearly as in October. It is to be pointed out, that the value of ration weight of uterus/weight of ovary shich expresses to a certain degree the rate of secretion of the ovary, in Novembeer in Sapphire minks is higher than in Standard, which evidences for higher level of secretory processes in mutant minks i comparison to Standard.

11 references, 3 tables, 1o pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 198o.

Authors discussion.

HORMONAL AND PHOTOPERIODIC REGULATION OF SPRING AND AUTUMNAL MOULTS IN MINK.

J. Rougeot, D. Allain, Laboratoire des Pelages, Toisons et Fourrures, Institut National de la Recherche Agronomique, 7835o Jouy-en-Josas, France.

It has been known for several decades that the seasonal coat moult

in mammals is regulated by the photoperiod. The spring moult produces a thin flat coat and the autumnal one a thick, long winter coat, each moult being induced by a different photoperiod. Althouth numerous studies have been done on the normonal regulation of the hair follicle cycle, no satisfactory explanation has been furnished for the induction of these moults or for the neuro-endocrine mechanism of the hypothalamo-pituitary system triggering them.

As RUST and MEYER (1969) who, using melatonin implant in the stoat, obtained renewal of the coat, white hair replacing the pigmented pelage, we carried out this experiment on the mink. In a second experiment, we studied modifications in the structure and composition of the pelage in relation to the photoperiod.

I. MELATONIN INDUCTION OF AUTUMNAL MOULT IN MINK.

The autumnal moult begins at the tip of the tail at the end of August; the pigmentation then progresses anteriorly and in the ventro-dorsal direction. On the other hand, the spring moult progresses posteriorly and usually does not affect the tail.

The melatonin implants induced a moult 5 to 6 weeks before the normal time; that moult had the characteristics of an autumnal moult, as observed by the gradient of hair changes over the body and the high number og hair follicles per bundle. The winter coats produced in this way were mature in the early days of October, i.e. 6 to 7 weeks before those of the control group. Thus, melatonin implants administered in the long days induced an autumnal moult in mink producing a winter coat, and one element of the neuro-endocrine mechanism controlling photoperiod-dependent moult is evident.

II. MODIFICATIONS IN THE STRUCTURAL AND COMPOSITION OF THE PELAGE TO PHOTOPERIOD.

Five adult female Pastel mink were kept in two closed rooms without windows from July 1977 to July 1978; the temperature ranges from 18

to 23° C. Photoperiodicity in the experimental group (2 females) was characterized by a daily light amplitude varying from 8 to 16 hours and lasting for 6-month periods; the normal periodicity in our latitude (12 months) was used for the control group of 3 females.

The 3 control mink showed a normal autumnal moult from mid-August to mid-October and the normal spring moult from early April to the end of May.

The semestrial light rhythm induced an autumnal moult in the 2 experimental mink 5 weeks before the normal time in the decreasing day phase. The winter coats produced in that way were mature in mid-October and had a higher number of hair follicles per bundle than the normal preceding summer coat. The next moult took place in the second light cycle period of decreasing day, and consequently gave a winter coat.

Thus, as sheep in semestrial light rhythm (ROUGEOT, 1961), the mink never had a spring moult or a summer coat, presenting only a single autumnal moult in the decreasing days always following by a winter coat. We observed small, irregular peaks of primary hair follicles in anagen in the long-day phase, but there was no general moulting and hair follicle density was unchanged. These peaks might be interpreted as a tentative spring moult.

1 table, 3 figures, 4 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 198o.

Abstract: G. Jørgensen.

PATTERN OF STEROID SECRETION IN THE RED FOX (Vulpes vulpes L.)

M. MONDAIN-MONVAL, M. BONNIN*, R. CANIVENC* and R. SCHOLLER
Fondation de Recherche en Hormonologie 67/77 boulevard Pasteur
94260 FRESNES (France) ; Laboratoire d'Endocrinologie Expérimentale
Université II Bordeaux* - 33076 BORDEAUX CEDEX (France)

S U M M A R Y

In the red fox, the pattern of steroid secretion during the reproductive season (March-April) was characterized by an increase of peripheral plasma estradiol (E_2) ($\bar{x}$ = 254 pg/ml) and by a surge of androstenedione (A) secretion ($\bar{x}$ = 1534 $\pm$ 458 pg/ml) just before the beginning of the progesterone (P) increase. P levels were above 5 ng/ml for 50 - 56 days and then between 2 - 6 ng/ml for about 150 days.

The hormonal status and the ovarian morphology varies during the anoestrus which lasts 9 - 10 months. E_2 was released episodically while P secretion remained low and level of A started to increase from October when follicles began to develop. There was no A peak which could be associated to this E_2 release. Follicles at different stages of development were present in the cortex and they could be stimulated by gonadotropins, even in the early anoestrus when corpora lutea were still well-developped.

5 figures, 6 references, 5 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 198o.

Authors summary.

ORGAN DISTRIBUTION OF ENZYMES IN MINK

T. Juokslahti, P. Lindberg and J. Työppönen
College of Vet. Medicine, Dept. of Biochemistry, Hämeentie 57,
oo55o Helsinki 55, Finland.

The determination of enzyme activities in serum is a common tool for diagnosis of different diseases. Elevated serum levels of enzymes are always a sign of cell damage. The absolute enzyme content and even the relative distribution of enzymes in different tissues are not necessary the same in different species of animals.

The purpose of this study was to find out the absolute and relative enzyme levels of some organs in healthy mink. The knowledge of the organ content of enzymes is a prerequisite for evaluating serum enzyme levels in future diagnostic work on various dietary and disease conditions in mink.

Tissue samples were taken from ten male standard kits and frozen immediately. For analysis one gram portions of each tissue was homogenized in 9 ml of cold medium (water or buffer solution) in a Potter-Elvehjelm apparatus and centrifuged cold. The determination of enzyme activities of the homogenate supernatants was carried out the day the homogenate was done, or the supernatant was kept in deep freeze until analysing. Standard enzyme assay methods were used. The organ distribution of enzymes are presented in Table 1. as absolute activity and in Table 2. as relative activity.

As can be seen from the results the distribution of the enzyme activities differs in some respect from that reported earlier for human and for domestic animals. For example, in mink gamma glutamyl transferase (GGT) hardly can be regarded as a specific liver enzyme, as the highest activities were found in pancreas and kidney. Ornithine carbamoyltransferase (OCT) was almost exclusively found in the liver, and a preliminary measurement of the OCT activity in serum thus seems to be a promising diagnostic tool.

Alkaline phosphatase (AFOS) was found in the highest concentrations in kidney and intestine, in the other organs its activity was negligible. Alanine aminotransferase (ALAT) had the highest activity in the liver; the heart muscle had 23.2 % relative concentration and the other organs still lower. Aspartate aminotransferase (ASAT) had high activity in heart muscle, liver, skeletal muscle and kidney. Creatine phosphokinase (CPK) showed high activities in the heart and skeletal muscles and in the stomach. Lactate dehydrogenase (LDH) had its highest activity

in the skeletal and heart muscles and in the liver. Glutathione peroxidase (GSH-Px) was fairly evenly distributed in the various organs studied. Sorbite dehydrogenase (SDH) showed highest activity in the liver and kidney.

2 tables, 4 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 1980.

Authors summary.

AMINO-ACID PROFILE OF THE PLASMA, PELT AND HAIR OF THE ADULT MINK

E.R. Chavez, Dept. Animal Science, Macdonald Campus,
McGill University, Montreal, P.Q., Canada

ABSTRACT

Eight adult male mink were used in this study including 4 Pastel and 4 Demi-Buff mink. Plasma-free amino acid indicated that histidine and lysine are the most distinctive essential amino acids between these two strains of mink. Histidine is much higher in Pastel, while lysine is in higher concentration in Demi-Buff. The amino acid profile of the protein of the mink pelt appears to be very similar in these two strains of mink. Arginine, leucine and lysine are the essential amino acids with the highest concentration. In general, the pelt protein represents the characteristic amino acid profile of collagen. The amino acid profile of the mink hair indicates that cystine accounts for about 18% of the amino acid content of the protein, which is typical of keratin. This distinctive amino acid profile present in the mink hair appears to be almost identical in Pastel and Demi-Buff mink.

4 references, 6 tables, 7 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 1980.

Authors abstract.

VARIATION IN BODY COMPOSITION OF MALE MINK DURING GROWTH

*CHARLET-LERY Geneviève - FISZLEWICZ Michèle - MOREL Marie Thérèse - D. ALLAIN**

Laboratoire de Physiologie de la Nutrition
Laboratoire des Pelages, Toisons, Fourrures*
CNRZ - INRA - 78350 - JOUY-EN-JOSAS - FRANCE

Body composition was studied in 36 growing male mink that were divided into 6 groups at weaning (in July), on the basis of equal mean body weights (750 g) and age (70-77 days). The animals were fed a pelleted diet ad libitum, containing 44% protein and 5460 kcal/kg dry matter. Successive groups were killed at the average weights of 742, 1003, 1231, 1759 and 1838 g. Others minks were choosen in different litters at birth 21, 56 and 70 days of age, weighing 125, 350 and 750 g.

During the whole experimental period, the mean weight of stored lipids increased 0,14 at birth to 659.9 g., the protein content from 1 g to 320.0 and minerals from 0.15 to 46.8 g. During the days 56 and 71, when the weight of animals increased from 347 to 742, the daily body protein retention was the highest (5,7 g). The protein gain made during this period was 27 % of the whole protein gain. Since this period, the daily retention of protein decreased drom 5.7 g/d to 0.3 g/d, while the lipid retention increased from 3.6 to 8.9 g/d during the experiment. In the growth period 732-1838 g, the total energy and protein efficiencies (table 3) were very low : 10.1 and 3.3 respectively.

It was concluded that mink are characterized by : 1) a very high lipid retention resulting at the end of the growth period in a fat content of 65.5 % dry matter and 2) very low efficiencies for energy and protein retention revealed by the methods of fasted body analysis used.

4 references, 1 table, 1 figure, 7 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 1980.

Authors summary

AN IMPROVED TYPE C BOTULISM TOXOID

BY

Herbert Kammer, Edward Carroll, Terry Cairns, Ted Mc Kenna
United Animal Science
7819 Airport Road
Middleton, Wisconsin 53562, USA

Protection against botulism is a major concern in mink farming. The main factors which determine the level of immunity to botulism in mink are the quality and quantity of toxoid per dose and the timeliness of vaccination. In recognition of the worldwide shortage of high quality feed ingredients, our laboratory engaged in a four year program to improve the protection level of our toxoid.

The findings indicate that a positive relationship appears to exist between toxoid potency tests conducted in both mink and mice. As the antigenic strength of the toxoid increases, higher dilutions protected both animals against a standard toxin challenge. Consequently, one can expect a standard 1 ml dose of toxoid to protect mink against a higher level of toxin in the feed.

5 tables, 1o pages.
2nd Internat. Congress in Fur Animal Production
Denmark 198o.

Authors summary

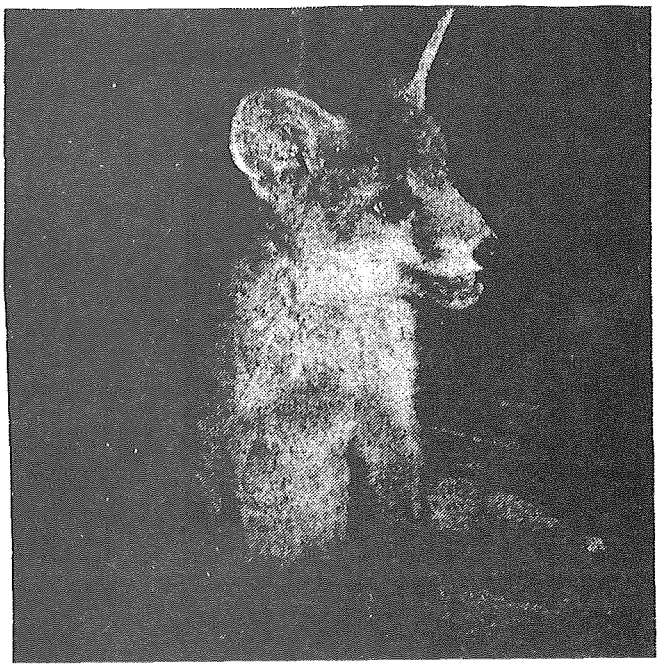
SERIOUS OUTBREAKS OF BOTULISM TYPE C IN BLUE FOXES.

J. Haagsma,
Central Veterinary Institute, Prof. Poelslaan 35, Rotterdam, The Netherlands.

In this paper 6 outbreaks of botulism type C in blue foxes are reported. The most dominant symptom is the general paralysis, starting in the hind legs.
In some outbreaks heavy losses occurred and in the most seriously attacked farm the mortality amounted to 298 foxes, both young and adult, which was 19.3% of the farm population.
In diagnostic examinations in the laboratory botulinum toxin type C was very carefully demonstrated in blood of diseased foxes and in liver, lungs and digestive tract by post mortem examination.
Four outbreaks were related with offal from poultry, one with chicken cadavers and one with offal from cattle.
Type C-toxin was demonstrated in the suspected food when available, in which the concentration varied from 1000 to 640,000 mouse LD_{50} per gramme.
In a series of experiments the intraperitoneal and oral susceptibility of blue foxes to type C was determined.
It was found that foxes can orally suffer very large amounts of toxin before they catch botulism.

6 tables, 1o pages.
2nd Internat. Congress in Fur Animal Production.
Denmark 198o

Authors summary.



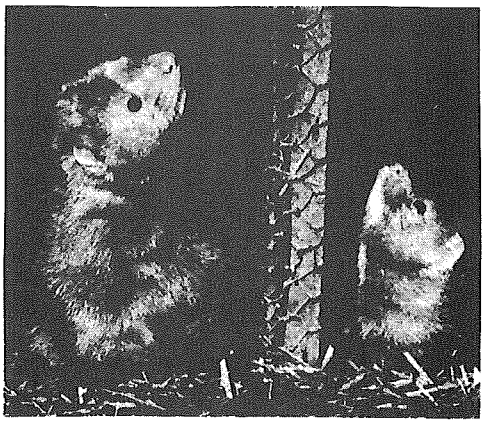
PURIFICATION AND CHARACTERIZATION OF ALEUTIAN DISEASE VIRUS

Bent Aasted. Department of Veterinary Virology and Immunology.
The Royal Veterinary and Agricultural University of Copenhagen,
13 Bülowsvej, DK-187o Denmark.

Virus was isolated from infected mink organs by a combination of tissue homogenization, fluorocarbon extraction and ultracentrifugation. The final preparation was analysed by crossed immunoelectrophoresis and electronmicroscopy. Virus had a capsid diameter of 22nm. About loo times more ferritin particles were found than virus particles. Preparative agarose electrophoresis separated virus from ferritin. Crossed immunoelectrophoresis of virus gave a single precipitate with sera from infected mink. Crossed immunoelectrophoretic analysis with intermediate gels showed that a part of the virus preparation was complexed with antibody. Serum from a certain mink was found to contain precipitating antibody to DNA. Virus and virus-antibody complex was found to focuse at pH 4.o-4.4 in isoelectric focusing. In SDS-polyacrylamidegel-electrophoresis the main virus protein was found to have a M_r of 69000 and two minor proteins M_r values of 86000 and 59000. Iodination (oxidation) was found to degrade these virus polypeptides to smaller ones. The study strongly confirms the impression that aleutian disease virus is a parvo virus.

19 references, 9 figures, lo pages.
2ns Internat. Congress in Fur Animal Production,
Denmark 198o.

Authors summary.



ERADICATION OF ALEUTIAN DISEASE IN DENMARK. STATEMENT FEBRUARY 1980.

Mogens Hansen, Danish Fur Breeders Association, 60 Langagervej, DK-2600 Glostrup, Denmark.

If the CEP test shall be a success for the mink ranchers and the eradication shall be more than a body without a head it is necessary to build up the prevention:

PREVENTION = LABORATORY WORK + PROGRAM + CONTACT TO THE FARMERS

By means of this model the Danish Laboratory has worked in five years. As a result by testing ½ million blood samples the last year, 341 farms (16 per cent of all farms) are registered as shown in the table.

Registration of 341 Danish farms february 1980.

Group	Number of farms	Defination
A	15	Farm free of A.D.
B	15	2 test without positive reactors
D	31	Less than 1% positive reactors, which must be pelted
E	56	All positive reactors pelted
G	75	Less than 40% positive reactors and isolation
H	149	More than 40% positive reactors and isolation

2nd Internat. Congress in Fur Animal Production, Denmark 1980.

Authors abstract.

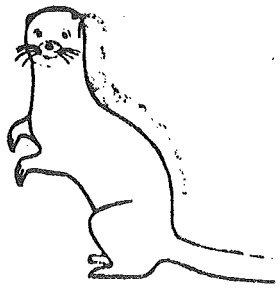
Contribution to the Epidemiology and Eradication of Aleutian disease.

by Dr. J. Haagsma and Drs. B.A. Bokhout

In the transmission of Aleutian disease both horitontal and vertical infections are reported.
However, there are no reliable figures concerning the relative influence of the two infection routes on mink-farms.
Moreover there is a lack in our knowledge with regard to the question of how horizontal spreading really takes place.
Therefore the presence of Aleutian disease virus (ADV) in saliva, faeces, urine and milk was investigated after the infection of 5 mink with a virulent ADV-strain or with an ADV-strain of low virulence, using for both strains a high and a low virus dose.
In 4 of the 5 infected mink ADV was demonstrated almost continuously until death in saliva and faeces, which on mink-farms results in the building up of high concentration of ADV, and in opportunities for an extensive horizontal spreading of AD.
In urine ADV was present irregularly and milk was only once examined but appeared to be positive for ADV.
At the moment the concentrations of ADV in positive samples are being determined. These results are compared with the susceptibility of mink for AD after infection by intraperitoneal, subcutaneous and oral route.
Concerning the vertical transmission the AD-status of the offspring from CIE positive females was examined. It was found that not the whole offspring becomes CIE positive and that at least a part of this CIE negative offspring can be utilized in building up an AD-free breeding herd.
This enhancement of the knowledge of the epidemiology of AD should be used in the eradication of AD, for which purpose the CIE has much better possibilities than the iodine agglutination test had.

6 tables, 8 pages.
2nd Internat. Congress in Fur Animal Production
Denmark 198o.

Authors summary.



Cell-Mediated Immunity in Mink with Aleutian Disease

S.H. An and B.N. Wilkie

Department of Veterinary Microbiology and Immunology,
Ontario Veterinary College, University of Guelph,
Guelph, Ontario, Canada. N1G 2W1

Discussion and Conclusions

The present study confirms previous reports (8) of defective T-lymphocyte function in mink infected with the Aleutian disease virus. That functional CMI may be instrumental in controlling expression of disease signs in ADV infected mink is suggested by comparisons of T-cell mitogenesis and of suppressor cell induction by T-cell mitogens in mink with NP-AD and P-AD. Mink with NP-AD, which had remained infected with ADV for at least 3 years at the time of this study, had significantly better PBL blastogenesis than did mink with P-AD in response both to lymphocyte mitogens and to ADV antigen.

Mink which were experimentally infected with ADV produced only transiently PBL which responded mitogenically to ADV antigen. By 7 weeks pi they were non-responsive. In our hands mink infected by laboratory methods develop P-AD. It may therefore be assumed that this observed difference in immune function may be instrumental in minimizing signs of AD in mink with NP-AD and deficiency of CMI may permit severe disease signs in mink with P-AD. Similarly the observed comparatively poor production of suppressor cells in mink with P-AD in contrast to those with NP-AD may permit the disproportionately high humoral immune response to ADV antigen which contributes to Aleutian disease signs in P-AD mink by formation of high levels of circulating immune complexes These new insights into the immunopathogenesis of ADV infection of mink may suggest new approaches to prophylaxis of AD in ranch reared mink.

1o references, 3 tables, 1 figure, 1o pages.
2nd Internat. Congress in Fur Animal Production
Denmark 198o Authors introduction and conclusion

Enzyme Linked Immunosorbent Assay of Aleutian Disease Viral Antibodies

P. Wright, F.J. DePauli and B.N. Wilkie

Department of Veterinary Microbiology and Immunology,
Ontario Veterinary College, University of Guelph,
Guelph, Ontario, Canada. N1G 2W1

Introduction

Aleutian disease (AD) is recognized throughout the world as the major cause of death, decreased production and loss of pelt value in ranch-raised mink (7). Control and eradication of AD in field situations presents many problems. Aleutian disease virus (ADV) may be spread by both horizontal and vertical routes (6,9). The virus is extremely resistent to damage by many chemicals, heat and extremes of pH (4). As well, AD may be present in a nonprogressive form (NP-AD) in which there are no overt clinical signs of disease; yet, the infected mink is a potential source of infection for susceptible mink (2,8).

Counterimmunoelectrophoresis (CIEP) (3) has been used extensively in our laboratory and by others (5) in an attempt to control or eradicate AD on commercial ranches. In our hands, complete eradication of AD has been achieved after 3 consecutive years of biannual testing on ranches presenting a low initial prevalence of reactors (10% initial prevalence of mink with anti ADV antibody). On ranches with an initial prevalence of reactors greater than 20%, we have been able to significantly reduce the number of reactors but have not been able to eliminate all reactors. Some ranches either present or convert to a prevalence of reactors greater than 80%. In this situation a test and slaughter program is not economically feasible. Utilizing both CIEP and the iodine agglutination test on these ranches, mink with progressive Aleutian disease (P-AD) can be crudely differentiated from mink with NP-AD on the basis of the hypergammaglobulinemia associated with P-AD. Mink with NP-AD appear to be a viable alternative to normal mink since NP-AD mink maintain their fur quality and reproduce effectively.

The raw materials of mink feed often contain enterotoxin producing staphylococci (Juokslahti & al., 1980). Moreover suitable conditions for staphylococcal growth (Chou & Marth, 1969) and production of pathogenic doses of enterotoxin exist during the warm season due to the feeding management - feed is kept on cage nettings at outdoor temperature for a feeding period of 24 h (Juokslahti, 1978).

Experimental staphyloenterotoxicosis was produced in minks by oral admistration of mink feed containing 5 or 200 µg of purified enterotoxin A per test animal. The animals became very exhausted after the ingestion of toxin. Vomiting was observed in 2 of 7 minks of the lower toxin group with a latent period of 2.5 to 4.0 h. The higher toxin concentration caused vomiting in 4 of 7 test animals with a latent period of 2.0 to 2.5 h. Vomitus was accompanied by strong salivation. Poor appetite was observed in 4 of 7 minks having ingested 5 µg of SEA, and 200 µg caused total loss of appetite in all the test animals. After a test period of 22 h all the animals but one had normal appetite. Diarrhoea was prominent in 3 of 7 minks with the low toxin concentration and in all with the high toxin concentration. Statistically significant hematological changes to the control group were an increase in neutrophil count and a decrease in lymphocyte count in the high toxin group. Significant changes in the blood chemical data were an increase in blood urea nitrogen with 200 µg of SEA and a decline in the cholesterol level in both toxin groups.

The other parametres investigated - albumin, total protein, phosphorus, creatinine, total bilirubine, α-tocopherol, alkaline phosphatase, alanine aminotransferase, aspartate aminotransferase, creatine kinase, γ-glutamyl transferase and lactate dehydrogenase - showed no statistically significant differences between the toxin and control groups. The picture of the post mortem examination of the minks in group I was normal. The stomachs of the minks of group II contained a bit of undigested feed. Their mucous membranes were slightly hyperemic. The large intestine and the small

Because of the limited success achieved with CIEP in the control and eradication of AD, we have turned out attention to a primary binding assay which has proven to be an effective serological technique in many other disease situations. The enzyme linked immunosorbent assay (ELISA) is a rapid and highly specific test, equal in sensitivity to the radioimmunoassay (RIA). However, the ELISA is much less expensive than RIA, the reagents are stable and the test can be performed easily and safely with no requirement for elaborate central facilities. As well, the ELISA is readily applicable to the large scale screening programs encountered in AD surveillance.

Discussion

Our initial experiments with the ELISA system appear to indicate several distinct advantages of the ELISA over CIEP. One major advantage of the ELISA is the net reduction in AD-Ag required for testing Optimal AD-Ag concentrations for ELISA testing are 8 fold less than required for CIEP. The ELISA is more sensitive than CIEP in detecting anti ADV antibody in low titered sera; at least 20 times more sensitive. Whereas low titered sera can easily be masked in CIEP by "fatty" or badly hemolyzed samples, the ELISA is completely objective since the ELISA is based on enzyme degradation and not a precipitin reaction.

1o references, 2 figures, 8 pages
2nd Internat. Congress in Fur Animal Production
Denmark 198o.

Authors introduction and discission

EXPERIMENTAL STAPHYLOENTEROTOXICOSIS IN MINK

T. Juokslahti, A. Niskanen, [illegible] Lindroth & T. Pekkanen

Staphylococcal infections are known to occur in mirks, but staphylococcal enterotoxin intoxication has not been previously observed.

intestine contained partly digested grainy feed and bloody mucus, the mucous membrane in this part of the digestive tract being strongly hyperemic. Several animals had the liver and the kidneys filled with blood. The mucous membrane of the small intestine of the minks in group III was hyperemic. The small intestine contained reddish mucus. The intestine gland was enlarged and the cut area was damp. The large intestine had dilatated parts containing bloody liquid, which in turn contained partly digested grainy digestion. Some of the animals in group III had blood congestions in the liver and the kidneys.

Disease outbreaks with symptoms similar to those observed in the present study have been occasionally noticed in commercial mink breeding. A new mink enteritis disease with a so far unconfirmed etiology has also been reported (Larsen & Gorham, 1975). Bacterial toxins were considered as a possible causative agent to the disease. The clinical symptoms of the present study closely resemble those of the new mink enteritis described by Larsen and Gorham (1975).

Wild minks usually eat only food which is captured and killed by the animal itself. They seldom eat cadavers (Gerell, 1975), contrary to the habits of some other carnivorous animals like foxes, dogs and raccoon dogs. Thus it is unlikely that mink would fylogenetically be accustomed to deal with common food poisoning toxins. The clinical symptoms (vomiting, diarrhoea, loss of appetite and exhaustion) and changes in hematological and blood chemical data on minks observed in the present study resemble those reported in the literature (review e.g. Bergdoll, 1970) for enterotoxicosis in other test animals and human beings.

According to the present study it is obvious that the occurrence of enterotoxin producing staphylococci in mink feed can be the causative agent to enteric diseases observed in mink breeding. Since enterotoxin has been shown to be

a strong hypotensor both in human beings and test animals and a drop in blood pressure can lead to fetus deaths and abortions in pregnant animals, the role of enterotoxicosis observed in whelp losses during gestation (Juokslahti, 1975) deserves closer examination.

Reference: T. Juokslahti, A. Niskanen, S. Lindroth & T. Pekkanen: Experimental staphyloenterotoxicosis in mink. Acta vet. scand. 1980, 21, ...-... (in press).

Authors summary

PSEUDOMONAS AERUGINOSA INFECTION OF MINK.

G.G. Long, D.V.M.,Ph.D. and J.R. Gorham, D.V.M.,Ph.D.
Science and Education Administration,U.S.D.A. and
Washington State University, Pullman, WA, U.S.A.

Pseudomonas aeruginosa is responsible for an acute infectious disease of mink often referred to as hemorrhagic pneumonia. The disease occurs sporadically in the United States, usually in the autumn months, and is associated with a mortality of 1-5o% of the mink in affected herds.
Experimental infection of mink kits and ferrets with picornavirus resulted in the development of viral neutralizing antibody in the ferrets and an increase in antibody titer in the mink. No clinical disease or lesions were detected. The negative results in the mink may be valid as the test mink had low levels of neutralizing antibody before infection, and mink from the same group experienced seroconversion naturally one to two months later. Clarification of the role ofthe mink calicivirus in producing disease, both alone and in association with P. aeruginosa will depend upon finding or producing mink without evidence of prior infection.

8 references, 3 pages.
2nd. Internat. Congress in Fur Animal Production
Denmark 198o.

Authors introduction and summary.

ENERGY AND NITROGEN BALANCES IN MALE MINK DURING THE ADULTE LIFE

Geneviève CHARLET-LERY, Michèle FISZLEWICZ, Marie-Thérèse MOREL

Laboratoire de Physiologie de la Nutrition
INRA-CNRZ, 78350 Jouy-en-Josas

The short annual mating period in March and the two moulting seasons (sping and autumn) suggest that the metabolism of the adult male mink and its nutritional needs undergo great changes during the year. For that reason, we determined all the year round live weight, feed intake, digestibility coefcients, metabolisable energy, nitrogen balance and heat production(1) of Pastel minks, 8 months old at the beginning of the experiment always fed the same pelleted diet (protein : 35 % dry matter, metabolisable energy : 3.86 kcal/g dry matter).

The first characteristics of the live weight curve is the very large difference between the winter period prior to mating and the 5 months after mating. During the mating period, all male minks lost weight between 10 and 30 % of their initial weight.

The most important factor of variations in energy and nitrogen balance was the large difference in the daily feed intake (234 - 473 kcal/d). From the 27 balances, nine of which were measured during the moulting seasons, we observed high correlations between gross, digestible and energy intake ($>$ + 0,99). As hairs were mixed with faeces, moulting induced a lowered protein digestibility (71.9 $\pm$ 3.0) compared to highest values in winter period (78.3 $\pm$ 0.7).

At high levels of energy intake when animals were growing larger, we observed the high protein deposition. The correlation between RN and ME was r = + 0.73. The highest depositions of protein were before the breeding season (weeks 2, 5 and 6) and just after (weeks 14 and 16) and during the autumn moulting (weeks 37 and 41). Negative or poor protein balances were obtained in the summer (weeks 22, 25, 26 and 33) and in December (weeks 47 and 49). Moults had no influence.

The adulte life of male minks is far from being a "quiet" one.

---

(1) Heat production results have not been fully interpreted yet.

4 figures, 6 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 1980. Authors summary.

INFLUENCE OF DIETARY PROTEIN ENERGY LEVELS AND ENVIRONMENTAL TEMPERATURE ON ENERGY METABOLISM AND ENERGY REQUIREMENT IN ADULT MINK.

N. Glem-Hansen, A. Chwalibog, National Inst. of Animal Science, Fur Bearing Animals, Trollesminde, 48 H Roskildevej, DK-3400 Hilleroed, Denmark.

The energy metabolism was measured in 8 adult pastel male mink fed different protein-energy proportions at three feeding levels and kept at different environmental temperatures.

The investigation indicated that the metabolic rate is independent of feeding level. The requirement of energy for maintenance was found to be 126 kcal ME/$W_{kg}^{0.75}$/day at 20° C.

The heat production increased by 2.93 kcal/$W_{kg}^{0.75}$/day per °C reduction in the environmental temperature. This corresponds to an energy requirement in the feed of 3.7 kcal ME/$W_{kg}^{0.75}$/°C/day.

19 references, 2 figures, 4 tables, 10 pages.
2nd Internat. Congress in Fur Animal Production, Denmark 1980.

Authors summary.

AMINO ACID DIGESTIBILITY IN MINK.

Anders Skrede, Dept. of Poultry and Fur Animal Science, Agricultural University of Norway, 1432 Ås-NLH, Norway.

The true digestibility of amino acids in different protein sources was studied in experiments with male mink. Protein sources were different fractions of raw cod, fish meal, meat-and-bone meal, and commercial dry pelleted diets. The method used was based on amino acid analysis of feed proteins and feces, and correction for fecal excretion of metabolic fecal amino acids.

The true digestibility of dietary protein (nitrogen) ranged from 60 to 98%. Individual amino acid digestibilities were on the average slightly higher than the corresponding N digestibility. The differences between the digestibility of different amino acids in the same diet were moderate when the protein was highly digestible, but increased rapidly with decreasing digestibility. This indicates that the digestibility of individual amino acids should be considered in the determination of amino acid requirements, in feed formulation, and in the evaluation of protein in mink diets. Estimation of amino acid digestibility from corresponding N digestibility appeared to be insufficient, especially with poorly digestible protein.

1o references, 6 tables, 2 figures, 15 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 198o.

Authors summary.

TECHNIQUE OF FEEDING PELLETS TO MINK

by ALLAIN D., ROUGEOT J., CHARLET-LERY G.* and SABAUT J.J.**
Laboratoire des Pelages, Toisons et Fourrures,* Laboratoire de Physiologie de la Nutrition, Institut National de la Recherche Agronomique, 78350 Jouy-en-Josas, France
** GIEERNA, Groupe des Grands Moulins de Paris, Domaine du Roulet, 33240 Saint-André-de-Cubzac, France

The experimental mink were given only pelleted, commercial food (Aqualim vison : 40-45 p. 100 crude protein, 16-20 p. 100 fat ; Grands Moulins de Paris, Aqualim, GSO, BP 2, 16160 Gond Pontouvre, France) in several trials to study :

1) females in reproduction and lactation from January 31 to the end of June ;
2) growing males from weaning to pelting time ;
3) the use of a special feeder for growing males ;
4) the possibility of raising two male mink in the same pen with a common feeder.

Table 1 - FEMALES IN REPRODUCTION AND LACTATION : FOOD OF FEMALES AND KITS, NUMBER OF KITS/FEMALE AT BIRTH AND WEANING, GROWTH OF KITS BEFORE WEANING

Dark Mink		Pellets	Mash
Number of females		15	15
Mating females		15	13
Whelping females (%)		14 (93.3)	10 (76.8)
Mean number of young at birth/litter		5.21 ± 0.43 (1)	4.30 ± 0.54
Mean number of young at weaning time/ litter		4.57 ± 0.50	3.20 ± 0.73
Kit body weight			
at day 21	male	101.7 ± 2.9	105.2 ± 3.5
	female	95.5 ± 3.1	93.1 ± 2.4
at weaning time	male	685.7 ± 15.7	643.0 ± 29.6
	female	538.2 ± 11.6	526.7 ± 7.0
Apparent food intake (2) g dry matter/day			
Females before whelping time (31.1 → 26.4.78)		48.4	63.9
Females with kits (26.4 → 28.6.78)		99.3	87.9
Kits before weaning time		21.2	36.2

(1) $\bar{x} \pm$ SEM

(2) Apparent food intake = intake + uncontrolled wastage

The control mink was given mash made with complete meal. The food in all groups was given ad libitum. All animals were kept in normal pens and rearing conditions.

No significant differences in reproduction, growth or mortality were observed between the experimental and the control mink. However, using the special feeder eliminated wastage of the pelleted food as compared with 30 p. 100 wastage with the mash. The time spent in feeding 100 minks with the pellets was only 1 h/week instead of 5 h/ week with the mash.

The pelleted food was even more efficient as two males could be bred in the same pen having a common feeder without any lower growth rate than the males bred alone.

Table 2 - GROWING MALES : BODY GROWTH AND FOOD IN PASTEL AND DARK MINK

Pastel Mink	Pellets	Mash
Number of males	20	20
Body weight (g)		
at weaning time (13.7.77)	863.2 ± 19.7(1)	858.1 ± 19.4
at pelting	1979.4 ± 62.9	1855.0 ± 47.0
maximum weight	2036.9 ± 52.2*	1855.5 ± 46.7
Apparent food intake g dry matter/day	99.1	95.2
Dark Mink		
Number of males	25	25
Body weight (g)		
at weaning time (2.8.78)	1034.8 ± 24.9	987.2 ± 21.2
at pelting	1657.0 ± 48.4	1545.1 ± 44.4
maximum weight	1750.9 ± 45.6	1706.1 ± 43.6
Apparent food intake g dry matter/day	81.6(2)	100.6

(1), (2) see (1) (2) table 1

* significant ($P < 0.05$)

Table 3 - BODY WEIGHT, FOOD INTAKE AND WASTAGE IN GROWING MALES FED AD LIBITUM WITH PELLETS IN A FEEDER FIXED ON THE NEST AND WITH MASH FROM OCTOBER 3 TO PELTING

Dark Mink	Pellets	Mash
Number of males	25	25
Food distribution (1)	72.7 ± 1.7	134.1
Quantity of food recovered on the following day (1)	0	33.5
Apparent food intake (1) (2)	72.7 ± 1.7(3)	100.6
Body weight (g)		
at October 3	1568.6 ± 46.5	1639.5 ± 42.2
at pelting	1657.0 ± 48.4	1545.1 ± 44.4
maximum weight	1750.9 ± 45.6	1706.1 ± 43.6

(1) g dry matter/day
(2) Apparent food intake = true food intake + uncontrolled wastage
(3) $\bar{x}$ ± SEM ; true food intake = no waste observed with the new feeder

Table 4 - FOOD INTAKE AND BODY GROWTH IN GROWING MALES BRED ALONE OR IN PAIRS AND FED WITH PELLETS FROM A COMMON FEEDER IN THE PEN

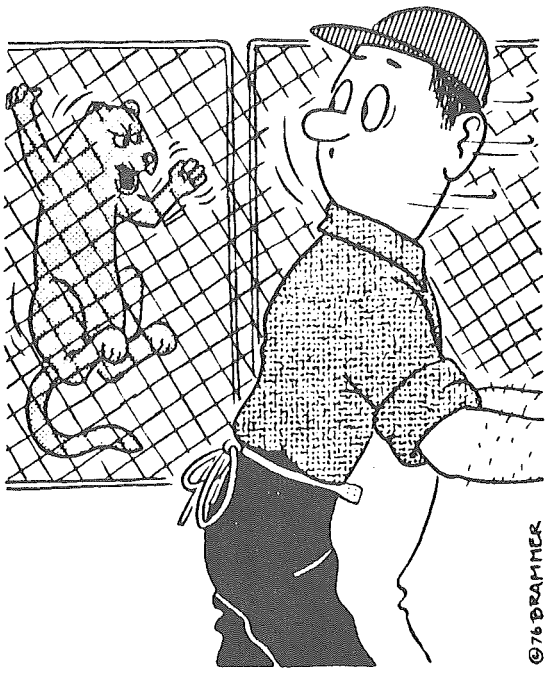
Dark Mink	Individual breeding	Paired breeding
Number of males	24	24
Body weight (g)		
at weaning time (18.7.79)	825.5 ± 22.4(1)	848.2 ± 25.7
at pelting	1697.5 ± 54.2	1684.4 ± 37.4
maximum weight	1748.1 ± 53.7	1725.9 ± 37.5
Food intake(2) g dry matter/day	72.26 ± 1.92	71.23 ± 1.02

(1) $\bar{x}$ ± SEM

(2) True food intake

2nd Internat. Congress in Fur Animal Production, Denmark 198o.

Authors abstract.



Perhaps I could take the pellets if you could learn the right technique!

A Survey of the Vitamin Status in Mink of Various Age, Sex, and Pelt-Qualities in France (F) and Yugoslavia (Y)

by I. Belcic

F. Hoffmann-La Roche & Co. Ltd., CH-4002 Basle, Switzerland.

Analyzed groups		Average vitamin content of liver ( ) number of samples				in plasma
		Weight of liver (g)	Vitamin A (IU /g)	Vitamin E (mg /g)	Biotin (ng /g)	Biotin (ng/100 ml)
Female age: 7-8 mts. fur quality: good	F	43.9 (30)	33'480	28.9	1'113	131 (14)
	Y	(30)	27'490	30.2	878	
Male age: 7-8 mts. fur quality: good	F	83.2 (30)	23'610	19.4	964	140 (14)
	Y	(24)	21'840	21.2	909	
Female age: 3-4 yrs. fur quality: good	F	47.9 (30)	53'140	43.9	1'012	140 (14)
Male age: 3-4 yrs. fur quality: poor	F	81.9 (30)	22'890	18.6	1'080	118 (14)

Inquiries into the vitamin A, - E, and biotin condition of pelted mink were undertaken at two farms. Considering the relatively high values found it can be concluded that a good vitamin status is a prerequisite for health, fertility, and pelt quality.

I.Belcic and H.Friesecke , Folacin in Animal Nutrition

I.Belcic, Genetical and Envoronmental Determination of Early Growth of Laboratory Animals.

I.Belcic,Ishrana vidrica/Mustela lutreola vison S./ gotovom hranom sa osvrtom na pomanjkanje vitamina.

H.Zintzen i I.Belcic, Aspekti vitamina E i Selena u svinja.

I.Belcic i F.Dumanovski,Pojave slabosti nogu u peradi.

I.Belcic i F.Dumanovski,Ishrana pasa.

F.Dumanovski i I.Belcic, Potrebe psov po hranilnih snoveh.

I. Belcic, Cincila i njezin uzgoj

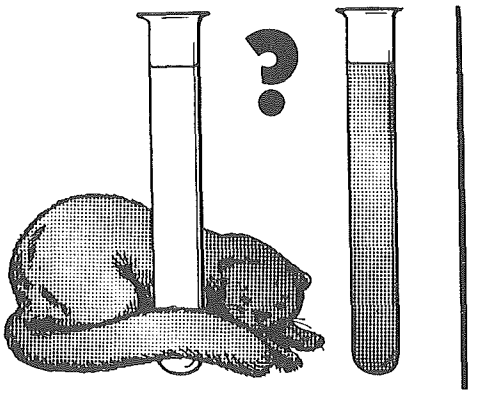
H.Zintzen i I.Belcic, Ishrana krmaca i odojaka

9 references, 1 table, 2 pages.

2nd Internat. Congress in Fur Animal Production,

Denmark 198o.

Authors abstract.



A POT POURRI OF DISEASE PROBLEMS IN NOVA SCOTIA - MINK AND FOXES.

G.G. Finley, D.V.M., Nova Scotia, Dept. of Agriculture, Livestock Service Branch, Truro, Nova Scotia B2N 5E3, Canada.

Nova Scotia is located on Canada's east coast and is a major producer of Canada Majestic Mink. Mainly dark (black) mink are ranched followed by the brown colors.

I am a government veterinarian responsible for fur farming - especially diseases.

Distemper has been a disease for concern. Prevention is by good vaccination technique after maternal antibodies are gone in kits. The last outbreak occurred when the virus spread from wild racoons to properly vaccinated ranch mink. Only kits assumed to have low or no vaccine titres died but losses were not great. Crusty face, and pads, interstitial pneumonia and inclusion bodies were seen.

Hemorrhagic pneumonia due to Pseudomonas aeruginosa is always feared by the ranchers. Outbreaks occur between August and December. Peracute death, blood from the nose and hemorrhagic pneumonia are found. The bacteria in recent outbreaks has been serotype 06. Rarely hemolytic E.coli will mimic this condition. We have had best results by immediately using stock bacterin. Often vaccination of the involved shed is sufficient to stop an outbreak.

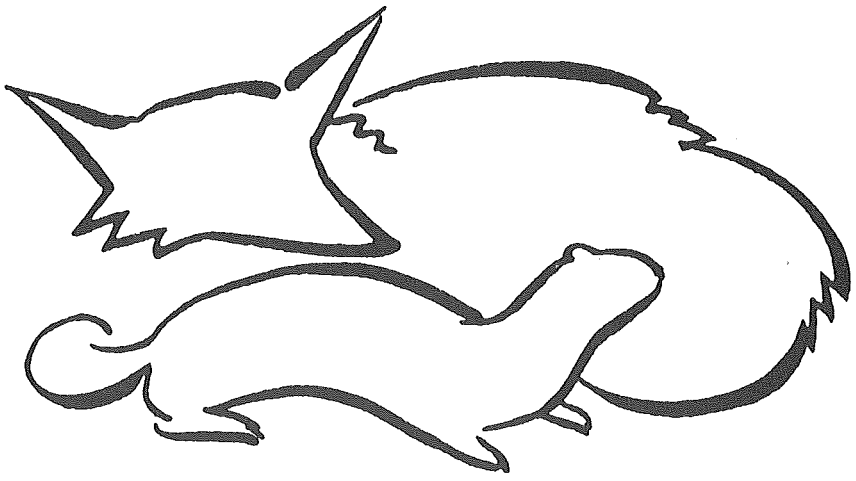
Aleutian Disease is always with us and our laboratory averages about 45,000 tests per season. The counter immuno electrophoresis (CEP) test is used. Steady progress is being made with a test, slaughter and disinfection program. Several ranches have had sudden and unexplained rises in the positive reactor level. It seems to be mainly the non-progressive form of the disease.

Foxes are a small part of our fur industry - mainly silvers. One problem area is reproduction. New breeders must be taught to recognize heat, breeding behaviour and sperm testing of males. A study of neonatal pup losses revealed dystocia (stillbirths), starvation and maternal cannibalism to be the main causes. Internal parasites are well controlled using several newer worming compounds such as mebendazole.

Routine vaccination for distemper and hepatitis/ encephalitis are recommended.

2 pages.
2nd Internat. Congress in Fur Animal Production, Denmark 1980.

Authors abstract.



EARLY GROWTH PERFORMANCE OF DARK and PASTEL KITS AT THE NORTHWOOD RANCH, 1971-75

William L. Leoschke
Valparaiso University
Valparaiso, Indiana 46383

The world mink industry will soon be entering a new era of practical mink nutrition wherein pellets will be the major nutrient resource for mink production. In terms of this potential for major changes in the composition of practical ranch diets, it would be prudent at this time for mink nutritionists to obtain specific data on the performance of mink being raised on current dietary programs consisting of fortified cereals in combination with fresh and/or frozen fish and animal feedstuffs. Data should be obtained during all phases of the ranch year including reproduction, lactation, early growth (May-June), late growth (July-August) and fur development (weights, pelt lengths and pelt weights).

An initial study of this type on the early growth performance of mink kits on practical ranch diets was conducted at the Northwood ranch at Cary, Illinois, during the years 1971-1975.

I would like to share with you some of the experimental data and some of my procedural errors relative to establishing guidelines for the selection of the litters for kit weighing. The data presented in this report is not especially significant; however, the concept of proper planning for the gathering of data from commercial mink ranches is of major importance and worth your attention and discussion.

Original planning included 6 sets of kit weight data, i.e., weights of mink selected from 3 litter sizes (5, 6 and 7) and including both dark and pastel mink. However, at the suggestion of Mike Goodfriend, a ranch foreman, the work was expanded to include 12 sets of kit weight data with kits to be selected from both young (1st lactation) and old (2nd and 3rd lactations) females. As the direct result of many years of work with lactating mink, Mike was convinced that older, experienced lactating females had larger kits in comparison with kits of the same age from young mothers experiencing their first whelping and lactation.

Initially kit weighings were made at birth and at 3, 14, 21, 28, 35 and 42 days of age. However, after the first year, birth weights were not taken on the basis of too great a potential risk of kit losses associated with the

handling of the animals so soon after birth. Another point favoring initiation of weighing with 3 day old kits is that litter size is more likely to be stabilized at that time than at birth.

A project goal of obtaining kit weight data on 3, 14, 21, 28, 35 and 42 day old kits from over 120 litters was achieved by 1975, i.e., a minimum of 10 litter weight sets for each separate classification of colorphase, maternal experience and litter size. However, the magnitude of my misjudgement in the planning for data collection on mink kit weights was only recently discovered when data was being prepared for this conference. It is apparent from the data to be presented that I deserve credit for my ambition but significant criticism for a lack of wisdom in planning for the data collection.

Consider the data present in Tables I and II. It is quite apparent, in terms of the great biological variation in the early growth performance of mink kits, that a goal of 10 litters per data set was naive, i.e., 10 litters are too small a selection for clear cut conclusions on the lactation and early growth performance of kits from young females (1st lactation) and old females (2nd and 3rd lactation). It is apparent from the data presented that small but not significant differences exist in the growth performance of kits from young versus old females.

A survey of early kit growth from experimental studies with lactating females on pellets in the period 1974-1978 provides more insight into the significant differences that may exist in the early growth performance of kits from young inexperienced versus older experienced females (see Table III).

In terms of my experiences of weighing mink kits over a period of 10 years, I feel that serious consideration should be given to a number of specific points when planning for a valid survey of the early growth performance of mink kits on practical ranch diets:

LITTER SIZE: A survey involving multiple litter sizes undercuts the validity of the data obtained inasmuch as automaticly the quantity of data on a given litter size is limited. Serious consideration should be given to litter size 6 for the assessment of ranch performance or the nutritional value of a given dietary program for the lactation and early growth phases of the ranch year.

In North America a ranch average of 4 kits per female wintered is common - representing a 5 litter average with 80% whelp and litter survival at 6 weeks of age. A selection of litters with 5 kits would provide a representative sampling of ranch performance BUT would not represent the same physiological stress as a reproduction-lactation performance of 6 kits. The

distinct advantage of a physiological stress factor in the nutritional evaluation of a given dietary program is readily seen. Experimental data on reproduction-lactation performance of 7 kit litters would be of major significance but would not be practical in terms of obtaining adequate numbers of litters with 7 kits on the average commercial ranch.

MULTIPLE WEIGHINGS: Serious consideration must be given to any experimental program involving weekly weighings of the same litter over a 6 to 8 week period. Each weighing experience represents an additional stress factor for the litter and hence a real potential for sub-optimum growth performance of the kits in the days immediately following the weighing day. In terms of other experimental studies, personal observations indicate a very significant weight loss in the 24 hour period following the weighing of mink kits. If multiple weighings of the same litter are to be made, they should be limited, at the very MINIMUM , to 3, 14, 28 and 42 days of age weight data to provide a minimal physiological stress to the mother and developing litter. Kit weight data at 28 days and 42 days of age would be most valuable in terms of providing data on both lactation performance and early growth performance of the mink.

LACTATION HISTORY: In terms of ten years experience in weighing young mink kits, I do feel that a significant difference may exist in the early growth performance of mink kits from young, inexperienced and older, experienced mothers. Until more specific experimental data is available, I do feel that all ranch data and experimental data on the early growth of mink kits should be segregated relative to the lactation history of the maternal parent, i.e., 1st, 2nd or 3rd lactation.

IN SUMMARY: The acquisition of data on the growth performance of mink kits on practical ranch diets is desireable. Ranch survey programs of this nature should be carefully planned with special consideration to such factors as (1) litter size selection, (2) maternal lactation history and (3) frequency of litter weighings.

3 tables, 3 pages.

2nd Internat. Congress in Fur Animal Production,
Denmark 1980.

Original paper.

MORPHOLOGICAL AND HISTOLOGICAL CHARACTERISTICS OF FUR DEFECT "METALLIC".

THE NUMBER OF CUTICLE LAYERS, HISTOLOGY OF HAIR FOLLICLES AND MINERAL CONTENT OF LONG GUARD HAIRS.

Blomstedt, Leena Zoological Institute, University of Helsinki, Arkadiankatu 7, SF-00100 HELSINKI 10
Lohi, Outi Finnish Fur Breeders Association and Yrjö Helve's Foundation, PB 5, SF-01601 VANTAA 60

The investigation belongs as a part of a comprehensive study concerning fur defect metallic. The aim of this investigation was to determine the number of hairs per follicle and the number of follicles per area of skin in male mink with straight or metallic hair and to study the mineral content of the lanceolate part of the guard hairs and the morphology of the cuticle layer. The animals originated from three different farms, two of them using the same feed.

The growing rhythm of hairs was different in normal and metallic animals. In the beginning of the hair growing season, in July less hairs per follicle were discovered in animals with straight hair. In these individuals the number of hairs per follicle evenly increased towards the pelting time. In metallic animals the increase in number of hair was not linear but slowing down in the beginning and growing faster again towards December. At that time the number of hairs per follicle was more or less equal in both groups. Less hairs per follicle were also found in samples from the straight haired region of a metallic animal.

The area of follicles per area of skin appeared to ocular detection approximately the same. Thus the thickness of the guard hair somehow determines the number of underfur per follicle. The thicker guard hair the less underfur per follicle. The greatest was the number of hair per follicle in follicles with only underfur.

The number of underfur per follicle is inversely proportional to

the number of follicle per area of skin. In straight haired regions there were in general more guard hair follicles and the number of follicles per area was higher than in metallic regions. On the contrary there was more underfur per follicle in metallic regions. The inverse proportion between the number of follicles and the number of hairs per follicle levels the total number of hairs per area of skin in normal and metallic animals even though remarkable difference is found in samples form different regions of the same animal.

In histological sections some kind of abnormal follicles so called "blister follicles" were also found in connection with the metallic defect. More abnormal follicles were found in metallic samples than in animals with straight hair or in straight haired regions of metallic animals. This disorder of follicle growth can be observed in all kinds of follicle (in guard hair follicles as well as in follicles with only underfur) but the morphological defects of the hair are ocularly defectable only in long guard hairs.

Some difference was also found in mineral content of the lanceolate region of long guard hairs in metallic and normal animals. A significant difference was found in Hg so that metallic hairs contained much more Hg than normal hairs.

In cross sections of the lanceolate region of long guard hairs a distinction can be made between the convex and the concave side and the gables. There are more cuticle layers on the convex side than on the concave side or the gables. Some difference was found in the number of cuticle layers between metallic and normal hairs, the metallic hairs having less cuticle hairs in corresponding parts.

10 photos, 6 tables, 2 references.

2nd Internat. Congress in Fur Animal Production,
Denmark 198o.

Authors abstract.

TOWARDS A MORE EFFICIENT MINK PRODUCTION.
(A review)

Rafael Garcia-Mata, Reconquista 165 - Of 316, 1369 Buenos Aires, Argentina.

The present paper shows the results obtained in the last eight years in a mink farm in Argentina Attempting to obtain an improvement in the results or yields.

The farm is located in the southern Hemisphere at 38.oo° of latitud south and 57.31° of longitude west. It currently has 53oo females of different colors (dark wild type, Pastel, White (Hedlund) and Pearl (double). The majority is of the wild varity. The farm iniciated its activities in 1935 with a very slow development in its first years. In the last year it has produced 255oo kitts, counted 21 days after whelping, yielding an average on the total mated females of 4.9 and 5.3 of whelped females. Tables 1 and 2 show the summary of the last eight years results.

The above mentioned Tables show a significant improvement in the yields, attributable to the gradual adoption of several measured that we will analyse in this paper, namely:

1. Utilization of artificial light
   - 1.1. In the females so as to shorten the gestation length and reduce the percentage of females that failed to whelp.
   - 1.2. In the males, to improve their fertility.
2. A better work on sperm checking.
3. Use of hormones (HCG) to facilitate a better utilization of males.
4. Better program for the mating season, to attain higher levels of repeats (8o%) in the second cycle of matings.
5. Special care in the feeding of breeders, mainly during the estrous period, gestation and lactancy, referred to
   - 5.1. Essential fatty acids supply.
   - 5.2. Ample supply of vitamin E according to the proportion of unsaturated fats in the feed.

5.3. Supply of a good source of iron as an special supplement.

6. More intensive and improved plan to prevent the plasmacytosis.

15 references, 7 tables, 1 figures, 6 pages.
2nd Internat. Congress in Fur Animal Production.
Denmark 198o.

Authors introduction.

● SOME SIGNIFICANT CHANGES IN MANAGEMENT ON NORTHWOOD FUR FARMS SINCE HELSINKI - 1976.

Anthony A. Rietveld, General Manager, National Northwood Co,
P.O. Box 4o, Cary, Illinois 6oo13, USA.

In the paper author gives a documentation for how to rise 4.7 pelts per female on a 71,ooo female ranch. Management, nutrition, watering, and reproduction with special discussion of the efficiency of hormone treatment are discussed as well as hygiene and control of Aleutian disease. Finally there is given a summary of important papers, contacts, and medical preparations, which have given rise to the improvement of the Northwood Fur Farm since Helsinki 1976.

9 pages.
2nd Internat. Congress in Fur Animal Production,
Denmark 198o.

Abstract: G. Jørgensen.