Fur Animal Research

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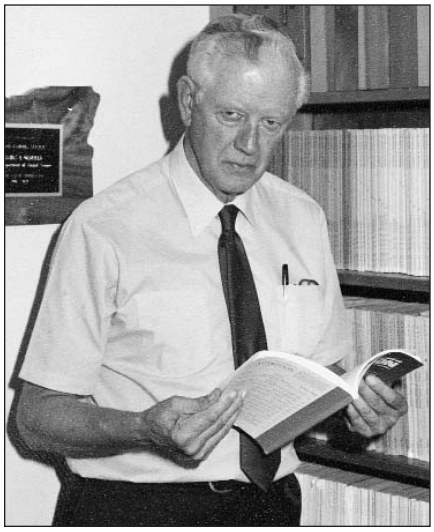

In the last issue, I mentioned the Eighth International Congress in Fur Animal Production, which was held in the Netherlands on September 15-18. I had intended to go there and was looking forward to it when I developed an infection and had to cancel out. This sort of thing happens more frequently as one gets elderly. I shall try to get a copy of the Congress Proceedings and report on them in a future issue.

Our Research Foundation board added a new category to those available for MFRF funding a couple of years ago. Environmental Issues and this will likely see increasing activity in the future. Mink Producers, like others involved in the animal industries, face challenges in keeping their operations compatible with their ever-increasing human population neighbors. This involves eliminating or reducing odors, among other things, and may be costly. It is possible, however, that some of this cost may be offset by marketable by-products, e.g. energy. As an example, I read recently about experimental work at the University of Illinois aimed at generating crude oil from animal wastes. Dr. Yuanhui Zhang, at Illinois has developed a chemical process which converts a manure slurry into crude oil. He estimates the yield from a 10,000 pig-feeding unit to be 5,000 barrels of crude oil/year. In his process, the liquid manure slurry is poured into a sealed tank called a batch reactor, which is kept heated and under pressure. In slightly more than 15 minutes, the organic matter in the slurry is converted to a type of crude oil. The process can use a slurry, containing up to 80% water and converts about 70% of the manure solid into oil, which, it is said, resembles diesel fuel. I will try to get more information on this interesting topic and report back to you. The volume of manure produced by a mink operation would be much less than from a swine farm and t his may present a problem (from Pig International 34:4, June, 2004).

Another possible by-product from manure is Biogas, which is produced by fermentation, and it has the added advantage of lowering the odor level. Two types of fermenters have been used: mesophilic that operates at temperatures around 38°C, and thermophilic which works at around 55°C. The fermenters operate in the dark and in absence of oxygen (anaerobic) and they rely on the activity of microorganisms present in the manure to digest the manure organic matter and produce biogas, which is a mixture of methane (CH4) and carbon dioxide (CO2). The fermenters are kept agitated and they operate continuously as the digested material is replaced by fresh slurry. The gases produced are commonly called "greenhouse gases" which contribute to global warming, so their removal from the atmosphere is an added benefit. The gas production does not affect the use of the manure slurry for fertilizer and lowers its odor level a bit. Fermenting manure from a pig farm has produced about 1800 cubic meters of gas per day and this amount may be increased by adding fat (from Pig International 34:35-36, June, 2004). These are some things to think about and we will continue to monitor the field.

We trust that none of your operations have been exposed to the terrible hurricanes that have swept the Atlantic coast this fall. Our weather in the Pacific Northwest has been warm and dry, with a change predicted to cool and moist. Best wishes to you for a successful and profitable pelting season.

J. E. Oldfield

A NEW POSSIBLE FEED SOURCE

Disposal of mortalities from broiler production farms has presented an environmental problem and traditional methods like burying or incineration are not now acceptable in some areas. Since broilers are a good source of protein and fat, workers at the University of Florida suggest that they might be made into a useful feed supplement. They collected mortalities at the poultry farms, where they were quick-frozen and then minced and combined with soybean meal and dried at a temperature of 120-130°C. The finished products contained 30 and 45% broiler mortalities, figured on a dry basis. They were then fed to pigs (growers: 9-26 kg and finishers 27-111 kg) in comparison with a similar diet containing soybean meal as the protein source. The grower pigs did equally well on the dehydrated, broiler-mortality (DBS) soybean meal supplement as on the straight soybean supplement, however, the finishing pigs grew at an average feed: gain ratio that was 9% better for the DBS supplemented diet than for the straight soybean. This, then, introduces a new, high-protein supplement that may find users in animal diets, while coincidentally solving a poultry mortality-disposal problem. (from Myer, R.O., J.H. Brendemuhl, F.W. Leak and J.B. Hess. 2004. Evaluation of a rendered poultry-mortality, soybean meal product as a supplemental protein source for pigs diets. J. Animal Sci. 82:1071-1078).

THIN-SKIN DISEASE

Dr. John Gorham has kindly provided a description of "thin skin" disease which can drastically lower pelt quality.

"Thin Skin" disease is analogous to Ehlers-Danlos Syndrome described in man. It is a heritable connective tissue disorder that is clinically characterized by fragility of the skin and peripheral blood vessels. The affected mink have very elastic and brittle skin. The skin is especially elastic on the head, neck and legs. The laxity in the skin is thought to be caused by a defect in the synthesis of collagen, particularly the cross-linking of fibers.

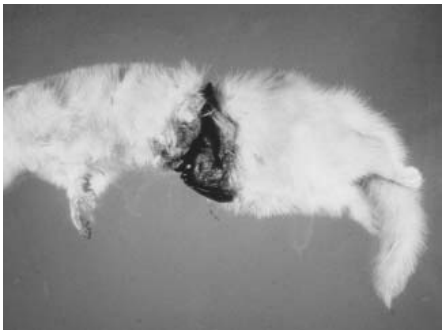

Figure 1. Ehlers-Danlos Syndrome (Thin Skin Disease). Because of the unusual fragility of the skin, a string of gunny sack bedding almost cut the mink in half.

The inheritance pattern of the syndrome in mink is autosomal dominant; only one affected parent is required to pass the trait on to offspring. This gene may be lethal when an affected individual is bred to another affected mink (both parents are heterozygous dominant). When only the sire is affected, approximately one half of the offspring will be affected and the other half of the litter will be unaffected (homozygous recessive). The unaffected offspring will not transmit the condition on to their own offspring.

Many times the affected animals are discovered at pelting when the pelt tears easily in the pelting process. Once "thin skin" is discovered in a herd, selective breeding is a successful way to deal with this condition by removing affected animals, siblings, and parents from the breeding herd.

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A NEW TEST FOR MAD COW DISEASE

Since Mink Encephalopathy is a similar condition to Bovine Spongiform Encephalopathy (BSE), commonly known as "Mad Cow Disease," the development of a new test for such conditions is pertinent to the mink industry.

As U.S. consumers seek reassurance that their hamburgers and steaks are free of deadly mad cow disease, researchers at the University of California - San Francisco say they may have found a promising solution. They have developed a faster, more reliable test for identifying the disease, possibly even in living cows.

Current tests can only detect the disease after the cow dies. The test was described at the 226th national meeting of the American Chemical Society, the world's largest scientific society. Critics argue that the standard immunoassay tests used to identify the infectious prion proteins that cause mad cow disease are inadequate for large-scale screening of cattle. The tests can produce false readings and may take a week to yield results. A better test is needed, they say. The new test, which has already undergone animal studies, seems to fit the bill. Called the conformation-dependent immunoassay (CDI), it can detect prion proteins with 100 percent accuracy at much smaller levels than conventional tests and only takes about five hours to produce results, according to the UCSF researchers. Like conventional tests, the new test is designed for detecting prions in the brain tissue of cows only upon necropsy. Unlike other tests, however, the new test also shows promise for detecting the proteins in muscle tissue and even blood while the animal is still alive. If so, it could be used to identify precisely which animals are infected before they show symptoms and could help end the current practice of slaughtering whole herds, scientists say.

"This represents a new generation of prion tests," says project leader Dr. Jiri G. Safar, M.D., an associate adjunct professor at UCSF. "It is the most promising test to date for accurately detecting prion proteins," says Safar, a member of the school's Institute of Neurodegenerative Diseases. He says the test has been used in a field trial to check for signs of the disease in the brains of 11,000 slaughtered cows in Spain, the United Kingdom, and Germany. Results were compared to those from standard immunoassays performed on the same animals. There were no discrepancies between the tests, he says. "We had a perfect score. There were no false positives and no false negatives," says Safar. "We can't afford incorrect conclusions, and we didn't see that in our tests." He says that the research group plans to use the test on an even larger scale among European cattle herds within the next year, checking them for signs of the disease upon necropsy. If further tests prove successful, he hopes it will eventually be used to evaluate dead cows for mad cow disease, also known as bovine spongiform encephalopathy, or BSE.

GENETIC MARKERS

Geneticists have a new tool now, which they can use to check animal variability and hereditary relationships. It is called microsatellite markers. Using these, scientists at Nova Scotia Agricultural College, in Truro, Nova Scotia, have compared characteristics of wild and farm-raised mink, and thereby obtained information helpful in designing mating programs. The farmed mink come from three large Nova Scotia operations and the wild mink were trapped in eastern Canada. The black mink involved were shown to be closely related to each other, and they were more closely related to the wild mink than to the colored mink. The microsatellite markers correctly classified black and non-black mink into their respective groups with 91-97% accuracy and from 70-88% of the black mink were correctly identified as to their herd of origin. Well, what does all this mean? It shows that the genetic variability of black mink herds in Nova Scotia has not been exhausted and is still comparable to the variability in wild mink. The close genetic relationships in the black herds shows that no great expansion of their genetic base can be achieved through exchanging breeding stock among these ranches. Linebreeding has resulted in variation on ranches being between lines and families and has given breeders the opportunity to keep lines with different fur characteristics, which is important. This type of mating system, however, has resulted in some inbreeding, which could contribute to lowered fertility, which has been encountered on some ranches. Creating several small mink lines within a herd and systematically crossing within these lines is a way to avoid inbreeding problems. The brown mink showed higher vigour and fertility than the black mink, which suggests that it may be helpful to expand the genetic base for the black mink (from Belliveau, A.M., A. Farid, M. O'Connell and J.M. Wright. 1999. Assessment of genetic variability in captive and wild American mink, using microsatellite markers. Canadian J. Animal Sci. 79:7-16).

METHIONINE FOR MINK

The sulfur-containing amino acids, methionine and cystine are important for fur production and may be the first-limiting amino acids in some mink diets. Supplementation of such mink diets with either methionine, or other methyl-donors such as methionine hydroxyl analog (MHA) or betaine, may be helpful. In Norway, three groups of 40 each male, wild-type mink were fed a basal, methionine-deficient diet supplemented with (1) 0.14% dl-methionine, or (2) 0.079% MHA and (3) 0.022% betaine. The basal diet composition was: fish 10.05, poultry offal 40.00, fish silage 15.00, barley 8.80, wheat 8.80, wheat gluten 1.92, hemoglobin meal 1.63, potato protein concentrate 2.00, soybean oil 4.08, lard 2.04, vitamins and minerals 0.25 and water 5.24. The animals were weighed at the beginning and end (pelting) of the feeding period and weight gains calculated (Table 1). Length of pelts was measured and color and clarity of the fur was graded on a scale of 1-5, with 5 being best and fur quality was graded from 1-12, with 12 being the best (Table 2).

Table 1: Weights and weight gains of experimental mink (adveraged).

Feed Supplements	Male weights, grams		Weight gains, grams
	September 4	Pelting	
dl methionine	2038	2547	508
MHA	2195	2723	528
Betaine	2071	2595	520

The group fed MHA had the longest pelts and the group fed dl methionine the shortest; however, the differences were not significant when analyzed statistically. The group receiving betaine had significantly better pelt quality and the most reddish pelts, while that receiving MHA had the least reddish pelts. It appears that substituting either betaine or MHA for dl methionine has no negative effect on the mink pelts. (from: Sandbol, P., T.W. Clausen and C. Hejleson, 2003. Methionine and methyl donors for mink in the furring period. NJF seminar no. 354, Lillehammer, Norway, October 8-10. 6 pp.)

	Pelt length, cm	Pelt quality (1-12)	Pelt color (1-5)	Pelt clarity (1-5)
dl methionine	84.3	6.0	2.8	3.0
MHA	86.4	5.8	2.9	2.7
Betaine	85.6	6.8	2.8	3.3

Table 2: Pelt lengths and fur quality.

ADJUSTING DATE OF BIRTH FOR MINK KITS

The date of birth of mink kits has been shown to be a hereditary factor and Danish investigators have demonstrated that, by selection, it may be postponed to later in the year. They carried out their study with brown mink, including 350 females and 70 males. From them they created two breeding lines of mink, showing either normal or late birth dates. Then selection was carried out within the two lines, which were named E (early; kits born at normal time) and L (late). The females in the L line were flushed one week before mating and were bred a week later than those in group E. The results are summarized in Table 3.

	Fall, 2001		Fall, 2002		
	No. of animals	Birth date	No. of animals	Birth dates	Litter size
Line E					
Yearling males	35	4/27 : 4/28	35	4/26 : 4/28	>5
Yearling females	75	4/27 : 4/28	115	4/23 : 4/28	>4
Two-year-old females	--	--	60	4/27 : 4/28	>7
Line L					
Yearling males	35		35	4/5 +	>5
Yearling females	175		115	4/5 +	>4
Two-year-old females	--		60	4/5 +	>7

Table 3. Numbers of mink in early (E) or late (L) mating lines, showing litter size and birth dates of the kits.

The response to selection for date of birth is charted in Figure 1, for the second year of the experiment. The solid line represents the early birth line (E) and the broken line shows the late line (L): Day 120 in the vertical axis is the 30th of April. Pregnancy tended to be shorter in line L, compared with line E. There was no significant difference in litter size between the two lines; however, the largest litters tended to be in the 2-year-old female group. The results, then, indicate that time of birth can be delayed by selection. The experiments will continue to see whether growth is affected - i.e. whether delaying time of birth will reduce the time necessary to attain mature weight and winter fur priming. (from: Fredberg, M., P. Berg and B.K. Hansen. 2003. Time of birth can be postponed by selection in mink: Provisional results. NJF Seminar no. 354, Lillehammer, Norway. October 8-10. 12 pp.)

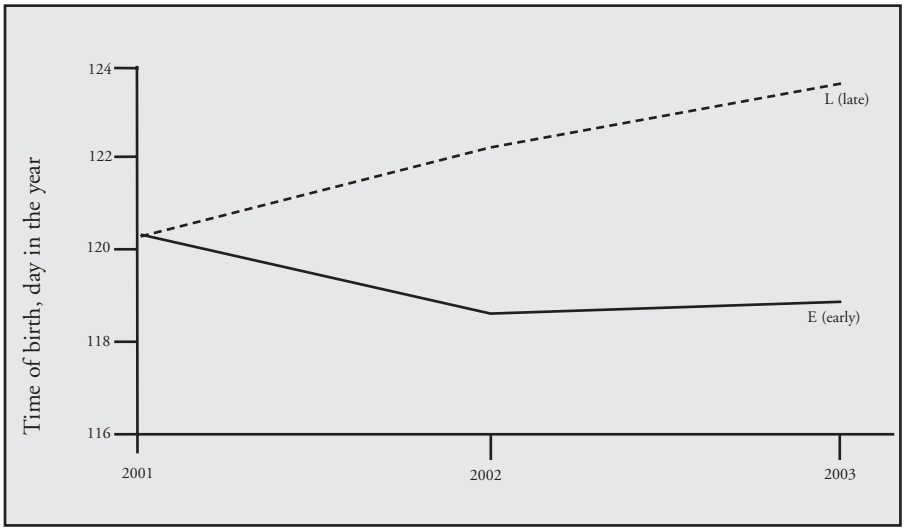


Figure 1: Mean response to selection for time of birth

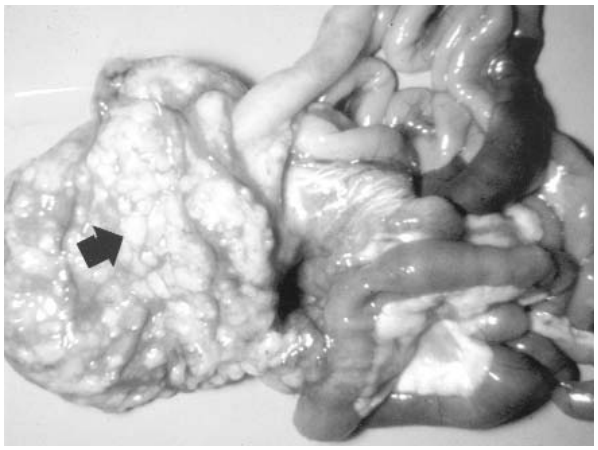
AVIAN TUBERCULOSIS IN MINK

Tuberculosis is a chronic infectious disease that affects most farm animals. The disease is almost always seen in Aleutian genotype mink with the Chediak-Higashi Syndrome. Nearly all infected Aleutian mink eventually die. While non-Aleutian mink may become infected, they rarely show signs of disease.

Infected chicken carcasses (spent hens) are the primary source of avian tuberculosis for mink in North America. While pigs can also be infected with the avian type, no one has "nailed down" contaminated pork by-products as a source.

There have been two recent outbreaks of avian tuberculosis. Dr. Robert Westlake, Mink Ranch Service of the Detroit Lakes Animal Service, observed an outbreak in Aleutian mink in Wisconsin and Dr. Gary Durrant of the Fur Breeders Agriculture Cooperative in Sandy, Utah, reported avian tuberculosis in Aleutian mink that were purchased for experimental Aleutian disease research in Montana.

Signs of the disease are the gradual loss of weight and general unthriftiness with a noticeable distention of the abdomen. Typically, only a few mink die each week on a large farm. Diagnosis is based on the history of feeding poultry by-products and the finding of the tuberculosis bacterium in tissues of the infected mink by laboratory procedure. Interestingly, Mogens Hansen has reported that mink with tuberculosis are often IAT positive.



Avian tuberculosis in an Aleutian (Chediak-Higashi) mink. Note the many small tubercles on the membranes of the abdominal cavity.

Both Aleutians and non-Aleutian mink are susceptible and apparently respond in a similar manner to the more virulent bovine variety of tuberculosis. Fortunately, bovine tuberculosis is very rare in the United States, therefore contaminated beef by-products are not typically a problem.

No effective or practical treatment for infected mink is available. Control measures include careful supervision of feed sources and special care should be taken to prevent the inclusion of contaminated poultry by-products in the diet.

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