

# What tells Minnie Mink that it's time to mate?

By K.A. KOUDELE &  
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It is known that the breeding season of most animals is timed so that the young are born in the spring, when warmer temperatures and increased food supplies help maximize their survival. In nature, many animals have evolved specific periods of reproductive receptivity regulated through changes in day length or photoperiod.

In some animals raised under domestication, this close link between reproduction and the annual changes in photoperiod has been weakened such that sensitivity to the natural photoperiod can be overridden by management techniques such as artificially increasing or decreasing the hours of light the animals receive each day. This enables producers to keep

a herd or flock reproducing year 'round or synchronize the onset of the breeding season so all the animals breed and then give birth within a narrow time interval.

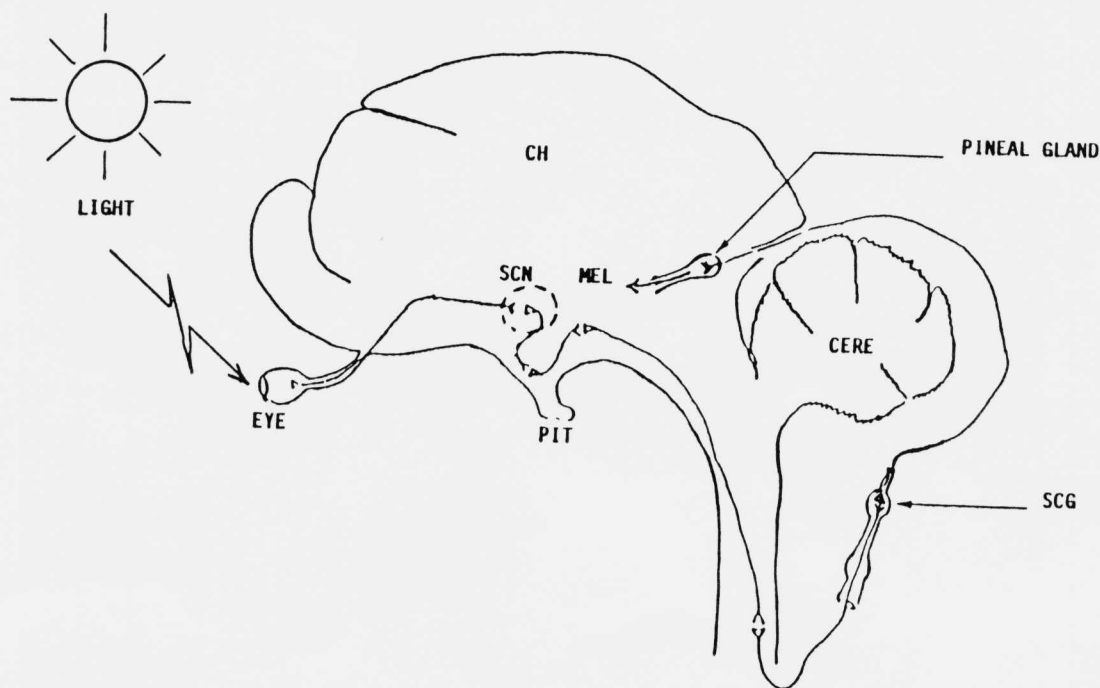
The young can be raised and marketed more economically in groups of similar age and size. Fur-bearing animals are no exception and also can be managed reproductively by manipulation of lighting regimes. The actual biological mechanisms underlying this photoperiodic response are not thoroughly understood, but certain aspects of the system have been studied in depth.

Shown is a diagram of some of the nervous system pathways in the mink brain that are involved with photoperiodicity. Incoming light waves are detected by the

retina of the eye. In turn, neurons in the retina transmit electrical signals to a bundle of nerve cells located in the hypothalamic region of the brain called the suprachiasmatic nucleus (SCN).

The suprachiasmatic nucleus comprises part of the "timekeeper mechanism" thought to be located in the hypothalamus. The photoperiodic information then is transmitted to the superior cervical ganglia (SCG) by way of the pituitary gland located at the base of the brain. The pituitary is the "master gland" of the body that secretes hormones that control not only reproduction by affecting the growth and maturation of ova and sperm but also water excretion and retention,

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Components of the photoperiod sensing and processing system in the mink brain. SCN = Suprachiasmatic Nucleus; PIT = Pituitary Gland; SCG = Superior Cervical Ganglia; CH = Cerebral Hemisphere; CERE = Cerebellum; MEL = Melatonin;  $\blacktriangleleft$   $\blacktriangleright$  = Nerve Pathway.

## Minnie Mink

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growth, lactation, heat generation, skin and pelage color changes, and general metabolic functions.

The SCG consists of a bundle of neurons that parallel the esophagus between the lower jawbones. There may be more processing of electrical signals at the SCG before they are relayed to the pineal gland.

### Pineal Functions

The pineal gland, a mysterious and long-misunderstood organ, recently has been shown to be an integral part of the photoperiod-sensing system.

When the animal is exposed to darkness, the pineal gland releases a hormone called melatonin. Since the production of this hormone is inhibited by light, nighttime concentrations of melatonin in the blood and cerebral-spinal fluid are high, while daytime concentrations are almost negligible. Therefore, the period of high melatonin is the biological cue that it is night.

Most scientists involved in pineal research believe that melatonin acts primarily within the brain, although the possibility that it affects other parts of the body has not been ruled out. Melatonin may bind to nerve cells within the SCN or pituitary cells and alter their function. Whether it inhibits or stimulates cellular activity may depend on how long and how much of the hormone is present.

For example, the female mink is a long-day breeder. She is receptive to the male and ovulates during increasing photoperiod (or decreasing dark period). With an increase in daylength, the duration of high melatonin concentration decreases. This in turn stimulates her pituitary to secrete more follicle-stimulating hormone, causing the ovarian follicles containing the ova to grow and mature and then secrete estrogen which induces estrus and tells Minnie Mink it's time to mate.

This entire system of photoperiod-induced reproduction is complex and still incompletely understood. However, with continued research support to increase our knowledge of this natural phenomenon, several potentially-beneficial management alternatives might be developed to help the fur farmer bolster the reproductive performance of his or her animals.

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## Big fox show all set for Nov. 8-9

Madison, Wis., will be the place to be on Nov. 8-9 for fox producers and all other persons interested in foxes. On those dates, the American Fox association will stage its fourth annual live fox show at the Dane County Exposition Center.

On Friday, Nov. 7, entries will be received and classified. Judging is scheduled to start promptly at eight on Saturday morning, Nov. 8, with David Jacobsen presiding. Plaques and ribbons will be awarded to show winners.

Following dinner on Saturday evening,

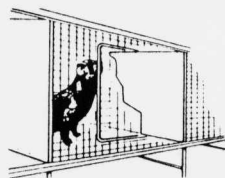
Furs by Francis of Winona, Minn., will present a fur fashion show. Some of the garments will be provided by AmFox members and their wives. Judy Holmes and Leona Rane will play key roles in the fashion presentation.

Many commercial exhibitors are expected. National Fur Foods will stage an educational seminar for fox breeders.

Social events will be held at the nearby Sheraton Inn on John Nolen Dr. in south Madison. ■

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