

# THE OBSERVATION POST

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## Scientists Throw Light on X-Disease

LAST JULY, the U. S. Department of Agriculture announced that one of the causes of x-disease, or hyperkeratosis of cattle was polychlorinated naphthalene compounds. The research leading to this discovery was conducted at several state agricultural experiment stations cooperating with the department. Although the first identification of the cause was made by Dennis Sikes at the University of Tennessee station, concurrent research at the Virginia station by Wilson Bell and at the New York station by Peter Olafson definitely confirmed that polychloronaphthalenes caused bovine hyperkeratosis.

X-disease has been known for about 10 years and its symptoms are well known. The first observations are lacrimation followed by salivation and reduced appetite. In the chronic stages the skin becomes dry, hairless and thickened—the folds that develop (see illustration) are leather-like and cannot be removed by stretching.

From a national viewpoint the economic losses due to x-disease are not very great. From the viewpoint of individual farmers who may lose about 50% of their herd, the presence of hyperkeratosis may be a financial calamity. From the viewpoint of scientific inquiry, the outstanding features of the fight against x-disease were good organization and brilliant research technique. Under the guidance of the Bureau of Animal Industry, USDA, 16 states participated in the attack on the problem. Team action appeared highly desirable because hyperkeratosis had been produced under a wide variety of experimental conditions by the use of: (1) certain alfalfa pellets, (2) a processed concentrate and fractions of this concentrate, (3) one lot of wood preservative, (4) a particular lubricant, and (5) a particular lot of timothy hay. It was the consensus of the interested scientists that immediate action should be undertaken to obtain definite information on the disease by survey and research.

Based on earlier observations that the oral administration of a pressure lubricant could produce x-disease, Dr. Bell of the Virginia station undertook to identify the active constituent or constituents.

With the cooperation of the lubricant manufacturer, he was able to show that chlorinated naphthalenes which were used as an additive for extreme pressure greases produce symptoms and lesions that are characteristic of hyperkeratosis. Di- and trichloronaphthalenes are not toxic at a dose of 14 mg. and 12 mg. per pound body weight respectively. The tetrachloro derivative appears to be slightly toxic. Penta-, hexa- and heptachloronaphthalenes are consistently toxic; pentachloronaphthalene is probably less toxic than the latter two.

The ever increasing use of trucks, tractors, harvesting machinery, and the like on farms provides more opportunities for cattle to lick grease from wheels, axles, and other lubricated parts. If such greases contain polychlorinated naphthalenes there is the ever-present danger that cattle will become affected. The hazard does not stop there. The Department of Agriculture in recent months has issued a warning that the use of chlorinated naphthalenes in lubricants for pelleting machines to produce livestock feeds—such as pelletized cottonseed and alfalfa—may also lead to x-disease. The National Lubricating Grease Institute is making a definite effort to apprise its membership that this serious cattle disease can be prevented by the elimination of chlorinated naphthalene from extreme pressure lubricants intended for farm vehicles or feed production machinery.

### Implications of Past Research

Although interesting and important there would be little justification in reviewing this history of x-disease if the subject did not have more serious and wider implications. Immediately following the development and accumulation of evidence that polychlorinated naphthalenes were responsible for producing hyperkeratosis, chlorinated pesticides as a class became suspect. Pentachlorophenol and creosote and even cottonseed meals sprayed with chlorinated pesticides were viewed with suspicion. The logical pursuit of such inquiries is commendable. More commendable however, is the restraint of the investigators in refraining from utterances that might cause irreparable damage

to the agricultural chemicals industry. Markets could be lost and unwarranted damage actions might be encouraged by a thoughtless observation.

### No Evidence Against Pesticides

Fortunately however, and to the credit of the Bureau of Animal Industry and its cooperators in the State Experiment Stations, scientific results and not conjecture have been reported. This research is throwing more and more light on x-disease. As a result, the pesticide industry will be able to operate in a healthier environment.

In studies on the cause or causes of bovine hyperkeratosis, creosote has received a clean bill of health. Pentachlorophenol and DDT also have been eliminated as a cause. In recent discussions at the U.S. Department of Agriculture it has been pointed out that certain polychlorinated insecticides derived from cyclopentadiene by chlorination followed by a Diels-Alder reaction are not really polychloronaphthalenes as might be suspected from their chemical nomenclature. They are hydrogenated derivatives which bear the same relation to naphthalene as cyclohexane does to benzene.

There is now no reason to incriminate the pesticide industry in the x-disease problem. However, the interested scientists are continuing their studies for other possible causes of this disease. In the meantime, farmers have the assurance that there is no evidence that the use of pesticides for crop protection will contribute to bovine hyperkeratosis.

In hyperkeratosis, the skin becomes dry, hairless, and thickened

