Fur Animal Research

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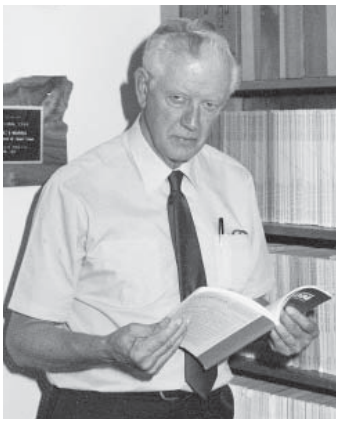

This issue of our newsletter may reach you a little later than usual. The reason is that I am moving to a smaller house, still in Corvallis. My new home address is 4766 Birdsong Drive, S.W., Corvallis, OR 97333. Any of you who have been through moves will appreciate, I'm sure, the amount of time and work involved. I had lived in the old house over 50 years and the amount of stuff I'd accumulated was incredible. Thanks to the good people at Goodwill I was able to recycle many things that I had no further use for, but which were still serviceable.

Since this is a research newsletter, I try to stick to reporting ongoing research, in the U.S. and elsewhere, and generally avoid political items. I'm going to make an exception this time, however, to report on actions the Congress has recently taken relative to the Animal Enterprise Terrorism Act. This bill makes it a crime to threaten animal research workers and their family members, expanding an existing law that Congress passed in 1992, outlawing physical disruption of animal research laboratories. I applaud this action which has been approved by both the House and Senate because I know full well just how dangerous this form of terrorism can be. The Fur Farm at Oregon State University was attacked and one building buned to the ground, and personal threats were made against me. Dick Aulerich's facility at Michigan State was similarly attacked, as was Dr. Gorham's in Pullman, Washington, and some others. Feed supply facilities were also targeted including the Northwest Farm Foods Cooperative in Burlington, Washington. It is most appropriate, I feel, to have these actions recognized formally as the crimes they are and hopefully the punishment will dissuade further acts of research and fur industry terrorism.

I wish you all, a little belatedly, a happy Holiday Season and a profitable and enjoyable New Year.

J. E. Oldfield

COMPACT DISK ON DISEASES AND PARASITES OF MINK

Mink Farmers Research Foundation Compact Disc: The compact disc (CD) Diseases and Parasites of Mink, by John Gorham, DVM, is now available. It was made from 80 kodachrome slides and consists of photographs of viral, bacterial, nutritional, genetic, and parasitic diseases. It can be ordered from the Fur Commission USA via email request to the following address: furfarmers@aol.com. There is no cost.

TRANSMISSION OF ALEUTIAN DISEASE VIRUS (ADV)

A lot more needs to be known about the spread of AD on the farm in addition to what we know about the genotype of the mink, the strain of the ADV and its virulence and transmissibility, the effects of climate and outside temperatures along with wind currents and the construction of the sheds and nest boxes.

The rapidity of the spread of AD varies on different farms. Sometimes it takes several months to spread from an infected mink to others in nearby pens. Perhaps a certain amount of virus is necessary to transfer to a susceptible mink. It might take most of a year for the virus to flow through a couple of sheds.

On the other hand, Dr. Gary Durrant of the Utah Fur Breeders Co-Op has observed explosive outbreaks on Utah farms. Female mink that were zero percent CIEP positive in February were 85-90 percent positive the following October. The outbreaks were caused by the highly virulent Utah 1 and Durrant strains of ADV.

Sources of the AD Virus

When a mink is infected with AD, it is a "virus factory." We have found the AD virus in the blood, urine, saliva and feces of an affected mink. With all of this ADV, it is not surprising that transmission by mouth and other routes occurs on mink farms.

Transmission by Food

A large food-borne outbreak was reported in Denmark. A food kitchen distributed a mixed food diet to several farms in the area near the kitchen. Clear-cut evidence showed that this food kitchen supplied food that was contaminated with ADV. Obviously questions were asked. What was the food ingredient in the mixed food that contained the ADV? At what time during processing was this ingredient added to the food? We need these answers in order to prevent future ADV contamination of the food supply.

Airborne Transmission

We and others (Dr. William Hadlow at the Rocky Mountain Laboratory in Hamilton, Montana) have infected mink by dropping ADV into the noses of susceptible mink. Since the ADV is in the saliva, there is little doubt that airborne is an effective route of transmission. Also, Danish researchers have fairly good evidence that the wind carries the virus between neighboring farms.

Indirect Contact

The AD virus is really a tough virus whether it is in urine, feces or saliva. I would compare its stability to the mink virus enteritis (MVE) which is in the same family as the ADV. Dr. Asa Uttenthal and her Danish coworkers said that MVE can survive 5-12 months under natural outdoor conditions. She added that mechanical cleaning of pens and premises is as important as disinfection. A lot of disinfectants have been sold to mink farmers but it is difficult to beat the efficacy of sodium hydroxide.

Shedding of the AD Virus

The time period at which the ADV begins to shed and when the shedding of the virus ends in an infected mink is of importance in any control program. There is no question that a blue (aa) genotype mink will shed virus until it dies. Based on very limited experience, I would bet that any infected non-Aleutian (AA, Aa) mink can potentially excrete virus as long as it lives.

Transmission of ADV from the Female to Her Kits

Mink farmers were first to notice that AD infected females were more likely to abort, produce smaller litters, or have no litters. Those kits that were born alive later died of AD. We took unborn kits from AD in-

fected females and ground them up. Then we inoculated the suspensions into susceptible mink. In every instance we found the unborn kits to be infected with AD. I agree with Dr. Mogens Hansen of the Danish Fur Breeders who said that probably all the kits from an infected female will be infected and will eventually die of AD. This route of transmission, called vertical by virologists, cannot be controlled unless infected females are eliminated.

The Future of Aleutian Disease Research

The goal of disease investigators is the eradication of disease. It may be possible to eradicate AD on a farm with rigorous testing and control procedures but AD will never be eradicated in any large population of mink in the United States, Canada, Scandinavia, or Russia. No veterinarian worth his salt should say "never" but I won't hesitate in this context.

First, the transmission of AD from a female to her kits is close to 100 percent. Secondly, it is a very stable virus and transmitted by a variety of routes. Lastly, AD can infect North American raccoons, Finn raccoons, dogs, ferrets and Blue fox. All of these species are potential sources of the virus. Then several investigators have found wild mink infected. Thus it is hard to argue that AD can be eradicated in the true sense of the word, but it certainly can be controlled.

Aleutian Disease Vaccine

An Aleutian disease vaccine is really needed. Although we have a good test to detect infected mink, prevention of the disease would be more desirable. The first serious attempt to make an AD vaccine was by Drs. David Porter and Austin Larson. They inactivated ADV grown in tissue culture with formalin and used it as a vaccine. Susceptible mink were vaccinated with this vaccine but instead of being protected, these mink died more rapidly than unvaccinated control mink when they were challenged with virulent ADV. The bottom line is "any new AD vaccine must protect against AD and not enhance the disease." There is currently a great deal of interest in developing both human and animal vaccines using new approaches and a wide variety of techniques. Let's hope for an AD vaccine!

Mink Resistant to AD

Mink farmers would like investigators to come up with research to select mink that are resistant to AD. This is tough research that won't be produced "on a Sunday afternoon." Biochemical or immunological factors and genes will have to be identified that show a resistance to AD. The gene or genes must be heritable in a practical breeding program. Mink, unlike many laboratory animals, do not have multiple litters in a year. Thus, at the present time, researchers could only conduct one AD challenge test each year to check the immunity of any genetically developed resistant mink.

Chediak-Higashi Syndrome

It did not take the mink farmers very long to realize that the Aleutian and all other blue (aa) genotypes were subject to a wide variety of ills. The mink farmers called them "one year mink." Later all blue mink were found to have an almost unpronounceable genetic disease called the Chediak-Higashi syndrome. The beautiful diluted coat color is "part and parcel" with this remarkable disease susceptibility syndrome.

In research done at Washington State University we found that granules (little bags of enzymes) in the white blood cells of all Aleutian mink do not function normally and fail to attack ADV and certain other bacteria. Since this susceptibility syndrome seems to be tied to the gene controlling coat color, control measures are a long way off.

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DISTILLERS' DRIED GRAINS AND SOLUBLES AS MINK FEED

With all the interest being shown in the use of ethanol as a fuel and possible gas replacement, distillers' grains should become available in quantities and at acceptable prices for animal feed. They may perhaps contribute to the cereal portion of mink diets. Dr. Steve Bursian at Michigan State University has planned an investigation of distillers' grains as a substitute for wheat middlings.

The use of "new generation" distiller's dried grains with solubles (DDGS) as a feed ingredient is receiving considerable attention within the swine and poultry industries. Distiller's dried grains with solubles is one of the three co-products produced in the dry mill ethanol plants along with fuel ethanol and carbon dioxide. The production of DDGS is increasing at a rapid rate due, in part, to many states banning methyl tertiary butyl ether (MTBE) as a gasoline oxygenation agent, which has led to an increase in ethanol demand. Currently, the fuel ethanol industry in the U.S. produces about 7.8 million metric tons of DDGS (http://www.usda.gov/oce/forum/speeches/markham.pdf).

Research has shown that DDGS can be a cost-effective partial replacement for corn, soybean meal and inorganic sources of phosphorus in diets of swine and poultry. Forty-five years ago, Schaible and Travis (1961) explored the use of DDGS in mink rations. They conducted a series of trials to determine if DDGS could replace: (1) portions of meat or cereal in mink rations during the growth and furring periods; (2) dried skim milk and liver products in dry pelleted feed during the periods of maintenance of adult mink; (3) fresh liver during reproduction and lactation. Their results indicated that DDGS gave good results during growth and furring when used as a replacement for 5% meat and as a replacement for up to 20% of a commercial cereal component of a typical mink ration. They also found that the product was a satisfactory replacement for dried skim milk and dried liver during the winter, summer and fall maintenance periods, but it could not be used to replace the fresh liver component of a mink ration during breeding, gestation, parturition and lactation.

Because research has indicated that DDGS can be used effectively in mink rations, it was of interest to reassess the applicability of the "new generation" DDGS in mink rations. Today's DDGS is produced in such a way that temperature is more carefully controlled, resulting in enhanced integrity of amino acids and other essential nutrients. We propose to conduct a trial in which DDGS will be used to replace the wheat middlings component of a basal mink ration during the growth period of mink. Because the protein and fat content of DDGS is greater compared to wheat middlings, we also will be able to decrease the percentage of relatively expensive high protein/high fat components of the mink diet.

Thirty-five bred females will receive the diet containing DDGS and 35 bred females will receive the traditional ranch diet containing wheat middlings. The two diets will be formulated to provide the percentage of protein and fat appropriate for the time of year. Table 1 provides the composition of the two diets appropriate for the whelping period during the month of April. Females will be started on their respective diets on April 15, which is the approximate time of whelping. At whelping, kits from each litter will be counted, sexed and weighed. Kits will be weighed again at three and six weeks of age as will their dams. Kits will be weaned between seven and eight weeks of age and continued on their respective diets through the furring period (December 1). At weaning, animals will be weighed on a monthly basis to assess growth.

	% Protein	% Fat	% Moisture	Diet		% Protein	% Fat	% Moisture
Wht Mids	15%	3%	5%	16.0%		2.4%	0.5%	0.8%
Chkn	19%	9%	66%	26.0%		4.9%	2.3%	17.2%
SD Liver	58%	12%	10%	3.0%		1.7%	0.4%	0.3%
SD Eggs	46%	31%	8%	5.0%		2.3%	1.6%	0.4%
Water			100%	36%		0.0%	0.0%	36.0%
Fishmeal	60%	6%	8%	4.0%		2.4%	0.2%	0.3%
SB Oil		100%		4.0%		0.0%	4.0%	0.0%
Bld Prtn	82%	3%	8%	6.0%		4.9%	0.2%	0.5%
				100%		18.7%	9.2%	55.5%
	Cost = $0.23/lb				DW Basis	42.0%	9.2%	
	% Protein	% Fat	% Moisture	Diet		% Protein	% Fat	% Moisture
DDGS	26%	10%	13%	25.0%		6.5%	2.5%	3.1%
Chkn	19%	9%	66%	26.0%		4.9%	2.3%	17.2%
SD Liver	58%	12%	10%	2.0%		1.2%	0.2%	0.2%
SD Eggs	46%	31%	8%	2.0%		0.9%	0.6%	0.2%
Water			100%	36.0%		0.0%	0.0%	36.0%
Fishmeal	60%	6%	8%	2.0%		1.2%	0.1%	0.2%
SB Oil		100%		3.0%		0.0%	3.0%	0.0%
Bld Prtn	82%	3%	8%	4.0%		3.3%	0.1%	0.3%
				100%		18.0%	8.9%	57.1%
	Cost = $0.13/lb				DW Basis	42.1%	20.7%	

Table 1. Composition of Wheat Middling and DDGS Diets for April

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CANADA MINK BREEDERS ANNUAL MEETING

The site for the Canada Mink Breeder Association's (CMBA) annual meeting in 2006 was Charlottetown, Prince Edward Island, in an area long recognized for its excellent research with mink. Among the speakers was Dr. Hugh Hildebrandt, recently appointed a Director of the Mink Farmers' Research Foundation, who gave timely information on research with Aleutian Disease and general comments on the status of welfare of farmed animals, including mink. The CMBA approved a grant of $66,000 over a 2-year span to Dr. Kirsti Rouvinen-Watt who is also supported by our Mink Farmers' Research Foundation. The Canada Chair for Animal Welfare, Dr. Georgia Mason, of the University of Guelph, reviewed the status of animal welfare studies. She outlined studies she has done on the provision of swimming water for mink – an item favored by some animal rights activists. Dr. Mason does not feel that swimming water is a hard-and-fast requirement for farmed mink – some like it and some don't. The CMBA is supporting work by Dr. Mason.

CHASTEK PARALYSIS

In the early 1930s, a new disease of foxes was discovered on the fur farm owned by J. S. Chastek at Glencoe, Minnesota. It was found that the raw fish in the ration caused paralysis and eventual death of his foxes. Soon after this outbreak, workers discovered that the fish contained a substance that destroyed vitamin B1 (thiamine). Mink or foxes that are fed fish containing this thiamine-destructive factor are deprived of all sources of thiamine. Reserves of thiamine are soon used up, resulting in paralysis and death.

This mink was paralyzed following the feeding of fresh frozen smelt. Photo courtesy of Dr. O.H. Muth, Oregon State University.

The symptoms are characteristic. First there is a gradual loss of appetite accompanied with weight loss. In the later stages, the weight loss is extreme and convulsions and paralysis appear.

The condition may be prevented by cooking the fish to destroy the factor, by removal of the raw fish from the diet, or by feeding raw fish on alternate days. In treating the paralysis, inoculations of thiamine should be given. Ample amounts of brewers' yeast also should be included in the ration. In an outbreak, the uncooked fish should, of course, be immediately removed from the diet.

Deutch and Hasler at the University o f Wisconsin reported the following species of fish as containing the enzyme that destroys vitamin B1: whitefish, Menomonee whitefish, freshwater smelt, carp, goldfish, creek chub, fathead minnow, buckeye shiner, and herring. Species of fish that do not contain the enzyme are garpike, dogfish, Lake Michigan chub, lake Superior herring, lake trout, rainbow trout, pickerel, walleyed pike, perch, crappie, large and small mouth bass, pumpkinseed, bluegill, rock bass, cod, haddock, mackerel, whiting,, lemon sole, yellow tails, black-backs, redfish and dabs.

Work at Oregon State University has shown that Chastek's paralysis may be experimentally produced in mink and foxes by feeding rations containing 50 percent fresh frozen smelt.

Further research is needed to show positively which species of fish contains the thiamine-destructive factor. It is true, however, that most members of the carp family possess it.

John R. Gorham
Washington State University

THE EFFECT OF PELTING TIME ON PELT QUALITY

Danish mink farmers tend to pelt their mink when they are prime, to get the best skin length and quality possible. Research has shown, however, that skin length and stretchability of the skin don't change from about mid-November to mid-December. They investigated this situation with two groups of 25 brown males either pelted when prime (November 15) or two weeks later (December 1). Weight at pelting and skin length was measured and fur quality was assessed by two official pelt graders. This work confirmed that pelting date had no effect on skin length and elasticity. On average, pelt quality was somewhat better at the later pelting date. The investigators concluded that when the pelt is prime the actual date of pelting has no effect on fur quality or skin length. Mink farmers may therefore plan this pelting season based on feed cost, manpower, and other relevant factors. (from Dr. Steen H. Moller, P.O. Box 14, DK 8830, Tjele, Denmark).

REDUCED DIETARY PROTEIN DURING WINTER FEEDING

Protein is one of the most important nutrients for mink, but also it tends to be one of the more expensive. It follows, therefore, that reduction of dietary protein levels will be desirable if this can be accomplished without lessening the value of the mink pelt. The winter feeding period is usually one requiring less protein, but the lactation period which follows requires higher dietary protein. Danish fur researchers have locked into the possibility of feeding less protein during the winter period. They fed three groups of 155 standard dark females each on the following diets: Group 1 – 50% of metabolizable energy from protein during the entire investigation (January 1 to day 42 of the lactation period). Group 2 – 30% of metabolizable energy from protein until February 25; thereafter 50%. Group 3 – 30% of metabolizable energy from protein; thereafter 40%. They found that feeding standard dark females with 30% of the metabolizable energy from protein until February 25 and thereafter 40% (Group 3) produced the same litter size and kit weights as feeding 50% of the metabolizable energy from protein over the entire period. (from Clausen, T. N., and C. Hejbein. Annual Report. 2002. pp. 23-25. Danish Fur Breeders' Research Center, Holstebro, Denmark).

MYCOTOXINS IN MINK FEED

Mycotoxins (toxins produced by fungi) are a continuing problem in mink feeds and our Research Foundation has funded investigations on how to deal with them, at Michigan State University. Workers at Auburn University, in Alabama, have recently warned that stressful weather (e.g. drought) may cause increases in the level of aflatoxin (a mycotoxin) in drought-stressed crops used for feed. They suggest that feed handlers carefully monitor the aflatoxin levels in their crops and regularly check and clean their grain bins, feed storage bins, and rolling stock. Incoming grain feeds can also be treated with mold inhibitors which is helpful. It is possible to have our feeds analyzed for aflatoxin, and you might find this worthwhile if you contemplate feeding some weather-stressed crops. (from Hess, J.B. 2002. Aflatoxin Anxiety. Feed Management 53(10):20).

Mink Farmers' Research Foundation Board

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