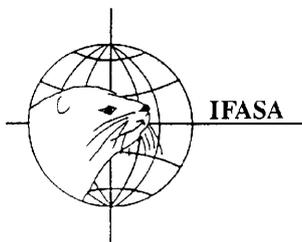
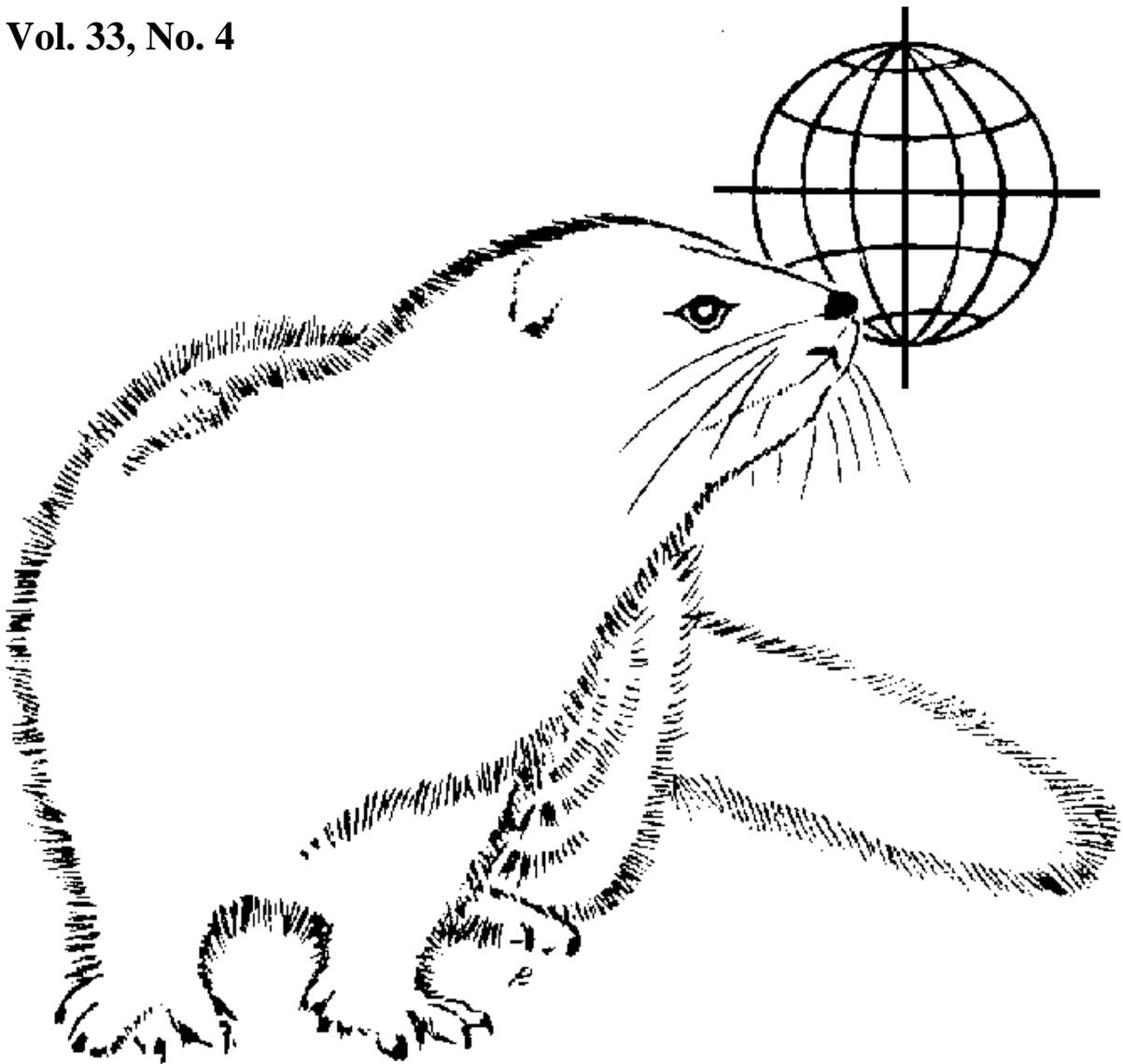


SCIENTIFUR

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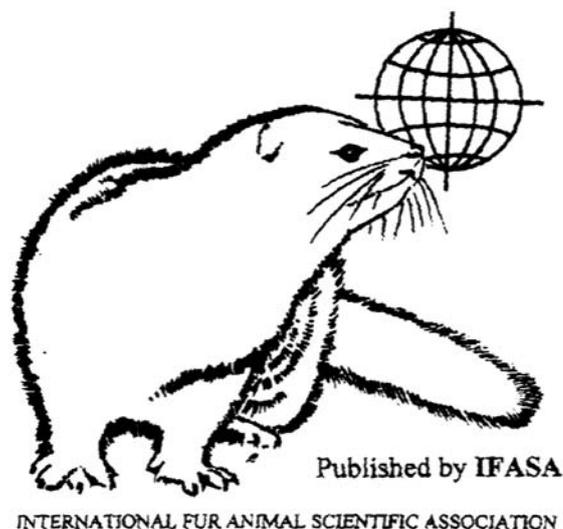
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Scientifur Vol. 33, No. 4 contains abstracts from The NJF Autumn Meeting within Fur Animal
NJF Seminar No. 427. Research was held in Vaasa, Finland 13-15 October
2009

Vivi Hunnicke Nielsen
Editor Scientifur

Nordic Association
of Agricultural Scientists



NJF Seminar 427
Fur Animal Research
- Autumn Meeting, Vaasa Finland
Vaasa, Finland, 13-15 October 2009

NJF
Nordic Association of Agricultural Scientists

Value of different dried protein sources to cover the minks need for amino acids

M.L.E. Christiansen, T.M. Lassén

Mink are carnivores, and have a higher demand for protein than other domestic animals. Protein is a component in all body tissues, including muscle, internal organs, skin and fur. Many important organ compounds such as hemoglobin, milk proteins, digestive enzymes, and certain hormones, have protein as their basic structure. Protein also serves as a source for energy for the mink. Since protein is involved in almost all metabolic and production functions, an adequate supply of good quality feed protein is essential to the mink. This is especially important during periods of high nutritional demand (e.g. gestation, lactation, growth and fur production).

NJF Seminar No. 427, Vaasa, Finland, October 2009, 11pp. Authors' abstract.

Apparent and true digestibility of protein and amino acids during the early growth period in mink fed different levels of carbohydrates and protein

A.L.F. Hellwing, N.E.Hansen, A-H.Tauson

Thirty-two pairs of male mink kits were allocated to four different diets four weeks post partum. The apparent and true digestibilities of the diets were calculated from quantitative collection of faeces when the kits were 6, 9 and 12 weeks old. The diets contained either 30% or 45% of the metabolisable energy (ME) from protein and 15% or 25% of ME from carbohydrate. The diet codes were HPHC (high protein, high carbohydrate; 45:25), LPHC (low protein, high carbohydrate; 30:25), HPLC (45:15) and LPLC (30:15). The apparent digestibility of nitrogen and amino acids was significantly lower on both LP than on the HP diets. The true digestibility on the LPHC diet was the same as on the HP diets except for methionine, leucine and valine, which were lower. The true digestibility of the LPLC was significantly lower than that of the other diets except for histidine. Both

apparent and true digestibility of nitrogen, fat, energy, and amino acids decreased with age.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 5 pp. Authors' abstract.

Late gestation protein supply to mink (*Mustela vison*) -short and long-term effects on performance and metabolism of progeny

C.F. Matthiesen, N.E. Hansen, P.D.Thomsen, D. Blache, A-H. Tauson

The purpose of this investigation was to study the short and long-term effects of low protein supply to mink dams the last 17.9 ± 3.6 days of the gestation. The effect of the lategestational protein restriction was studied in relation to breeding results, possible changes in the gene expression of some key hepatic enzymes in the foetuses, the birth weight of the offspring and early kit growth. The short-term effects of the low protein supply were investigated in 7 to 9.5 weeks old male offspring in relation to growth and to a possible adaptation to protein restriction during foetal life. Furthermore, long-term effects were studied in female yearling offspring of protein restricted mothers according to breeding results, kit birth weight and postnatal growth of the offspring.

Mink dams were fed either a low-protein diet, i.e., with a protein:fat:carbohydrate ratio of 14:51:35% of metabolizable energy (ME), or an adequate-protein diet (29:56:15% of ME, control) from when implantation was completed until parturition (17.9 ± 3.6 days). It can be concluded that low protein supply during late gestation leads to poor reproductive performance, effects that remained also in yearling dams exposed to protein restriction during foetal life. Late gestation low protein supply resulted in lower kit birth weights whereas dams exposed to low protein supply during foetal life gave birth to heavier kits than controls, despite being adequately nourished from birth. The expression of some hepatic enzymes was significantly lower in foetuses both of protein restricted dams and their offspring. This confirms that changes obtained due to foetal life malnutrition can be transmitted to the subsequent generation. Our findings further indicate that foetal life protein restriction affects glucose homeostasis and protein

oxidation during early post-weaning growth in male offspring but not in yearling females.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 12 pp. Authors' abstract.

Energy metabolism of growing blue foxes

N. Koskinen, J. Sepponen, T.Rekilä, A-H.Tauson

Sixteen female blue fox cubs were allocated to four different treatment groups and fed the same conventional diet and given different energy supply from *ad libitum*, target body condition "very high" to 50 - 60 % below the *ad libitum* group, target condition "lean". The experiment was accomplished from August to December 2007 in five different periods, carried out at approximately monthly intervals. The experiment was performed in five 7d balance periods. Each period included a 22 hr respiration experiment by means of indirect calorimetry in an open-air circulation system. Mean live weights were similar (4890 -5870 g) among groups at the beginning of the trial, but at the end of the experiment the group mean weights and ME intake were significantly different, as intended. During the fifth measuring period RE values declined with decreasing ME intake. From period III onwards there were statistically significant differences in N intake, in faecal and urinary N excretion ($\text{g/W}^{0.75}\text{day}$) with both intake and excretion reflecting the feed provision. During the final period when animals could be considered having reached mature body size and full winter coat the retention of the N was as low as 0.07-0.15 $\text{g/W}^{0.75}\text{day}$.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 5 pp. Authors' abstract.

Body Score (BS) in feeding strategy in reproduction period mink

J. de Rond

2 Groups of 400 young brown females mink were formed and a feeding strategy project was performed in 2 periods. The research group received an amount of feed depending on the weekly scored

Body Score (BS). The feed portion was fed by the automatic feeding system Farm Pilot. The control group received an amount of feed according to the observation of the person on the feeding machine (Farmfed). The first period, the pre-mating period, started at the 11th of February till the 5th of March. The goal for the first period was to reach a BS of 2/2,5. The second period, during gestation, started at the 31th of March till the 21th of April. The goal for the gestation was to achieve a growth in BS.

The performed feeding strategy by the Farm Pilot resulted in 95% of the animals in the right BS at the 5th of March. During gestation 67% of the animals did grow in BS on the programmed feeding amount. Those females had a breeding result of 6,1 kit at 21 days per mated female. The total research group scored a breeding result of 6,0 kit at 21 days per mated female vs 5,8 kit per mated female for the Farmfed group (ns). In both groups the number of empty females was much higher when the mink did not show a growth in BS between the start of mating and the end of gestation (13% empty vs 7%). It was concluded that the feeding strategy resulted in a good breeding result. Feeding in the gestation period is more difficult than in feeding in the pre-mating period. Feeding for the right BS results in good breeding results.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 4 pp. Authors' abstract.

Methionine for Mink (*Mustela vison*) in the Growing-Furring Period – A Review

P. Sandbøl, T.N. Clausen, J. Elnif, N.E. Hansen

We briefly cover the milestones of establishment and changes of the norm for methionine during the growing-furring period and the interim research leading to the change. A more detailed description of the research which has been carried out since the last change of the norm is given and finally a proposal for a new norm for methionine during the growing-furring period is presented. The present norm is set at 0.16 g of digestible methionine / 100 kcal of ME. We recommend a new norm of 0.13 g of digestible methionine / 100 kcal of ME in the period from early July to early August, 0.16 g of digestible methionine / 100 kcal of ME from early August to mid September and finally 0.13 g of digestible methionine / 100 kcal of ME from mid September and until pelting. The present norm of

0.06 g digestible cystine / 100 kcal ME should be maintained throughout the whole period. Furthermore, we recommend a general assumption that the mink is able to utilise 65 % of the methionine from DL-methionine.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 10 pp. Authors' abstract.

Litter size in mink in relation to feeding intensity during flushing

S.H. Møller

Under *ad libitum* feeding during flushing and mating many female mink will regain the same body weight they had at the time of live animal grading. If their energy requirements are also met in the subsequent implantation and gestation periods they are at risk of dystocia due to obesity. We therefore tested whether a somewhat reduced feed allowance during flushing and mating can make room for a sufficient energy allowance during implantation and gestation, without hampering the positive effect of flushing on litter size. In order to test this on a sufficient number of females and under farming conditions the experiment was carried out on 4 private mink farms. The test showed that an 11 % reduction in feed allowance during flushing and mating did not affect the reproduction. This makes it easier to meet the energy requirements of female mink during implantation and gestation without the females gets obese. The litter size depended not only on the flushing, but on the feed allowance in the whole period until delivery. We conclude that the full effect of flushing on litter size in mink can be achieved with less than *ad libitum* feeding.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 1 p. Authors' abstract.

Level of inbreeding and genetic distance in Danish farm mink (*Neovison vison*)

P.F. Larsen, H. Bækgaard, M. Sønderup, H.H. Møller, B.K. Hansen, V.H. Nielsen, D. Demontis, V. Loeschcke, C.Pertoldi

With special emphasis on the level of relatedness (R) within mink color types (*Neovison vison*)

originating from different mink farms in Denmark we present here the results from a microsatellite analysis study. Within strains we detected large difference in level of R (R range: 0.017-0.520) and also in genetic distance (FST range: 0-0.29) between strains and farms. Moreover, we correlated the level of R and breeding result for individual mink populations and found a very strong and highly significant negative correlation between these two parameters ($R^2=0.60$, $p<0.001$). To our knowledge this is the first time that such a correlation has been demonstrated in mink from commercial mink farms. As a result we suggest using microsatellite or an alternative type of markers e.g. VeraCode, SNPlex and Fluidigm EP1 systems, which can be utilized to evaluate level of R in mink strains with reproductive problems and apply information from genetic markers when e.g. buying in new breeding animals in order to optimize fitness. Alternatively this technique could also be employed in order to obtain heterosis within color types applying the genetic variation found within a color type. We hope that this new molecular genetic information can be applied in practical mink farming in the future.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 4 pp. Authors' abstract.

Genetic parameters of body condition score and leg weakness in Finnish blue fox (*Alopex lagopus*)

R. Kempe, N. Koskinen, I. Strandén

Data from fur animal research station of MTT Agrifood Research Finland in Kannus (2005-2006) was used in the estimations of genetic parameters for body condition score (BCS), fore leg carpal joint angle (LEG) as an indicator of leg weakness, physical activity, feed efficiency (FE), daily gain (DG), dry matter intake (DMI), animal grading size (gSI), body weight (BW) and animal length in the blue fox. The BCS, LEG and physical activity were assessed using a scale from 1 to 5. Heritability estimates for BCS and LEG were moderate, 0.30 and 0.25, respectively. BCS had high positive genetic correlation with DG, DMI, and BW (0.78-0.86) and moderate correlation with gSI (0.57). LEG had negative genetic correlations with gSI, BWOct, DG and BCS (-0.40–0.53). The genetic parameter estimates obtained for BCS and LEG measurements indicated that the genetic improvement through

selection could be possible for reducing fatness and leg weakness in the blue foxes, but single-trait selection for measurements will decrease slightly DG and size traits like gSI and BW due to correlated response to selection.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 7 pp. Authors' abstract.

Responses in weight, feed intake and feed conversion ratio in lines of mink selected on *ad libitum* and restricted feeding

V.H. Nielsen, S.H. Møller, B.K. Hansen, P. Berg

The experiment was set up to test for genotype-environment interaction when selecting for high November weight on *ad libitum* (AL) and restrictive (RF) feeding in mink and thus whether selection in the two environments results in mink which are genetically different. Large direct response to selection was obtained in both selection lines in agreement with high heritability estimates for November weight. After three generations of selection, the AL- and RF-line were tested on both feeding regimes. November weight and feed intake and feed conversion ratio from July to November were recorded. A significant genotype-environment interaction was found for November weight in males. The genetic correlation between November weight on *ad libitum* and restricted feeding in males was estimated to of 0.89 (± 0.13). The highest weight and feed intake were obtained in the AL-line on *ad libitum* feeding. This indicates that selection for high weight on *ad libitum* feeding is selection for appetite. Selection on restricted feeding was found to improve feed utilization. Based on the average November weight in the two feeding regimes, the AL-line had the best performance. However, the sensitivity expressing the difference between November weight on *ad libitum* and restrictive feeding was smallest in the RF-line. Feed conversion ratio was similar in both lines and under both feeding conditions. The number of fertile females and number born were largest in the RF-line. Overall, the results suggest that selection on restricted feeding results in the most robust mink.

NJF Seminar No. 427, Vaasa, Finland, October 2009 pp. 1. Authors' abstract.

A meta-analysis shows that access to a swimming bath reduces stereotyped behaviour in farmed mink (*Neovison vison*), but...

M. Mohaibes, L. Ahola, J. Mononen

Our results show that mink with water baths develop less stereotyped behaviour than mink without the baths. Thus, it would be tempting to conclude that the baths are beneficial to the welfare of mink. However, the matter may not be that straightforward. Firstly, within the bath group, those mink that swam spent more time in the nest box than mink that did not swim.

One can hypothesise that thermoregulatory reasons “forced” the swimmers to spend longer time in the nest box where stereotyped behaviour is not performed or where stereotypies are unobservable. Indeed, there was a positive correlation between the amount of activity and stereotypies, i.e. the mink that spent more time in the nest box were spending less time stereotyping. Accordingly, the difference in the amount of stereotyped behaviour between the mink with and without bath may be at least partially a thermoregulatory artefact than a true sign of frustration of mink without the baths. However, there was no significant difference in the amount of stereotyped behaviour between the swimmers and non-swimmers within the bath group, as could have been expected on the basis of this thermoregulatory hypothesis. Secondly, Mohaibes et al (2006) have shown earlier, that female mink housed in traditional male-female pairs without water baths had less stereotyped behaviour than singly housed females with water baths. Most of the swimming water studies in juvenile mink have been carried out with singly housed animals, which make the external validity of these studies questionable.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 2 pp. Authors’ abstract.

Behavioural studies on the use of varied open water supplies by American mink (*Neovison vison*)

E. Heyn, A. Hagn, M. Schneider, M. Erhard

In contrast to an earlier report in wild red foxes (*V. vulpes*) kept in captivity, our blue foxes showed no behavioural laterality in curling direction while

resting. Instead, our female blue foxes used more frequently their left than right forepaw to reach for a titbit. Interestingly, several studies have shown bias to the right in the forepaw use by female dogs (*Canis familiaris*). In conclusion: behavioural laterality may exist in the form of pawedness in farmed blue foxes, and it can be measured with a simple behavioural test..

NJF Seminar No. 427, Vaasa, Finland, October 2009, 4 pp. Authors’ abstract.

Measuring behavioural laterality in the blue fox (*Vulpes lagopus*)

J. Mononen, S. Tikka, H.T. Korhonen

In contrast to an earlier report in wild red foxes (*V. vulpers*) kept in captivity, our blue foxes showed no behavioural laterality in curling direction while resting. Instead, our female blue foxes used more frequently their left than right forepaw to reach for a titbit. Interestingly, several studies have shown bias to the right in the forepaw use by female dogs (*Canis familiaris*). In conclusion: behavioural laterality may exist in the form of pawedness in farmed blue foxes, and it can be measured with a simple behavioural test.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 1 p. Authors’ abstract.

Effect of enlarged cage on production in foxes

H.T. Korhonen, H. Orjala

The aim was to find out the effect of higher and wider cage on production in farmed blue fox. Three different cage setups formed the three experimental groups: 1) control group in standard cage; 2) high cage, walls heightened close to the roof of shed; 3) wide cage, cage built to fit between the supporting structures of the shed. The weight development was normal in all groups. Capture test showed that the fox was caught ca. 3 seconds faster from the standard cage than from the high cage. It took longest to catch a fox from the wide cage. The time it took to catch a fox increased in all groups as the foxes grew. At pelting, the capture time was longest

in a high cage and shortest in a standard cage. The foxes remained healthy throughout the study and the results of small blood picture indicated of good general health in all groups. Right and left adrenal glands were lightest in foxes with high cages. Raising the roof of the cage succeeded without difficulties. The door is traditionally situated on the roof of a cage which now had to be displaced on the front wall of the cage. The door needs more developing. When foxes grew, a second person was needed to hold the door when catching a fox, which prolonged the time needed to catch a fox. The two doors in the wide cage were situated on both ends of the cage, thereby complicating the capture. Only one door situated in the middle of the cage could ease the capture. The animal grew well, remained healthy and produced a good fur, so high cage seems to be suited for housing foxes. High cage also seemed to be the less stressful cage setup of all three. Because of the high roof, foxes are able to sit on the self and the roof does not wear down the fur on the back. Moreover, a great height makes it possible to attach another self on the wall.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 6 pp. Authors' abstract.

Preliminary results of using behavioural latencies to assess the use of sand floor in blue foxes

H. Orjala, T. Koistinen, H.T. Korhonen

The aim of this study was to study why blue foxes change floor material between a mesh floor and sand floor. We measured latencies of various behaviours after the fox entered the sand and mesh floor. Our Blue foxes could use two cages, one with mesh floor and one with sand floor. The cages were connected with two one-way doors, to which weight could be added. The latencies for various behaviours were measured after entrance to a cage with 0 and 2.5 kg of extra weight on the door in 15 foxes. The first behaviours after entering either of the cages were related to inspection of the surroundings outside and inside the cage, suggesting that the behaviours have certain order irrespective of the floor material. The sand was used more for elimination and caching of food leftover than the mesh floor, and in resting and contact with neighbour fox the trend was opposite. The latency to

start sniffing sand was shorter than that of digging. Our results show that latency may provide a good tool to evaluate resource use.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 6 pp. Authors' abstract.

Drinking water in Nestbox when kits start eating farm food supports kits and dam

J. de Rond

Research farm Edelveen has looked in 2008 and 2009 into the effect of the availability of drinking water in the nestbox from the moment the kits receive farm food on the nestbox. The moment the kits start to eat farm food, they need to drink water. The interest was to look for a correlation in kit losses, kit growth and condition of the dam. At 28 days of age, 120 litters of brown mink were weighted. From each litter size 6, 7, 8, 9 and 10 kits, 24 litters were divided into 2 groups of the same weight at 28 days. This resulted in 60 litters in each group. The litters in the research group received per litter a drinking system in the nestbox, in the corner at the entrance to the pen. The drinking nipple was the same as the drinking nipple in the back of the pen. That drinking system is from the company Columbus (pumps water round (like Forelco), always fresh water). The water pressure in the Columbus drinking system was low (<8 l/min). The drinking system in the nestbox was filled daily or 2 times per day. In 2008 the project lasted to an age of 50 days of the kits, in 2009 till an age of 55 days. In both years the nestboxes did not turn into a mess due to the water system. Also the kits did learn to manure in the back of the pen. The water in the nestbox was frequently used by the kits as also the dam. In appr. 10 days the water use reached the top of over 425 ml/litter/day. The top lasted again 10 days and after that the use of water over this system lowered. The kits were much more in the pen and had almost tripled their weight. The total intake differed between the litter size and the litters with 10 kits used 30% more water than the litters with 6 kits. In 2008 the research group had lower losses than the control group (0,5% vs 2,2%). The weight gain was equal, but the weight of the kits of the research groups showed less variation and the litters looked more homogeneous. In 2009 a new flock of mink were conducted in this project. The losses were in

both groups very low (0,2 & 0,3%). The growth of the kits in litters with water in the nestbox was in all litters 3% higher. Also in 2009 the litters with water looked more homogeneous. Not scored in behaviour, though spotted in the first weeks of the project: no saliva licking at the dam of the kits with water in the nestbox. In the control litters saliva licking at the dam was observed a lot. It is not known whether this behaviour is correlated to problems of cannibalism. In was observed (not scored) that the litters with water in the nestbox were more calm. These observed items will be implemented to be scored in the next lactation period. Water in the nestbox in the lactation period helps the kits and the dam though the hard figures are not yet present.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 1 p. Authors' abstract.

Importance of nest box size and material, for litter size – a pilot study

M. Sønderup, H. Bækgaard, P.F. Larsen, T. Clausen

Nest box design and type of nesting material affect kit survival and wellbeing. In this pilot study, 12 farms were involved. As background material in the nest was, Easy Stroe (trade name for heat-treated, forage harvester wheat straw), compared with shavings and short cutted barley straw were studied. As nesting material the long cutted barley straw was compared with the short cutted barley straw and the wood shavings. It was also investigated whether reduced nest box size had an impact. The Number of living and dead pups from 2 to 5 days of age and the number of living pups at 3 to 4 weeks of age were recorded. Easy Stroe compared to shavings as bottom material, showed a statistically significant difference in favour of Easy Stroe on a total number of pups at birth, the number of living pups at birth and the number of puppies at the second count.. There was no significant difference for kit loss between the first and second counts. The study points to the importance of choice of nesting material and design. There was found a statistically significant difference of 0.20 kits/female for Easy Stroe over shavings, measured as living pups at 3 to 4 weeks of age. Moreover, future areas of focus will be discussed.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 7 pp. Authors' abstract.

Effect of sulphur containing amino acids on mineral absorption in mink

Ø. Ahlstrøm

Effect of supplementary DL-methionine and L-cysteine on apparent absorption of Ca, P, Mg, Fe, Zn, Mn, Cu and Se in adult mink was investigated. Four groups of six adult males were included in the study. The animals were given a basal diet (BS), or BS + 0.2 % methionine or BS + 0.4 % methionine, or BS + 0,4 methionine + 0.2 % cysteine. Generally, apparent digestibility values were low because of low requirement and endogenous excretion and therefore close to 0 for most minerals. Cysteine supplementation enhanced apparent absorption rates for Ca, P, Mg and Se, but not for Fe, Zn, Mn, and Cu. The mechanism for enhanced absorption by supplementary L-cysteine is not clear, but chelates formed by L-cysteine+mineral may prevent forming of poorly absorbable mineral complexes in the digestive tract.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 6 pp. Authors' abstract.

DNA vaccination of mink kits induce robust protection against distemper

T.H. Jensen, L. Nielsen, B. Aasted, M. Blixenkron-Møller

DNA vaccination is a new promising vaccination strategy with potentials for inducing immunity in young individuals because of the possibility to overcome maternally derived antibodies. However, even the capacity of a DNA vaccine to induce immunity against CDV in young mink without maternal antibodies has so far not been described. In this study young mink kits (n=8) were vaccinated with DNA plasmids encoding the viral haemagglutinin protein (H) of a vaccine strain of Canine distemper virus (CDV). The mink were protected against challenge inoculation with a recent wild type strain of CDV. The T-cell immune response of the vaccinated mink was boosted by

challenge inoculation indication that the vaccine primed a memory response. Essentially, these results demonstrate that early life DNA vaccination with the H gene of a CDV vaccine strain induced robust protection immunity against a recent wild type CDV.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 1 p. Authors' abstract

Animal data from Sampo-farms – a basis for knowledge and information Joint Finnish / Norwegian database from Visual Sampo

K-R. Johannessen, E. Børsting K. Smeds, H. Kristiansen

Visual Sampo is a PC-operated breeding programme owned and marketed in Finland by the Finnish Fur Breeders' Association (FPF), and marketed in Finland by the Breeders' Association (NPA). The program operates as a local database with essential animal data for the actual farm. The animal data is regularly every year reported to the organisations and in cooperation with mr. Ejner Børsting, the two organisations have created a joint database with data from all the active farms using the program. The database now contains pedigrees and reproduction data on approx. 630.000 Norwegian foxes and minks, and 9.3 million Finnish foxes and minks. Many of the fox farms also received individual skindata from the auction house promptly after each auction. The goal and purpose of this database is monitoring the breeding programs both on general industry base and on individual farms. Furthermore as a tool in the practical advisory work towards commercial farmers, and finally act as a potential source of real life data for genetic and statistical research.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 9 pp. Authors' abstract.

Economydoctor as a tool for monitoring and analysing of the economy of fur farms

O. Rantala

Economydoctor is an online Internet service for presenting the profitability bookkeeping results for public and private use (www.mtt.fi/taloustohtori). The service was launched in December 2006. Economydoctor provides average weighted results and forecasts representing all production sectors, size classes and regions from accounting year 1998 onwards. Diversified classifications and reports make the service very effective tool for reporting and analysing the results. The privacy of individual data is strict. It is not possible to get out of the system any data of an individual bookkeeping farm. All the results are presented as weighted group averages of at least seven farms. Bookkeeping farms can look at and report results of their own farm only by user identification code. The farm-specific data are totally confidential also in the research use.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 3 pp. Authors' abstract.

Fox animal manure as P source for plants

K. Ylivainio, E. Turtola

As meat bone meal (MBM) contributes significantly to the diet of fur animals, manure subsequently contains large amount of phosphorus (P), corresponding to about 1 kg ha⁻¹y⁻¹. For comparison, respective values for spreading cow manure and mineral fertilizer P are 4.1 and about 8 kg ha⁻¹y⁻¹. To promote efficient use of P in fur animal manure, we investigated P solubility and P availability in fox manure (FM) and MBM. Solubility was studied in laboratory with Hedley fractionation scheme. Availability for plants was evaluated in pot and field experiments using soils with very low P status. The solubility and availability of P for plants were compared to those of superphosphate (SP). Most of the P in FM and MBM (65-90%) was soluble only in acid, while the shares of water soluble P were 5-28% and 3%, respectively. Immediate (first cut) plant availability of P for ryegrass in the pot experiment was 35-54% (FM) and 63% (MBM). In the field experiment, P availability during the year of application in FM was 21-61% and in MBM at

the most 18%, as compared to that of SP. After the application year, P in FM and MBM was equal to superphosphate, and the availability of P during the 3-4 year experiments were 55-78% and 32%, respectively. The results showed that P derived from bones is gradually dissolved in slightly acid soils and forms a long-term source of P for cultivated crops.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 4 pp. Authors' abstract.

Numbers of nipples per kit affects kit survival

J. de Rond

Research farm Edelveen has looked in 2006 and 2009 into the effect of the number of nipples per kit on kit survival and kit growth. In 2006 the various number of nipples per female were observed in the lactation period. The number of nipples varied from 1 to 11 per female. In 206 a group of 100 brown female mink were conducted in a project in the lactation period. The growth of the kits was measured and related to the number of nipples per kit. For small litters, the growth of kits was higher when the number of nipples per kit were higher than the number of kits. For the bigger litters (6 to 10 kits) the effect of the number of kits was on kit survival. In average the females survived the number of kits appr. Equal to the number of nipples + 1. In 2007 Edelveen did count the number of nipples at the moment of vaccination of the kits (6 weeks of age). This was too late, several nipples were dried in and hard to see. In 2009 the new flock of young brown female mink were all checked on the number of nipples at 2 to 3 weeks in lactation period. There were 924 litters with 6 till 10 kits. Each litter size was split in 2 groups depending on the number of nipples regarding the number of kits: lower vs equal or more (6 or 7 kits) or lower vs equal (8 and 9 kits) or much lower vs 1 or 2 lower (10 kits). For each litter size the result was the same: the lowest kit losses with the higher number of nipples. For each litter size the difference was significant. The average kit losses between the day after birth and the age of 21 days were 0,15 kit per female for high number of nipples and 0,9 kit per female for the low number of nipples. Edelveen will

start a new project in 2010 to look for the genetic influence for number of nipples like in rabbits and sows. Kit losses are mentioned in the discussion of mink welfare. If the number of nipples is genetic, it should be adapted in the selection of breeding animals.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 4 pp. Authors' abstract.

Artificial light & Fur animals – effect of light pollution on reproduction and fur quality

J. Taipale

The project aims to find out if the artificial light from greenhouses with year round production has a negative effect on breeding result and fur quality of fur animals raised in the proximity of the greenhouses. In Ostrobothnia in Finland fur animal farms and greenhouses are often situated very close to each other. Some mink farmers have noticed a decline in their breeding result, with special regard to number of mated females, since the number of greenhouses with year round production has increased. Both reproduction and fur development are regulated by photoperiods. Too much light in autumn and winter could be harmful for coat development and testis activity. It may also have an effect on the time of female estrus. A field study is planned for the project. Data on mink and fox matings and breeding results will be collected and the amount of light on farms will be measured. Also data on breeding results and fur quality from the last decade is analyzed to detect possible negative trends since the amount of greenhouses with year round production and the amount of lighting has increased. The two-year project is carried out in the years 2009 and 2010, with YA! Vocational Education and Training as project coordinator. The project is financed by TE Centre for Ostrobothnia with money from the European Agricultural Fund for Rural Development (EAFRD).

NJF Seminar No. 427, Vaasa, Finland, October 2009, 1 p. Authors' abstract

Glycerol in mink feed in the growing and furring periods

T.N. Clausen, P. Sandbøl

To the investigation of increasing amounts of glycerol 0 – 2 – 4 – 6 – 8 percent to mink kits in the growing period, we used 5 groups of 132 wildtype mink kits each. The results showed that we can use up to 8 % glycerol instead of 8 % cornstarch, with reservations to changes in feed consistency. Glycerol should be analysed for Na and methanol before use. The skin quality was best at 8 % glycerol and no cornstarch, also it seems that glycerol reduces the liver fat content.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 7 pp. Authors' abstract

Compensatory growth in mink kits (*Mustela vison*) following reduced protein intake after weaning

M. Schulin-Zeuthen, P. Sandbøl

Two groups of 8 weeks old mink kits were offered a synthetic diet containing 17.5 % ME_p corresponding to 50 % of the protein requirement of the kits. In one of these groups, soy lecithin replaced 5 % of the dietary fat fraction. A control group was kept under normal farm conditions offered a regular feed kitchen diet. The two restricted groups maintained weight (lecithin group) or loosed weight (synthetic control) during the 11 days of restriction. 2 weeks after conclusion of the restriction period, live weight of all mink kits were the same and therefore the two restricted groups was able to compensate growth.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 5 pp. Authors' abstract

Apparent digestibility of Glycerol in mink (*Mustela vison*)

M. Schulin-Zeuthen, P. Sandbøl

A dark and light sample of Glycerol was compared in a digestibility trail. The light Glycerol contained slightly more crude protein, fat, ash and salt

(percentage of dry matter) and thus slightly less calculated crude carbohydrates than the dark sample. A discrepancy was noted between carbohydrate content in the product sample and recovery of carbohydrates in the diets. The apparent digestibility of carbohydrates in both samples of Glycerol was 93 %.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 4 pp. Authors' abstract

Coat colour in Mink (*Mustela vison*). – Effect on amino acids and chelated minerals (Phe & Tyr, plus Fe, Cu & Zn)

T.N. Clausen, P. Sandbøl

To find the optimal level of Phe+Tyr for body growth and pelt colour and to find the importance of Fe, Cu and Zn for pelt colour, we used 5 groups of 142 black male and female mink kits each, and 2 groups of 122 wildtype male and female kits each. To a control feed with a low content of Phe+Tyr (0.41 g digestible Phe + Tyr / 100 kcal) we added Phe + Tyr up to a total content of 0.47 vs. 0.55 g digestible Phe + Tyr / 100 kcal. Further we had two groups with and addition of chelated minerals, cupper (Cu), zink (Zn) and iron (Fe) in two levels to the control feed.

The results showed a tendency towards the lowest weight at the lowest Phe + Tyr level and a tendency towards the darkest skins at the highest level, both in black and wildtype mink kits. Increased addition of minerals in the amounts used here gave a better body growth, there were no significant difference in skin length and pelt quality, but a tendency towards lower skin quality, and a darker colour at the highest addition. The liver fat content was highest at the highest addition of chelated minerals. There was a tendency towards and increased liver mineral content when the feed mineral content increased, but no significant increase.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 11 pp. Authors' abstract

Microsporidia linked to systemic inflammatory lymphoplasmocellular lesions in mink (*Neovison vison*) a preliminary study

R. Fernandez-Antonio

Given that there was absolutely no serological evidence for the plasmocytosis virus infection, it is possible that it was the infection by microsporidia that was the cause of these histopathological symptoms. However, there was an absence of animals with cataracts which would have corresponded to an infection caused by *Encephalitozoon cunicola* in mink.

The confirmation of this diagnosis depends upon specific analytical tests in order to identify the microorganism and to study its prevalence in the farm. The results of these tests are, as yet, unavailable.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 1 p. Authors' abstract

Body condition scoring method for the blue fox (*Alopex lagopus*)

R. Kempe, N. Koskinen, J. Peura, M. Koivula, I. Strandén

During the last decade, blue fox has been bred to be large and fat, because price of the pelt is mostly determined by pelt size. In order to attain large pelt size, blue fox is fed unrestricted during growth period. This excessive dietary intake and inadequate

utilisation of energy gives both very fat and obese foxes at pelting time. However, extreme obesity should be avoided because of its negative impact on animal health. Obesity is detrimental especially to young vixens used for breeding. Extreme fattening followed by fast and outstanding weight loss influences negatively fertility traits. New breeding strategies need to take into account obesity, and an easy way to record it is needed.

Body condition scoring (BCS) is a subjective method for estimating subcutaneous fat cover. In this study BCS measure was assessed for 868 blue foxes on a scale of 1 to 5, where 1 is very thin and 5 obese. BCS measure is an indicator of body fat stores and its categories reflected the amount of subcutaneous fat, fat content of carcass, body weight and grading size. The BCS measure was compared with five other measurements; fat thickness measured with ultrasonic equipment, fat content of the whole carcass, body weight, grading size and animal length. BCS had the highest correlation with the body weight. The BCS method developed in this study proved to be a useful and practical tool for assessing the degree of obesity in the blue fox. The method allowed distinguishing fatness in an animal from its large size.

The BCS method can be applied to live animals during growth period. However, presence of a long heavy hair coat can complicate more accurately. Assessing the nutritional status and degree of obesity of foxes *via* BCS is a convenient and time saving way in comparison to weighing a fox.

NJF Seminar No. 427, Vaasa, Finland, October 2009, 1 p. Authors' abstract

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