

## VITAMIN A THERAPY FOR "WINTER RINGWORM" IN GUERNSEY CATTLE\*

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The most common dermatophytosis of Guernsey cattle is caused by *Trichophyton verrucosum* and is termed "winter ringworm" or "barn itch". An entire herd may be infected by the fungus developing typical papulosquamous lesions about the head and neck and perianal skin. The lesions are circular, have an active border, tend to clear in the center and generally resemble tinea in humans. Trichophytosis in cattle may be associated with irritability, poor feeding and reduced milk production. The sale value of these animals is low and they may not be approved for export.

In 1962 while studying nitrogen metabolism in Guernsey heifers, Campbell (1, 2) administered vitamin A and noted an unexpected side effect, the rapid clearing of trichophytosis in all the animals. In retrospect, this observation is not so unexpected. Trichophytosis appears in young cattle, usually during the winter, when they are fed skim milk, forage and grain; a diet deficient in vitamin A. In the spring when these animals are let out to carotene-rich pasture, the infection heals. Furthermore, Guernsey cattle are known to convert carotene to vitamin A less efficiently than the other major dairy breeds and also seem to have the least resistance to *Trichophyton verrucosum* infections. The distinctive golden yellow color of Guernsey milk is caused by a high carotene content. We are reporting clinical data concerning the practical therapy of trichophytosis in cattle, as well as describing an experimental system for the study of the effects of vitamin A on mammalian skin.

### METHOD AND RESULTS

*Prevention.* One group of non-infected heifers was given weekly injections of 150,000 IU of vitamin A† and another group of non-infected control animals remained untreated. In the untreated group, over 50 percent of the animals became infected; whereas, no animals developed trichophytosis while receiving vitamin A by injection. In the usual infected herd it may be expected that 50 to 60 percent of the animals will develop tinea. Subsequent tests with oral vitamin A indicated that 20,000 IU per animal daily in the feed also will prevent infection. To date, over 100 animals have been utilized in these studies.

*Treatment.* Within three weeks after beginning intramuscular injections of 150,000 or 300,000 IU of vitamin A into infected animals, resolution of the trichophytosis began. Healing was complete within 4 to 8 weeks, apparently depending upon the dose of vitamin A and the severity of the infection. All infected animals responded to treatment. In addition, it was noted that as the trichophytosis healed, an improved gloss and suppleness of the hair developed.

*In Vitro.* Water-soluble vitamin A was added to nutritional test media (3) in various concentrations up to a saturated solution. The actual crude vitamin A used for the oral treatment of the animals was employed similarly. *Trichophyton mentagrophytes* and *Trichophyton verrucosum* were planted on the vitamin A supplemented and a non-supplemented media. In no culture did the vitamin A induce a different growth pattern or morphology in either fungus. It was concluded that vitamin A did not inhibit the growth of *Trichophyton verrucosum* directly.

### DISCUSSION

Vitamin A is said to have no role in the metabolism of fungi (4). It is neither essential to nor a growth stimulant for any known fungus. However, vitamin A is known to affect integrity of epithelium and particularly stratum corneum. Speculations about the mechanisms by which vitamin A acts on the skin in animals or man are unsupported by experimental evidence. We speculated that the action of vitamin A might be directly on the fungus because some chemicals known to be strong chelating agents are also highly toxic to fungi. Vitamin A is known to increase the efficiency of chelation of some metals (5). The indirect action of vitamin A in curing cattle of trichophytosis is now under study.

### SUMMARY

Campbell observed that the administration of vitamin A to heifers infected by *Trichophyton verrucosum* cures the disease. Because of the low cost, effectiveness and ease of vitamin A administration, the value of this observation to dairymen is substantial. The curative effect seems to be an indirect action of Vitamin A on the skin.

We have described a new experimental system for the study of vitamin A action on fungus infections in the skin *in vivo*.

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† Injectable vitamin A type-M, palmilets—250,000 IU/gm dry dispersible as the stabilized palmitate. (Pfizer)

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