Fur Animal Research

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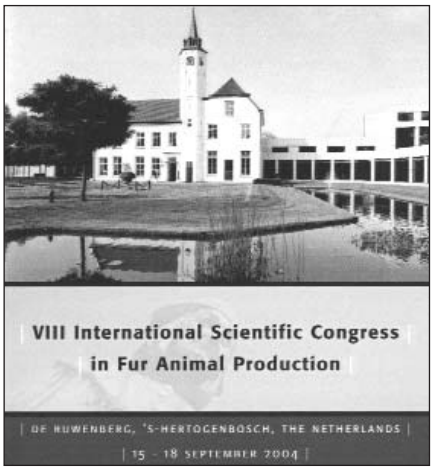
This is the time of the year that your Mink Farmers' Research Foundation (MFRF) holds its annual meeting, and part of this issue will be devoted to reports from that group. While we're on the subject of meetings, I will remind you the VIIIth International Scientific Congress in Fur Animal Production is scheduled for September 15-18 at s'Hertogenbosch in the Netherlands. This gathering will bring together many of the top figures in mink research worldwide. The MFRF Board will be represented at it and I believe you, as practicing mink producers, would find it both informative and enjoyable. For further information you can contact: The VIIIth International Congress, P.O. Box 488, 6600 A.L. Wijchen, the Netherlands. The meeting site holds special interest for me since it is near where my Canadian Army service was nearly 60 years ago during World War II. It will be nice to see the country under more peaceful conditions.

About a month ago, I was invited to the annual meeting of Northwest Farm Foods, a large feed cooperative in northern Washington. Meetings of this sort give producers an opportunity to hear from some research people and feed representatives as well as visit with others in the business. Dr. Gary Durrant, MFRF Secretary, was the keynote speaker and did a good job of summarizing the various mink diseases and what can be done about them.

Two of the most devastating current diseases now have their focus on animals other than mink (Bovine Spongiform Encephalopathy [BSE] and Avian flu) and both of them have possible implications for mink. BSE has been the subject of an extensive surveillance program run by the U.S. Department of Agriculture. This program targets the highest-risk animals: animals that die on the farm, so-called "downer animals," older animals and animals evidencing some kind of neurological distress. All in all, the government expects to sample brain tissues from over 200,000 animals in a period of 18 months, beginning June 1, 2004. When action was taken it was prompt and decisive. A calf-raiser, whose animals included a BSE positive calf from Canada lacking positive identification (ear tags), had his entire calf crop slaughtered (449 head) so as to take no chances on a positive-tested animal getting through. Both U.S. and Canadian cattlemen are cooperating fully with authorities and the beef market, after an earlier slump, is getting back to normal. Researchers at the University of California/San Francisco have announced a faster, more reliable test for BSE, which can detect prion proteins (which cause the disease) with



100% accuracy. Current tests are run on brain tissue, which means the animals must be killed. The new test may be run on muscle tissue of live animals, which would be a great advantage.

Avian flu is causing a tremendous loss of poultry in British Columbia—totaling millions of birds. Veterinary officials have reported that this deadly virus can infect and kill cats. A Thailand veterinarian suggests that cats may get the virus by eating carcasses of infected chickens. This infection of other species with Avian flu is cause for concern.

On a happier note, reports I have been receiving suggest that this year's kit crop is a good one. I wish you all success in bringing these young animals through their growth stages that are now upon us.

J. E. Oldfield

ODOR CONTROL IN ANIMAL FARM OPERATIONS

Mink farms, along with most other animal production units, are sometimes criticized by their neighbors for odors inherent in their operations. We can perhaps learn from experiences with other species. This past year has seen investigations funded at about the equivalent of $1.35 million U.S. directed towards solving odor problems on Danish pig farms. One of the first objectives has been achieved in the development of an accurate test for measuring farm odors, both qualitatively and quantitatively. This method traps the materials causing the odor on an absorbent material in a special tube that is then sent to the laboratory for chemical testing. This is a good beginning, but the Danes have not reported much success so far in actual removal of odors. They found that lowering dietary protein for the pigs reduces the ammonia present in the exhaust air from the operation, but did little to reduce the actual offensive smells. A Danish company, Turbovent, proposes to wash air from the animal operation within a chimney-like structure. This method is said to remove about 60% of the odor-causing chemicals, 40% of the ammonia and nearly all of the dust. The wash-water is treated biologically using bacteria, and then recycled. This method, which works in closed buildings, would not likely be satisfactory with mink operations, which are largely in the open air. (from: "Look, No Smell," in Pig International, vol. 34, no. 4, pp. 11-13, April, 2004).

ABSCESSES

Abscesses are usually sporadic in non-Aleutians and are treated effectively by mink farmers with antibiotics. However, in Aleutian herds, they are frequently severe and lead to death. Scandinavian veterinarians have reported that staphylococcal infections are more prevalent in Aleutian mink.

Abscesses in CH-S mink frequently develop in bite wounds following breeding (see Figure 1). The bacteria that are commonly isolated in these cases are Streptococci bacteria.

A rancher in western Oregon had a serious annual problem with subcutaneous abscesses in his mink. He maintained approximately 500 Aleutian and 500 non-Aleutian breeder females and 100 males of each type. In 1965, 257 Aleutian and 15 non-Aleutian breeder females had abscesses just prior to whelping. Death among the adult mink due to abscesses was rare if the abscess was lanced and treated. Within 4 weeks after parturition 160 of the Aleutian kits had died; in this interval only one non-Aleutian kit died. On post-mortem examination the kits had abscesses or severe subcutaneous infections. Cornyebacterium sp. was isolated from the abscesses. The number of animals sick and dead is shown in Table I.

Figure 1. A draining abscess on the neck of an Aleutian mink. Affected mink should receive an antibiotic injection.

Table 1. Frequency and severity of Cornyebacterium sp. infection in Aleutian and non-Aleutian adult female mink and their kits.

Animals	Aleutian	Non-Aleutian
Total adult females	500	500
Adult females with Cornyebacterial abscesses	257	15
Kits dead from Cornyebacterial infection	160	1

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PRESERVATION OF MINK FEEDS BY IRRADIATION

Dr. Steve Bursian, at Michigan State University has begun experiments to determine whether irradiation will be a safe and effective means of preserving mink diets until they are fed. If successful, this would lower and perhaps eliminate the need for adding antibiotics to the feed mix. Dr. Bursian has submitted the following report on his progress:

Because irradiation is an effective methodology to preserve human foods, it is of interest to assess the process as a means of sterilizing and preserving fresh mink feed ingredients/complete feed to determine if disease-causing bacteria can be eliminated or reduced and to determine how long ingredients/feed can be stored in a non-frozen state without rapid spoilage. The objectives of the present proposal are (1) to assess the length of time that irradiated duck offal and complete feed can be kept in a cooler before high bacterial counts and oxidative damage render it unusable and (2) to assess palatability of the treated product.

We had made arrangements with the SureBeam Corporation to irradiate both fresh feed ingredients and complete feed at their Chicago facility. Unfortunately, all of the company's facilities were closed in January due to financial problems. We located another irradiation facility, CFC Logistics in Quakertown, PA, which was willing to irradiate the complete mink diet and the duck offal. Approximately 240 lbs. of feed and 85 lbs. of ground duck offal were thawed overnight and packaged in 2 gallon plastic bags (approximately 8 lbs/bag). Bags were then placed in styrofoam coolers and refrozen for 48 hours prior to ground transport to Quakertown. Feed/duck offal was processed upon arrival at the CFC Logistics facility, which maintains a Genesis cobalt 60 irradiator. A dose of 3.00 kGy was requested, which is sufficient to inactivate spoilage and pathogenic bacteria. The actual minimum dose was 2.03 kGY and the actual maximum dose was 3.03 kGy. After irradiation, which required approximately 60 minutes, the product was placed in a freezer for 24 hours prior to the return trip to Michigan State University (MSU). Upon arrival at the MSU Experimental Fur Farm, the styrofoam coolers containing the irradiated feed and duck offal were placed in a freezer until subsequent use.

Within the next month, irradiated and non-irradiated feed and duck offal will be placed in the farm's walk-in cooler and samples will be taken on a daily basis for up to 21 days to assess bacterial growth. In addition, irradiated and non-irradiated feed will be kept at room temperature for up to 7 days with bacterial counts being determined on a daily basis. We then plan to provide young mink untreated and irradiated feed for a 4 week period to determine palatability. Feed consumption will be determined on a daily basis and body weights will be determined on a weekly basis.

If data indicate that irradiation results in low bacterial counts in feed maintained in a cooler and at room temperature for a prolonged period of time, we will irradiate a larger quantity of feed in 2005 to provide to females at time of breeding through lactation. Kits will then be maintained on the irradiated feed through August with survivability and growth being assessed.

Preservation of Fresh Feed Ingredients and Complete Feed by Irradiation

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COMPOSTING MINK WASTES

Before his retirement, Dr. Dick Aulerich, at Michigan State University, experimented with composting—a process during which heat is generated—as a means of disposing of mink wastes, including carcasses. After being composted these wastes can be returned to the land as fertilizer. We reported on this work in Volume 9, Number 1 of this newsletter, published in March of 2001.

Composting is being used in large animal operations too, and the following announcement from Iowa State University is relevant:

Ongoing research at Iowa State University (ISU) shows composting may be a viable way to dispose of large animal carcasses. And a new website (www.abe.iastate.edu/cattle-composting) provides information on the research, preliminary results and guidelines for producers interested in composting animal carcasses.

The website is organized for use at three levels. The executive summary page is for those with a casual interest. Researchers, environmental officials, veterinarians and others seeking more in-depth information should use the "Project in Detail" section. Producers and others who just want to learn how to do it can go to "Draft Guidelines for Emergency Cattle Mortality Composting."

More than 40 tons of cattle carcasses have been composted during the first 16 months of the project. Researchers learned it takes 8-12 months for soft tissues and organs of a 1,000-lb. carcass to decay under all three types of cover material being tested—silage, ground cornstalks and a hay/manure mix. Some trials begun during warm weather have taken less than 6 months.

Tom Glanville, project coordinator and associate professor in ISU's agricultural and biosystems engineering department, says shorter times are feasible when compost piles are turned frequently.

He also reports that the test units constructed with corn silage have the best potential for killing pathogens, as they typically produce the highest core temperatures in the shortest amount of time and that odor in the immediate vicinity of the composting test units is low. In many cases, odor from the test units cannot be distinguished from the odors that are characteristic of the cover material.

Iowa State University Ag Communications Service

FUR CHEWING: EFFECTS ON REPRODUCTION

Causes of fur chewing in mink have been debated and it has not been clear whether this undesirable trait is inherited. Studies in Poland addressed this problem and also investigated the effects of fur chewing on reproduction. Two groups of pastel mink were involved (24 females and 12 males whose fur was damaged on the tail and sides of the body, and 31 females and 15 males whose fur was not damaged) as controls. The animals were bred within these groups (damaged x damaged and control x control).

It appeared that fur chewing was an inherited defect. In the fur-damaged group 19% of the kits born chewed their fur. Chewing was observed on the tail and neck. The tail-chewing was thought to be self-inflicted while that on the neck and body was attributed to other mink in the same cage.

As far as reproduction was concerned the worst kit-rearing results were found in the females with fur damage. Males with fur damage appeared fairly normal and exhibited normal sexual activity. Culling of mink showing fur-chewing tendencies is recommended and it was suggested that animals who chewed their own fur also had a tendency to damage the fur of others in the same cage. (from: Gugolek, A., M.O. Lorek and A. Hartman. Studies on the relationship between fur damage in mink, reproduction results and the occurrence of this defect in offspring. SCIENTIFUR 25(4):115-116. 2001).

SPRAY-DRIED BLOOD AS A SOURCE OF PROTEIN FOR MINK FEED

Dr. Bursian and his group at Michigan State University have proposed looking at blood meal as a protein source of mink diets. Their proposal follows:

The purpose of this project is to evaluate the use of spray-dried blood protein for feeding mink by assessing adult female reproductive performance and survivability and growth of their kits through the furring period.

Fifteen adult female mink are being fed a basal diet containing 7.5% spray-dried liver, 2.5% spray-dried egg and 4% fishmeal (Diet 1) and 16 animals are being fed the basal diet in which spray-dried blood protein (80-88% protein, Van-Elderen, Inc., Martin, MI) was incorporated into the diet at 11% of the total ration to replace the liver, eggs and fishmeal (Diet 2). Animals were started on their respective treatments on February 3, 2004. Females will be fed the diets through lactation and their kits will be continued on their respective diets until pelting. Breeding began on March 1 and was completed on March 23. Whelping began on April 19. Females were weighed just prior to mating and at whelping and will be weighed at 3 and 6 weeks of age, and monthly thereafter. Kit survivability will be monitored throughout the treatment period.

The cost of the diet containing the spray-dried blood protein is $1.62/lb and the cost of the diet containing the spray-dried liver, spray-dried eggs and fishmeal is $2.70/lb. All females in both groups successfully bred. To date, 13 of 15 females on Diet 1 have whelped and 15 of 16 females on Diet 2 have whelped. Females on Diet 1 have whelped 73 live kits (80 total) for an average litter size of 5.6 kits. Females on Diet 2 have whelped 75 kits (76 total) for an average litter size of 5.0 kits. Average birth weight of male kits in the Diet 1 group was 10.5 g compared to 10.9 g for males in the Diet 2 group. Average birth weight of female kits in the Diet 1 group was 9.4 g compared to 9.6 g for the Diet 2 female kits.

Results to date indicate that the reproductive performance of females fed a diet containing 11% spray-dried blood protein is comparable to that of females fed a diet containing 7.5% spray-dried liver, 2.5% spray-dried egg and 4% fishmeal. The cost of Diet 2 is 40% less than the cost of Diet 1. This suggests that spray-dried blood protein can be used as an inexpensive alternative to spray-dried liver and egg and fish meal as a source of quality protein.

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STORAGE OF MINK PELTS BY FREEZING

In a Danish study, prime pelts from standard, dark mink (four male and four female) were involved in a storage/handling investigation. A pair (one male pelt and one female pelt) was frozen in plastic bags at -21° C for 120 days immediately after skinning. Then they were thawed, fleshed, stretched and dried. Another pair was treated immediately after skinning including machine fleshing, stretching and storage in a hanger at 11° C (not frozen). Two leather samples were clipped from the dorsal (back) side of each pelt for further study. Mean values showed that male pelts were relatively less stretchable before breaking if the pelts had previously been frozen. This work is to continue with other characteristics measured (from: Rasmussen, P.V. and L.L. Shovlokke. Measurement of leather properties in dressed mink pelts. Preliminary results in relation to storage of pelts by freezing. Scientifur 25(4):120-121. 2001).

EFFECTS OF MELATONIN AND PROLACTIN IN MINK

Dr. Jack Rose, at Idaho State University, who was one of those responsible for developing the acceleration of the production of prime pelts with melatonin (MEL) is continuing these studies and, at the MFRF Board's request, is broadening his work to include prolactin (PRL) and to also study effects on reproduction. In the pelt studies he showed that MEL-treated mink showed significantly thicker epidermis (which explains why they are often somewhat heavier) and suggests that this treatment may result in pelts with greater tensile strength and resistance to abrasion.

In his reproductive studies, Dr. Rose noted that PRL is a major hormone responsible for terminating embryonic diapause in mink. Because of the loss of viable embryos during diapause, a better understanding of the role of PRL-signaling in mink uterus should result in methods to shorten diapause and increase litter sizes. Therefore, beginning in early March, mink were treated with melatonin (MEL) to inhibit PRO secretion, haloperidol (HAL) to increase PRL secretion, and untreated as controls. The animals were sacrificed in early August, the uteri collected and RNA extracted and subjected to reverse-transcriptase-polymerase chain reaction (RT-PCR). PRL mRNA abundance did not differ between the uteri of control or HAL-treated mink, but surprisingly was almost non-detectable in MEL-treated mink. This suggests that MEL acts either directly on the uterus to inhibit PRL expression, or that the MEL-induced reduction in circulating PRL, was necessary to maintain uterine PRL production; that is, PRL directly or indirectly stimulates PRL gene expression in the mink uterus. Uterine PRL-L-R mRNA abundance was greater in MEL-treated mink, and much less in HAL-treated animals. This trend strongly supports the hypothesis that PRL down-regulates its receptor in the uterus, at least in response to very high PRL levels. This data clearly demonstrates the production of PRL and its receptor by the mink uterus, and that the expression of both genes are influenced by PRL. It is our hypothesis that PRL: (a) stimulates uterine glandular secretions, and (b) down-regulates the expression of insulin-like growth factor binding protein -5 (IGFBP-5), which results in greater free concentrations, and activity of IGF-I within the uterine lumen. We feel both actions are important to promote blastocyst activation and subsequent implantation. In an effort to test our hypotheses, future studies (utilizing in situ hybridization and RT-PCR for uterine IGFBP-5, PRL and PRL-R mRNA expression) will be conducted to determine, among other things, if PRL decreases IGFBP-5 as a prerequisite to blastocyst implantation.

Dr. Rose has been on sabbatic leave in Pennsylvania this past winter, but he intends to be back at Idaho State University this fall.

FUTURE CANINE DISTEMPER (CD) RESEARCH

Mink offer a unique opportunity for CD study. It is not unusual for farms to have 25,000 or more mink in which 7,000-8,000 mink are raised on an acre of ground. When a CD outbreak occurs, "shoe leather" epidemiology allows reasonable impressions of CD activity.

Most veterinarians familiar with mink farming and mink farmers in North America and Scandinavia have observed that distemper mortality in disease outbreaks is almost invariably greater in the pastel (bb or gg) color phase mutation mink than in natural dark mink (Hansen, 1971, 1985; and Hunter and Lemieux, 1996). While the Aleutian (aa) Chediak Higashi gene (Padgett et al., 1964) had increased the susceptibility of this color phase mutation to bacterial diseases, we have not noted an increase of CDV virulence in this genotype. While the increased CDV disease mortality of the pastel mink is a solid clinical worldwide observation, molecular tools are available to determine if the pastel genes for color are linked to genes for CD susceptibility.

There seems to be a gradual change in the clinical course of CD in mink during the past 50 years even though the case/fatality rate is about the same. The catarrhal signs (nasal, ocular exudates, hyperkeratotic foot pads) are less severe. Interestingly, the occurrence of neurotropic episodes has apparently not decreased.

If the observation of the reduction in the severity of the catarrhal signs is valid the genotypic properties of CDV strains circulating on mink farms should also be considered. A study of the interaction between CDV and the mink would provide some insight on the reduced severity of the catarrhal forms of the disease. One wonders if wide scale CDV vaccination of millions of mink each year influenced the disease picture.

Large populations of mink on farms where the breeding history of each mink is recorded allow critical observation of the circumstances under which clinical disease occurs on a farm and the factors that influence the frequency, spread, and distribution on a single farm or from farm to farm. The environmental effects of temperature on humidity and the influence of nutrition on the disease can be observed.

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ANTIOXIDANT EFFECTS ON MINK

The synthetic antioxidant, Ethoxyquin (ETOX) has been added to mink feed mixes containing highly unsaturated fatty acids (for example in high fish diets) to prevent rancidity and its subsequent undesirable effects on the mink. Two groups of mink were involved: one receiving no ETOX, the other receiving the same diet to which ETOX was added at 300 parts per million (ppm). The female minks' milk was analyzed and it was found that ETOX was transferred from the feed to the milk. Use of the antioxidant in the feed caused no problems and there was a trend (although not significant statistically) towards improved reproduction and growth of the kits. The authors considered that the lack of statistical significance was probably due to wide variations in the mink used and they recommended that antioxidants should be added to feeds which included fairly high levels of polyunsaturated fatty acids. (from Bjorgegaard, C., T.N. Clausen, H.H. Dtetz, K. Mortensen, N. Sorensen and J.C. Sorensen. High content of ethoxyquin in feed for mink in the reproduction, lactation and early growth periods. In: Annual Report, 2001, Danish Fur Breeders' Research Center, Holstebro, Denmark. pp. 133-139).

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