FUR ANIMAL RESEARCH

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BY J.E. OLDFIELD
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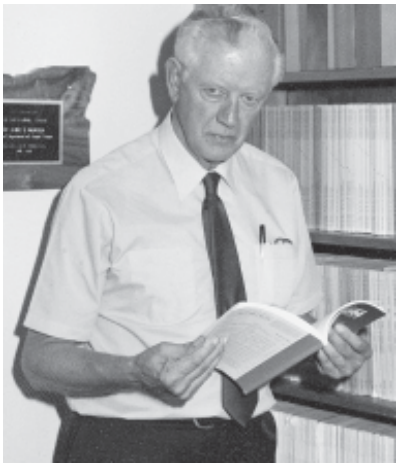

The spring of the year is always an important season for mink producers. The first fur sales have been held and growers have been able to assess the effectiveness of their breeding programs in meeting demands of the ever-changing fur markets and to make at least a rough estimate of their "bottom line" for the year. Some items of the business are not under the direct control of the producer, e.g. market prices, and it is always a matter of the greatest interest to learn how these have held up. From a visit to one of the auction houses' sales, I find that the reaction this year is "reasonable" = not outstanding, but livable. Another cause for excitement in the spring is that it is the breeding season, which provides the animal population for the coming year's markets. Serious problems during the breeding season can mean the end to a promising business. We try to provide timely information to you through this newsletter, and in this issue we look at a continuing problem of the breeding season: "nursing sickness," sometimes wrongly called "nursing anemia."

We all recognize the unique nature of the mink business – how in many ways, mink are different from other species of domestic animals and require special treatment. But occasionally something comes along that reminds us that there are similarities, too; problems that we share with other areas of animal production. One such example is BSE, bovine spongiform encephalopathy, the terrible brain-damaging disease that is the basis for the common name, "mad cow disease" and has created havoc among the European animal industries. Teresa Platt has recently published a review article on BSE in her FCUSA newsletter, and we are adding a few notes in this issue. There are a couple of items of special concern for us: mink diets sometimes contain the animal protein feeds that are recognized as sources for the BSE organisms, and a somewhat similar condition, mink spongiform encephalopathy, has been diagnosed in mink.

As I write this, we are preparing for the annual meeting of your Mink Farmers' Research Foundation Board, which will be held this year in Corvallis, Oregon. Although Oregon State University no longer operates its Experimental Fur Farm there is a lot of historic interest here and it pleases me that the group has elected to return for this important meeting. As always, your comments on research underway or additional areas for study will be welcomed. You may send them to any member of the Board, whose names and addresses appear on the back of this Newsletter.

Best wishes,

J. E. Oldfield

2001 HARTSOUGH SCHOLARSHIP

The winner of the G.R. Hartsough Endowed Scholarship for 2001 is Kerrie J. Beckett, who will be working on PCB toxicity in mink fed fish from Saginaw Bay in Lake Michigan. Kerrie received her undergraduate training, majoring in Zoology, from the University of Montana, after which she worked with the Smithsonian Tropical Research Institute in Panama and later with a marine mammal rehabilitation center in Alaska. She earned her M.S. degree in Marine Ecotoxicology from the University of Alaska at Fairbanks. She is now working with Drs. Dick Aulerich and Steve Bursian in fur-bearing animal toxicology at Michigan State. We are fortunate to have this talented and experienced young lady involved in research with mink and congratulate her and wish her well in her future programs.

Figure 1. Kerrie Beckett collecting PCB-contaminated carp from Saginaw Bay, MI, for her mink-feeding study.

STAPHOLOCOCCAL SKIN INFECTION IN KITS

When a young kit scratches itself on a sharp bit of nest hay, splinters or wire, bacteria on the surface of its skin may invade the outer layers of the kit's skin. Also, the teeth of a nursing female may "inoculate" her kits when she moves them. While E. coli and Streptococci can cause skin infections, Staphylococci is the most likely cause. There are many types of these bacteria. Some are quite harmless while others are particularly virulent, especially after transfer of the bacteria from one kit to another.

Appearance of the Infection

After an incubation that probably averages about 2-5 days, the lesions first appear as small, red raised spots on the top of the neck and back, base of the tail and on the inside of the back and front legs. The farmer calls them "pimply" kits.

When the red, pus-filled, raised spots (pustules) become enlarged and rupture, yellowish pus dries in brownish scabs. Affected kits become depressed and may die of an overwhelming infection.

The staphylococcus skin infections should not be confused with other diseases presenting crusting lesions, such as distemper and ringworm infections. I would hazard the guess that the infections are more severe and the death rate is higher in Aleutian type mink. In our experience, females nursing kits with staphylococcal skin lesions show no pustules or scabs.

Transmission

I will never forget a staphylococcus outbreak that occurred in Sapphire mink on a farm south of Seattle, Washington. The farmer noticed that a couple of litters of three-week-old kits "were not doing well." He did not notice the "pimples." Following his usual ranch practice, he moved these kits to other lactating females without full litters. Within five days, the new kits were infected by direct contact and the skin infections were widely dispersed throughout his farm.

Control

Transmission is most marked in instances in which debilitated kits are kept in dirty nest boxes. After determining the extent of the infection and to prevent further spread, first isolate the infected litters and feed and water them last each day. If kits are handled, care should be taken because the Staphylococci may be virulent and infectious for humans. Use rubber gloves and rinse with a germicide like a chlorine solution.

Contaminated nest boxes and pens should be treated with a 2% lye solution prepared by adding one pound of lye (sodium hydroxide) to 5 gallons of water.

Treatment

Most mink farmers have treatments that have been successful on kits that are not severely affected. The crusts may be softened and removed with a weak boric acid solution before applying a mendicant, such as tamed iodine solution (Betadyne) or antibiotic ointment combinations. Unfortunately, whatever is used, the female will probably lick it off. If the treatment has been successful, new hair will appear in the bald spots.

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STAPHOLOCOCCAL Cont.

Pus can be collected from unopened pustules for bacterial sensitivity tests. By these tests it can be determined what antibiotic or sulfa or combinations will give the most favorable response. Some mink farmers add antibiotics to the ration prior to whelping to reduce the incidence of skin infections in the kits and mastitis in the females. Because some treatments might be toxic, check with a veterinarian familiar with mink diseases for advice.

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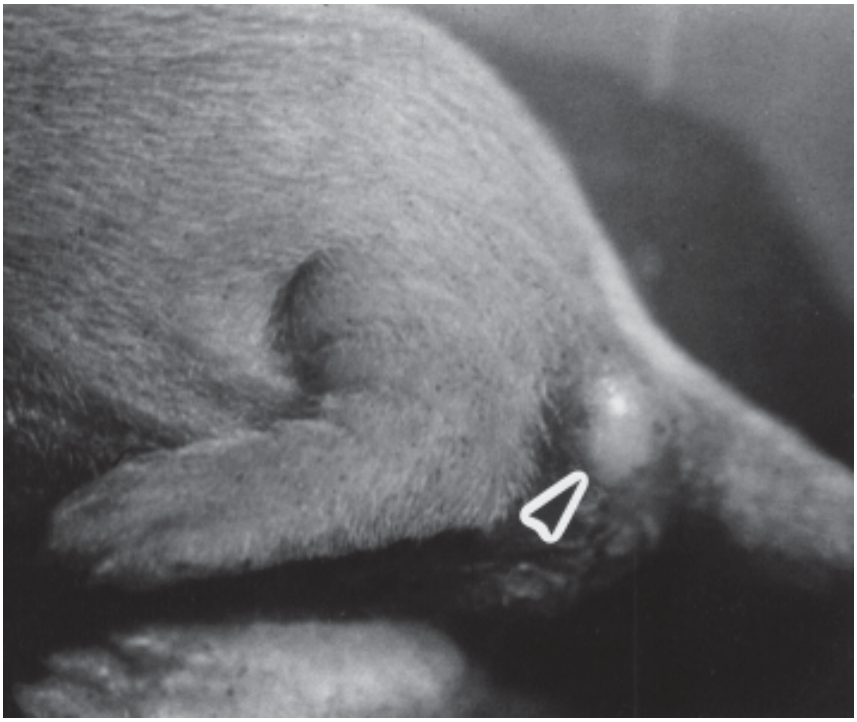

Figure 2. The apocrine sweat glands, which may secrete a substance that stimulates maternal behavior, are frequently infected and a pustule results. These glands are in the neck and inguinal area.

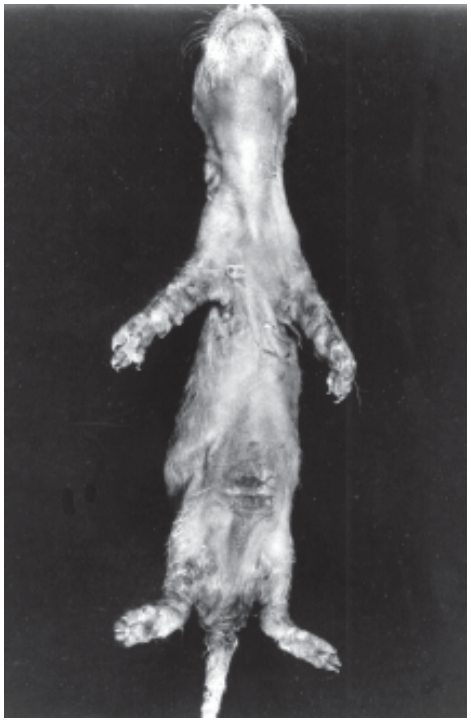

Figure 3. Staphylococcal skin infection. This kit is covered with pustules that have opened and formed crusty scabs.

PREVENTIVE ACTIONS AGAINST B.S.E.

The American Feed Industry Association (AFIA) Board of Directors acted in early February to further protect the nation's beef supply by implementing additional safeguards to prevent bovine spongiform encephalopathy (BSE) from recurring in the United States. They approved two measures: (1) They advocated voluntary withdrawal of ruminant-derived meat and bone meal from facilities that produce feed for ruminant animals, and (2) they created a certification program ensuring compliance with the current ban on mammalian protein feeding instituted by the Food and Drug Administration (FDA).

The AFIA is calling for the removal of all ruminant-derived meat and bone meal from feed plants that make beef and dairy rations. Excluded would be blood products, gelatin, inspected meat products which have been cooked and offered for human food, milk products, and products containing only pork or horse protein. (from **Commercial Review**, Portland, OR 20 Feb. 2001, p. 4)

A number of firms are working to develop early-detection tests for BSE which can be run on the blood, rather than the brain of a killed animal. BSE is not easy to test for, since it is not caused by a bacteria or a virus, but rather by prions, which are nervous system proteins that are normally harmless but can become misshapen and cause waste material to collect in the brain. This will be a complicated procedure and may never be worked out, but it is encouraging that a start is being made (from **Commercial Review**, Portland, OR March 6, 2001, p. 4).

ANTIBIOTIC USAGE

You have no doubt noticed, and we have commented on it previously in this Newsletter, that there is an ongoing controversy about the use of antibiotics in agriculture. The concern, basically, is that widespread use of antibiotics may eventually produce strains of microorganisms that are resistant to them, thus lowering their usefulness in combating human and animal diseases. In the mink business, our use of antibiotics to avoid high level contamination of fresh feed ingredients makes the issue one of special importance to us.

Over the past six months, the federal Food and Drug Administration (FDA) has given a lot of attention to the matter of antibiotic resistance. Last fall, it proposed banning the use of fluoroquinolones with poultry, on the basis that their use increases the risk that humans will become infected with drug-resistant bacteria. Last month it published a proposal for banning or restricting use of certain antibiotics with livestock, and this proposal was debated at a public meeting on January 22-24.

For over 10 years the Centers for Disease Control & Prevention (CDC) has warned that use of antibiotics with livestock for growth promotion contributes to the increasing problem of antibiotic resistance in humans. About 80% of all farm animals – mainly hogs, poultry and cattle, are said to receive antibiotics in their feed, at least part of the time. The U.S. Department of Agriculture (USDA), on the other hand, claims that there is little evidence that antibiotic use in agriculture does, indeed, pose a risk to human health, and its view was supported by a National Research Council study in 1998 that concluded, "The use of drugs in the food animal production industry is not without some problems but it does not appear to constitute an immediate public health concern." From 1977 to 2000, the FDA's policy on antibiotic use with livestock tended to mirror that of the USDA. In 1977, the FDA tried to ban the use of penicillin and tetracycline in animal feed, but Congress intervened and asked that the FDA do more research before activating the ban. As a result, the FDA backed off and has not attempted to control antibiotic use for about a decade. The recent action by the FDA, therefore, to ban fluoroquinolones in poultry indicates a major policy shift.

Elsewhere, Sweden banned the use of antibiotic growth promoters in 1986, and there was increased mortality in young pigs for a year after the ban. Swedish farmers made some management changes, however, which improved hygiene: they used a straw bedding system, decreased protein and increased energy in the feed, and used zinc oxide to counteract diarrhea, and with these they found they could live with the ban.

I think antibiotic use with mink is,

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ANTIBIOTIC Cont.

on the whole, responsible. We do not use them for growth promotion. It is well to keep this matter of antibiotic resistance in mind, however, and to only use antibiotics when they serve a specific purpose. (from Hileman, B. 2001. Furor Over Animal Antibiotic Use. Chemical & Engineering News, Feb. 12, 2001 p. 47-52.)

PROTEIN SOURCES: EGGS AND CHEESE

From time to time, changing economic conditions make certain protein sources a good buy, and I am asked how these should be substituted for other common protein sources, and how high a level of them can be fed. I am listing below (Table 1) some nutrient values for these products that help answer these questions.

Note particularly that in some of these products, water becomes a limiting factor. This is evident when you compare raw eggs against dried egg products and when you compare cottage cheese versus other, drier, cheeses. The protein quality in all these products is good – eggs especially. Some of the products add to the energy content of the diet, with their fairly high fat levels – see dried, whole eggs, for example, and all the cheeses except cottage. (from Heinz, H.J. Company. 1959. The Heinz Handbook of Nutrition. McGraw-Hill Book Co., New York, pp. 402-425.)

Table 1. Partial Nutrient Values for Some Protein Sources[1]

Feedstuff	Calories	Water	Protein	Fat	Ash (Minerals)
1. Eggs					
Eggs, whole, raw	162	74	13	12	1
Egg white, raw	50	88	11	0	1
Eggs, whole, dried	592	5	47	42	4
Egg white, dried	398	3	86	0	5
2. Cheeses					
Blue cheese	368	40	22	31	6
Cheddar	398	37	25	32	4
Cottage cheese	95	77	20	1	2
Swiss cheese	370	39	28	28	4

[1] Figures are grams/100 grams of the feed.

NURSING SICKNESS

Like death and taxes, nursing sickness seems always to be with us, but there are some things we can do to minimize its harmful effects. The symptoms are familiar: nursing sickness is characterized by a severe weight loss, progressive weakness and a high incidence of mortality (Figure 4).

Figure 4. Female suffering from nursing sickness and her kits.

Richard Schneider (see "Diseases of the Lactation Period" 1996, in **Mink… Biology, Health and Disease**, Bruce Hunter and Nathalie Lemieux, editors. University of Guelph, pp. 12-1 to 12-8) says that nursing sickness is a leading cause of death in adult female mink, with losses reaching as high as 15% on some ranches. In Denmark, it has been estimated that 30,000 – 150,000 mink are lost annually to this disease, although these figures have been lowered recently. The economic damage caused by this problem is increased since it involves selected breeding stock, and females with large litters are particularly affected.

Nursing sickness affects only lactating mink and is highly correlated with the duration of lactation. Most cases appear about 42 days after whelping, regardless of the date of whelping and the location of the ranch.

Affected females show a sudden loss of condition and weight, dehydration, loss of appetite and lethargy. In later stages of the disease, they may show black, tarry feces, head tremors and a staggering gait. Without some form of treatment, death usually occurs in about 5 days after symptoms are first seen.

The basic cause of nursing sickness is an energy deficit: that is, the female needs more energy to raise her kits than she is able to generate from the feed she eats. This is why the disease seems to hit hardest on the most productive females, with the largest litters. The females, too, often do not feel like eating heavily, shortly after parturition, and this compounds the problem. The cause of death, when it occurs, is heart failure resulting from dehydration, electrolyte imbalance, and kidney failure.

These things suggest some management changes that may help avoid, or minimize the problem. To lessen the energy drain on the dams, some kits from extra-large litters can be fostered out to other mothers. A highly-digestible feed and high energy content should be given during lactation, and supplementation with a vitamin mix and 0.5% salt may be helpful. In acute cases, females that have nursed over 35 days and are looking thin should be weaned of all but one kit and given oral electrolytes by mouth. Dr. Durrant describes a treatment which he has used with some success in Utah which combines the antibiotic, penicillin, an electrolyte solution named LRS, and winstrol, which is an anabolic steroid. This is given by intramuscular injection, daily, for 2-3 days. This preparation must be made up by a veterinarian, and it might be prudent to have some on hand for use in emergency situations.

It is interesting that some of the first preventive procedures against nursing sickness were made, many years ago now, by Dr. G.R. Hartsough, who correctly diagnosed the dehydration problem and prescribed adding salt to the diet, which encourages drinking water and helps stabilize the electrolyte balance.

(I am indebted for material in this section to the article by Dr. Richard Schneider, referenced earlier, and to Dr. Gary Durrant, our Ranch Services consultant, from Utah.)

COMPOSTING

Vastly increased public concern about maintenance of the environment, and the effects of disposal of animal wastes upon it, suggest that we should study and develop effective methods for disposing of waste by-products of our mink operations – specifically, uneaten feed, manure and animal carcasses. Dr. Aulerich, at Michigan State, has done some useful work on composing methods which have been reported in earlier issues of this Newsletter. The following report, which deals with wastes from large animal operations, contains some useful information.

New guidelines for disposing of animal carcasses have been approved by the Governor of Nebraska, Mike Johanns. Under these regulations, which were signed into law on November 28, 2000, livestock producers have the option of composting carcasses weighing up to 300 pounds on the premises where the animal died. The carcasses are placed on a bed of fibrous material (sawdust, ground or chopped straw or corn stalks) and are covered with the same material. The composting process then begins and the temperature of the material rises to 100-160°F. When the temperature drops from this first heat cycle, the compost is thoroughly stirred or turned and a second heat cycle begins. In most cases, it is reported, once the second heat cycle ends and the temperature drops, the compost is safe to spread on the land. (from: "Guidelines approved for animal composting" in **Feedstuffs**, December 18, 2000, p. 3)

FOLIC ACID

We have had a few questions lately about folic acid and the possible need to add supplementary amounts of it to mink diets. Folic acid, or Folacin as it is also called, is one of the B-complex vitamins. The need for folic acid increases during pregnancy, and it has been estimated that up to one-third of all the pregnant women in the world have a folic acid deficiency to some degree. It may be this involvement in reproduction that stimulates interest in folic acid for mink, although folacin also supports growth and general health.

For animals, needs for folic acid are chiefly met from natural food sources, and in the case of ruminant animals, from microbial synthesis. Synthetic folic acid is frequently added to diets for pigs and poultry; however, these species consume diets that are quite different from those of mink. The amounts of folic acid needed are small: in humans the normal body stores have been estimated at 5-10 mg, about half of which is stored in the liver. In mink, the requirements are estimated at 0.5 mg/kg of dry feed, or about 0.07 mg per pound of wet feed. Mink diets, which usually contain some liver, are thus generally pretty well supplied with this vitamin. (from McDowell, L.R. 1989. **Vitamins in Animal Nutrition**. Academic Press, New York, pp. 298-322)

LEVEL OF FEEDING AND 'STICKY KITS'

Some Danish experiments throw some light on the effect (or lack of effect) of level of feeding of dams on the incidence of so-called "sticky kits." In 1995 and 1996, some 2700 female mink were fed at a low, standard, or high level from the end of April to the end of May. The incidence of sticky kits was 8.6%, 7.9% and 9.6%, respectively for the females on the low, standard or high levels of feeding. The body weights of the females after whelping averaged 1013, 1015 and 1007 grams, respectively, and weights of male kits averaged 374, 377 and 377 grams. All differences were non-significant. It was concluded that the level of feeding during the preweaning period had no effect on the incidence of sticky kits. (from: Hejlesen, C. 1998. Level of feeding does not affect the risk of greasy kits. Dansk Pelsdyravl 61:180-181)

GELATIN HYDROLYSATE

A Danish report describes a new potential protein source, gelatin hydrolysate, which is made from bones. Two groups of nine each, male standard dark mink, were allowed free access to a control diet and a similar test diet which had 4% gelatin hydrolysate added. The investigators concluded that the addition of 4% gelatin hydrolysate had no effect on the palatability of the diet to mink, but they suggested that 4% might be close to the limit at which gelatin hydrolysate should be fed. (from: Hejksen, C. 1998. Smageligheds forsog med gelatinehydrolysat. In: Pelsdyrerhvervets forsogs & Radgivningsviskomhed A/S, Holstebro, Denmark, pp. 115-120)

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