FUR ANIMAL RESEARCH

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BY J.E. OLDFIELD
ELAINE SCHEFF, EDITOR

I have delayed this issue a little because we (Mink Farmers Research Foundation) have just attended our annual meeting with our parent body, Fur Commission USA, and I wanted to bring you some news of our deliberations there. This is the time when we (MFRF) give a report of our activities to FCUSA, and I opened this with the following remarks:

The Mink Farmers Research Foundation is the research arm for FCUSA. As such, we review research priorities every year and identify scientists and research sites where work can be done to relieve the various problems. The researchers report the results of their work to us and, in turn, we get them to you, through our quarterly newsletter: **Fur Animal Research**. The newsletter currently has a mailing list totaling 750, of whom 580 are located in the United States. The foreign mailings make a point of liaison for us with mink research scientists overseas. They reciprocate by sending us results of their work, which we publish in our newsletter, and this also helps us avoid duplication of effort on the same problem, which makes our support go farther.

People are understandably concerned, sometimes, about whether or not they are getting top returns for their research dollars. It's a complicated business. In a country as large as the United States there are many different industry problems, and what is important on the East Coast, say, may not be as important to producers on the West Coast, or in the Great Lakes area. And the problems are of many different types: relating to disease, breeding, feeding and nutrition and management, including environmental matters. We try to cover the waterfront, on a pretty small budget. In doing this, we are helped immeasurably by our research workers, who attract money from other sources, to supplement what we give them. To give a couple of examples, Dr. Aulerich, at Michigan State, and Dr. Rose, at Idaho State University, each receive from us less than $15,000 a year, yet both of them have programs with costs totaling over $100,000, so by giving them a little "seed money," we are able to buy a much larger program than we could finance on our own. Dr. Rose gets all his experimental mink and feed for them donated by an interested and supportive mink rancher.

How do we decide what to do? The Mink Farmers Research Foundation Board members have some ideas of needed research. We get suggestions from ranchers (each issue of the newsletter invites these) and some very useful research topics have been proposed by the investigators, themselves. One example, with which I am familiar, is the hormone studies that led to the use of melatonin to accelerate winter pelt production. This grew out of suggestions made by Dr. Fred Stormshak at Oregon State University, and it has led to practical applications that have saved some ranchers thousands of dollars a year in feed costs. It is doubtful that such a suggestion would have come from industry sources, but it was one that was, and is, profitable to the industry.

This year (1999-2000), we are financing seven research projects at a total of just under $60,000. Five of these relate to various disease problems, one is on nutrition and toxicology, and one on hormone influences on fur production. The average funding is thus about $8,600 and the range is from $5,500 - $13,500.

As a matter of interest, I would like to report to you on the status of the G.R. Hartsough Memorial Fund at Michigan State University. This was established to honor Dr. Hartsough and also to support a continuing program of mink research at Michigan State. The cash value of the account is $36,329.01. There have been 22 contributors, and the Mink Farmers Research Foundation has given $13,500. From this fund we are able to provide a $2,000 scholarship annually without using up the principal, so the fund will be a perpetual one. This year's scholarship winner, as reported in the March newsletter, is Miyuki Tauchi, who is working on mink behavior problems with Dr. Adrealdo Zanella at Michigan State University. Tax deductible contributions to this fund can be made at any time, and instructions are in the March newsletter, page 3.

In the course of his studies, Dr. Aulerich, our principal investigator at Michigan State, has learned a great

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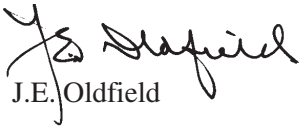
deal about mink. This year, he has gathered a lot of this information together in a book titled **Handbook of Biological Data for Mink**, which he is making available to interested ranchers without charge. There has been a steady demand and the book is now in its second printing. If you would like a copy, write Dr. R.A. Aulerich, Dept. of Animal Science, 132 Anthony Hall, Michigan State University, East Lansing, MI 48824. This is a valuable by-product of our research program.

We wish you good prices in the coming pelting season.



J.E. Oldfield

ATTACK ON E. COLI

Sometimes it is instructive to see how other organizations with similar objectives to ours handle their problems. I was drawn to a recent report on studies with **E. coli** as it affected the meat industry, put out by the Beef Industry Food Safety Council (BIFSCo). They are concerned with **E. coli** 0157:H7 and the beef industry is putting $40,000,000 into research with it, over a 5 year period. Their program has five objectives:

BIFSCo's highest research priorities:

- Better understanding the host/pathogen relationship to aid in identifying intervention strategies.
- Identify practices that discourage growth and spread of *E. coli* 0157:H7.
- Develop microbial sampling guidelines for meat before grinding.
- Develop irradiation guidelines.
- Improve general biological/ecological understanding of *E. coli* 0157:H7.

You can get information on this organization and its programs by visiting the Web site at www.bifsco.org (from **National Cattleman**, June/July, 1999, p. 94).

NUTRIENT MANAGEMENT

"Nutrient Management" is a new term describing ways that feed formulation can be changed, so as to minimize the amount of nutrients (like N, P and K) that are regularly lost in the animals' manure. All branches of government are becoming stricter and are imposing stronger controls and are monitoring animal waste disposal to protect ground waters from excessive levels of nutrients, including not only the "big three," NPK, but also salt (NaCl), copper and zinc. This is politically a high level situation, with vice-president Al Gore announcing last March 9th that a National Strategy for Animal Feeding Operations would be produced jointly by the USDA and the EPA and would be fully implemented by 2009. A spokesman for Perdue Farms, a large broiler producer on the Eastern Shore said, "Unfortunately, you can't put 10 gallons of waste in a 5 gallon bucket." The production of poultry waste has already exceeded the land area available to apply it, in some places. In the mink business there are similar concerns. Some of the alternatives being considered are: composting for bagged fertilizer, burning to produce electric power, and feeding in silage mixes to cattle. The MFRF has Dr. Aulerich working on this problem, and we look forward to seeing his results next year (from **Render** - the National Magazine of Rendering, August, 1999, pp 10, 11, 26).

WELFARE OF MINK

The comfort and well-being of their animals has always been a prime concern of mink producers and methods of housing and feeding them have developed, over the years, with this in mind as well as the production/profitability aspects of the business. More research has been directed toward behavior and welfare of mink in recent years than in the past, stimulated both from within and without the industry. A recent review paper from England lists some of the conclusions that such work has led to. It is suggested that provision of larger-than-usual cages, without provision of some play items within the cages, does not improve the welfare of the animals. On the other hand, provision of nest boxes appears to improve the welfare of mink over that in cages without boxes. Research comparing mink caged singly against mink kept in pairs or small groups suggests that group housing may be helpful if the group mink have had social contact with each other since weaning. The authors pose the question that mink are generally weaned too early and they suggest a need for studies to investigate whether leaving kits with their mothers for 11-12 weeks might improve their long-term well being. (from Nimon, A.J. and D.M. Broom. 1999. The welfare of farmed mink in relation to housing and management: a review. **Animal Welfare** 8:205-228).

DISTEMPER, AGAIN

Dr. John Gorham, from his long career in the area of mink diseases, is an excellent and willing source of background information on distemper and distemper-control vaccines. He has kindly provided the following on production methods for mink vaccines:

Killed Virus Vaccines

John R. Gorham
Department of Veterinary Microbiology and Pathology
College of Veterinary Medicine
Washington State University

The purpose of this paper is to point out some of the problems encountered when mink virus vaccines were made from infected mink tissues. They were called "killed" or "inactivated" vaccines because, in preparing the vaccine, the distemper or mink virus enteritis viruses were killed with formalin before the tissues could be used as a vaccine.

In 1942, I arrived at Washington State University and got a student job with Dr. O. J. Hummon of the Fish and Wildlife Service. At the time, Hummon was busily making killed distemper vaccine. He would first collect the spleens and lungs from dead mink on a farm where an outbreak was in progress.

After grinding up the spleens and lungs to make a suspension, formalin was added to kill the distemper virus. There was a seven-day waiting period while the formalin (0.3%) killed the virulent distemper virus and converted the tissues into a vaccine.

But everything was not "beer and pretzels." Certainly the distemper virus was killed by the formalin, but the tissues also contained the highly stable Aleutian disease (AD) virus. The seven-day waiting period to kill the distemper virus did not inactivate the AD virus. Unfortunately, when the distemper vaccine was used, the mink were inoculated with live AD virus.

In the 1940's and early 1950's, not much was known about AD other than it was a killer of blue mink. When Dr. G. R. Hartsough and I first described the disease, we had no proof that AD was caused by a virus. Therefore, no one can blame Hummon for his distemper vaccine that was contaminated with AD virus.

Following the use of the Hummon vaccine in 1949, Floyd Marsh, an Oregon rancher, lost about 500 Aleutian and Sapphire mink to AD. Floyd, a truly colorful mink farmer, told me that "they didn't make baskets big enough to pack the dead mink to my million dollar ditch." Several other vaccine "incidents" occurred in the Middle West when AD-contaminated "home brew" distemper vaccines were employed. The AD-contaminated distemper vaccines prepared by other veterinarians caused large losses.

Aleutian disease virus also contaminated killed tissue mink virus enteritis vaccines. Again, the more resistant AD virus survived the formalin treatment. About 1960, Clarence Jordan of Olympia, Washington, had an outbreak of enteritis. After the diagnosis, Jordan vaccinated his farm with two commercial "straight" mink virus enteritis vaccines. There were no losses from the use of one of the vaccines, but the other vaccine eventually caused the deaths of all of his blue iris and Aleutian type mink. Over a three-year period, Jordan lost about 900 breeder mink. In addition, there were a large number of kits that died of AD. There is little doubt that most of the vaccinated pastel and dark mink on his farm were also infected but did not show signs of AD.

Today, mink farmers need not be concerned about live AD virus in any vaccine because no commercial vaccines are made from mink tissues. Vaccines prepared from cells grown in the laboratory have eliminated the danger of AD.

MINK CAGING/HOUSING

Probably as much attention has been paid to methods of caging mink in the Netherlands as anywhere. There have even been some suggestions there that mink production should be banned in that country.

Dutch investigators produced, over several years, two distinct strains of mink that they called "active" and "passive." They used these animals in a housing experiment where all other aspects of management were kept constant. Females were all fed a standard diet, which was restricted in the late fall and then they were flushed just before breeding. After weaning their kits, they were housed in traditional cages, 86 cm x 30 cm x 45 cm, equipped with a nestbox (controls), or in sets of at least two cages, with circular openings, allowing access back and forth (experimental groups). Several groups had swimming pools, 100 cm x 50 cm x 40 cm, placed on the ground outside the shed, which could be entered by a wire mesh tunnel, from the cage. Results showed that all mink grew well: in single or double cages, with and without pools; so none of these things apparently affected growth rate. Frequency of damaged pelts, from chewing, was a concern. In 1995, the stocking density was standardized at either 2 or 3 animals/cage. Out of 233 controls pelts, 8.1% were considered damaged, while in 187 low-density group pelts 14.4% were damaged and in 159 high-density groups 21.3% were damaged, indicating that grouping tends to encourage pelt damage (chewing). Occurrence of stereotypies, which are repeated, apparently aimless movements, like running back and forth in the cage, was related to the feeding level, rather than to cage design or presence of the growing kits. It seemed safe to maintain a stocking density of no more than three animals per cage (from de Jonge, G., 1996. Polish Soc. An. Prod. VIth International Scientific Congress in Fur Animal Production. Warsaw, Poland, pp. 45-51).

PSEUDORABIES AND PORK PRODUCT FEEDING

Dr. John Gorham, who has contributed strongly to our research programs in mink diseases for many years, has provided information on a pseudorabies outbreak in mink, apparently related to the feeding of pork lungs.

Pseudorabies (PR) which is known to occur in mink all over the world, usually causes mink to go suddenly off feed, salivate excessively and exhibit muscular tremors and paralysis before death. Mortality occurs 12-24 hours after symptoms are seen, and the mortality rate is very high. Dr. Gorham reported that, because of a favorable feed price situation, a mink producer began feeding pork lungs, at about 12% of his total diet. To begin with, he cooked the lungs at 190°F for 30 minutes before adding them to the rest of the diet. After about a year, however, he discontinued the cooking because of expense and time involved. After he fed raw lungs for 120 days, deaths from PR began to occur. The losses were severe: 525 animals over an 8 day period. Feeding of pork by-products has been a suspected cause of PR worldwide, and the response is clearcut: either avoid them, or follow the prescribed cooking process carefully and completely (from: Gorham, J.R., G.R. Hartsough and D. Burger. 1998. An epizootic of pseudorabies in ranch mink. **Scientifur** 22:243-245).

MANAGEMENT AND MINK WELFARE

Beyond considerations of caging, of course, a major influence on the welfare of ranch-raised mink comes from the management program in which they are raised. Steen Moller, in Denmark, has summarized some of the welfare implications of management. He points out that the increased productivity of mink, including greater litter size and increased growth rates, makes higher and higher demands upon management. Many management improvements have been made with increased productivity in mind, and though these often have positive implications for the welfare of the animals, good production by itself is not always a guarantee of good welfare. He discusses several areas of management.

• **Water Supply**

The great majority of ranchers are well aware of the mink's need for cold, pure water and make sure it is met. There are occasional difficult times, however, including the extremes of cold in the winter and heat in the summer, when special precautions may need to be taken. These include putting more water in the feed mix in the winter and using shade and misters over the cages in hot summer weather. It is a good idea to have a circulating water system, to avoid warming of water in the pipes in summer, and freezing in winter.

• **Slimming/Flushing**

General ranch practice calls for females to be fully fed up to the time when breeder selections are made, and then slimmed down considerably before flushing and the breeding season begins. Moller questions whether extreme slimming, such as a loss of 30% of the female body weight is good welfare-wise, and he suggests a short slimming period of 14 days, followed by 4-5 days of full feeding, to flush, before mating. He justifies this by noting that severe weight loss (about 30% of body weight) leads to poorer whelping results than moderate weight loss.

• **Feeding Kits**

During the weaning process it is important that their first mixed feed should be placed where the kits can reach it. The usual practice of feeding on the wire top of the nest box works well if the bedding is sufficiently high enough that the young animals can reach it and if the nest box is kept clean of feed wastes.

• **Animal Handling**

Early handling of the kits, as for weighing, seems to be positively accepted by the animals and builds confidence in their reactions with humans. It is more important that the mink be handled deliberately and quietly than whether tongs or traps are used. The choice of a weaning time for the kits is a compromise between the welfare of the kits and that of their mothers. Moller suggests weaning at 7-8 weeks, with a shorter time of 5 weeks used if problems with nursing sickness are involved (from: Moller, S.H. 1998. Management and welfare in mink. **Scientifur** 22:279-285).

ENERGY SUPPLY FOR REPRODUCTION

And another paper dealing with feed restriction and flushing comes out of the Danish Foulum Research Center. Seventy-five each scanbrown and scanblack yearling females were fed ad lib. or on a restricted basis from December through mid-February. The restricted group got about 20% less feed than the ad lib. group. In the last half of February, both groups were fed 20% under ad lib. intake followed by five days full feed for flushing, just before mating. The ad lib. females lost 11% of their body weight, while the restricted females lost 21% of theirs. Litter size was not affected by the two treatments, which further confirms the observation that it is the short, high flux of feed just before estrus and mating that causes the flushing effect, rather than a long period of conditioning (from Borsting, C.F., B.M. Damgaard and R. Fink. 1998. Effects of different energy supply prior to the breeding season on reproductive performance and metabolism in female mink. Proc. NJF Seminar no. 295. 8 pp).

THE ORIGIN OF ALEUTIAN BLUE MINK

Kamala Venable, a young veterinarian who has been studying mink disease problems with Drs. John Gorham and Gary Durrant, has provided this interesting history of the Aleutian blue mink strain.

The Aleutian blue mink is one of the most sought after color phases in the fur industry. The Sapphire, Iris, and Violet are among the more popular blue color phases that stem from the Aleutian gene. In 1964, it was discovered that this same gene also transmitted the genetic leukocyte and bleeding disorder known as Chediak-Higashi Syndrome. CHS causes the mink to be more susceptible to a variety of bacterial diseases and the Aleutian disease virus. The desirable blue coloring and the difficulty of raising mink afflicted with CHS are two of the factors that place these animals in such high demand within the fur market.

Unlike other blue color phases of mink, namely Steelblue and Platinums, the Aleutian mink breeds a true and clear blue with little hint of brown. The Aleutians have a darker blue topfur than that of the other blue color phases and are densely furred with the long, silky guard hair in uniform distribution over the entire body. The genetics of these mink, be it a blessing or a curse, can all be traced back to 1941 to two mink farmers, Paul Autio and Andy Waris in Clatskanie, Oregon (USA).

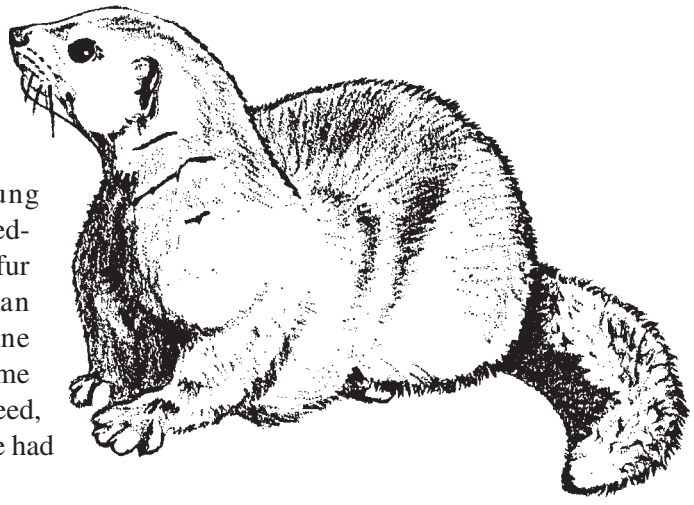
Andy Waris began his farm in 1929 with a small handful of wild mink that he had trapped in Oregon. The following year he added four pairs of Yukon mink that he had purchased out of Alaska. In the days before modern technology, mink ranching consisted of scrounging meat from downed cows, cast off veal caves, old horses, excess fish and various wild fowl shot in the backyard to feed to the mink. Fur ranching was a tough way to make a living. In spite of the hardships, Andy successfully found himself in possession of a thriving mink farm. In 1937, in need of help for his expanding venture, he hired a young man by the name of Paul Autio. That same year, after purchasing three of the Yukon males from Andy and a few females from a neighboring ranch (who were descendants of Andy's original wild-caught, Yukon crosses), Paul started his own ranch.

While experimentally trying to reproduce mink that bore white markings on their legs and feet, Paul selected a white-footed male to keep for breeding purposes. In 1941, from this male and a female inbred to him, a litter was produced that contained two blue gray female kits. Curious about this phenomenon, Paul consulted Andy and showed him the two mutant colored kits. Andy first thought they were Platinums and purchased one of them, thus unknowingly he helped to establish the bloodlines of the first Aleutian strain of mink.

As the young animals grew, shedding out their kit fur and growing an adult coat of fine blue fur, it became apparent that indeed, a new color phase had been discovered. These mink, known in the early days as Waris Blue or Gunmetal Blue, were later dubbed Aleutian after their resemblance to the blue colored Aleutian Fox. The underfur was a medium misty shade of blue and the topfur, or guard hair, was also a clean blue color but a few shades darker than that of the underfur.

In an attempt to see if this color phase could be reproduced, both kits as well as their dam were bred back to the white-footed male. From these crosses, Autio produced five of these blue-gray kits and Andy two more. The crosses also produced several half-bloods or hybrids that were still the original wild brown color, but had the potential to carry and pass on the Aleutian gene to their offspring.

At this time, the general poor thrift of the animals due to the Chediak-Higashi Syndrome was as yet unknown. The first clue to their delicate health became apparent when disaster struck on one hot summer day in Northwest Oregon. In the heat, Andy lost one of his two 6-week-old kits, and Paul three of his five Aleutians and all but one male hybrid.



ORIGIN Cont.

World history also came into play at this time. In 1942, with the United States involvement in the war, Paul Autio, being at prime age for being drafted, sold all his herd, including the Aleutians, back to Andy Waris with the understanding that after the war, if Paul decided to resume mink farming, Andy would assist him in restocking his ranch.

Paul went to work in a sawmill, and Andy was now in possession of the old original female, both of her first two female Aleutians, and all of the remaining offspring including two pure homozygous Aleutian females, one pure Aleutian male, one hybrid female and one hybrid male, both with Aleutian potential. With this stock, Andy began his breeding program to perpetuate the Aleutian color phase. From these six females and the one Aleutian male (the hybrid male having been mistakenly killed and pelted), four litters were produced with a grand total of nineteen kits, thirteen of which were pure Aleutians. In 1944, the Aleutian herd was expanded by 43 more purebreds. By this time, other ranchers had heard of this new color phase of mink and were eager to get in on the action. Andy began to sell a few breeders. In 1945, blue male kits were selling for $600 a piece, female kits for $300 each, and hybrid females for $200, quite profitable prices for that time frame.

Andy also began to experiment in crossing the Aleutians with other mutations to see what could be produced there. One such successful endeavor was the crossing of the Aleutian with the Blufrost (also known as Silver Sable). The product was a blue mink several shades lighter than the Aleutian color that came to be known as the Breath of Spring Aleutian which Andy simply referred to as the Arctic.

After the war was over, Paul came back, restocked his herd, and was successfully involved in the further development of the Aleutian strain. When the old female died, Paul had her mounted, and she was proudly pointed out to any visitor of the Autio household as the female that produced the first Aleutian mink.

As previously mentioned, many of the blue mink strains so prominent today have their blue bloodlines rooted from the Aleutian strain. Besides the Arctic, Eric developed from an Aleutian and brown-eyed Pastel cross, and the Lavender is homozygous for the genes for Aleutian and Moyle Olsen Buff. Some of the better known and more popular blue breeds also have Aleutian heritage. The Sapphire is an Aleutian, Platinum cross, and the Iris is an Aleutian crossed with the Steelblue.

There are also several triple recessive breeds with Aleutian blood. The Hope (Aleutian X Platinum X Ambergold Pastel), Violet (Platinum X Aleutian X Moyle Olsen Buff), Triple Pearl (Aleutian X Platinum X Palomino), and the Winterblue (Platinum x Aleutian X brown-eyed Pastel) all have the Aleutian gene in the genetic make-up.

Thus, the mink industry has vastly benefited from the endeavors of these two mink farmers. The history of the Aleutian mink and all the associated blue color phases can be traced back to a small town in Oregon and thanks can be given to Paul Autio and Andy Waris and their pursuits to see what could be done with two off-colored kits out of a white-footed male and a female of wild-caught and Yukon blood.

Special thanks to Clarence Jordan who was able to provide me with some details of the story from his personal affiliation with Andy Waris. Also, thanks to Andy's wife for taking the time to dig up old receipts and articles used to reference this paper.

References

Hunter, D.B. and Lemieux (eds). Mink. Biology Health and Disease. Graphic and Print Services, Guelph, Ontario (Canada) 1996.

Langenfeld, E.P. Aleutian, Blue Magic in Mink. American Fur Breeder. March, pp 8-14, 1947.

Shackelford, R.M. Genetics of Ranch Mink. Pilsbury Publishers, Inc. New York, NY, 1950.

Shackelford, R.M. Types of Mink. The Blue Book of Fur Farming, 1967 edition, pp 19-46. 1967.

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