

1968. Powder has since been reapplied when it was occasionally removed in cleaning operations, or when it became wet, but this minimal maintenance program has resulted in satisfactory control.

#### Several treatments

Insect proofing requires several trips to the construction site. To control subterranean termites, soil should be treated before the foundation is poured. In the case of slab-on-ground foundations a single treatment may be sufficient if a monolithic slab foundation is poured. Two treatments may be necessary if the footing and the remainder of the slab are poured in two separate operations. Another treatment should be made just before the concrete cap is poured on earth-filled extensions of the foundation such as steps, stoops, porches, patios, terraces, etc. Approximately half of the subterranean termite infestations originate under earth-filled extensions of the foundations; the termites gain entry to wood structures through cracks that eventually appear between the concrete caps and the main foundation. For raised-foundation construction, another insecticide application should be made after floor construction is complete and after wood scraps are cleared out from under the building. At this point the area under the floor should also be treated.

Dust should be blown into the wall voids during the interval between the installation of the plaster lath or drywall and the plastering or taping operations. It is the only procedure in which timing is a critical factor. The remainder of the insect-proofing operation is best done after construction is complete and before the final cleanup. The pest control operations must be scheduled at appropriate times during construction operations in order to obtain thorough treatment. An agreement on this point should be a part of the pest control operator's contract with the builder and construction firm. In certain buildings or in localities where cockroach infestation is practically certain and where the range and refrigerator are not built in at the time of construction, boric acid powder should be applied under these appliances when they are installed.

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## CROOKED CALF DISEASE

CARL W. RIMBEY



Crooked calf characteristics shown above include enlarged knees on the front legs which are bent forward. The neck also is not natural and shows some effects of this malady.

LUPINE—CROOKED CALF TEST, RAMELLI RANCH  
PLUMAS COUNTY

Cow No.	Date born	Description
758	March 15th	Very crooked legs, back—died at birth
515	March 20th	Very crooked legs and back—died at birth
111	March 26th	Very crooked back & legs—died at birth
Ear Tag 42	March 11th	Crooked front legs—Average
211	March 13th	Crooked front legs—Average
908	March 13th	Crooked front legs—Average
201	March 28th	Crooked front legs—Average—Died April 17
312	March 14th	Crooked front legs (great) and slight back
772	March 21st	Very crooked front legs
016	March 20th	Crooked front legs—Average
221	March 15th	Right front leg crooked
410	March 25th	Both front legs crooked—Average
773	April 1st	Both front legs crooked—Slight
921	March 22nd	Right front leg crooked—Very
774	March 15th	Left front leg crooked—Sidewinder
907	March 29th	Both front legs crooked—Slight

**C**ROOKED CALF DISEASE has been a problem in the northeast mountain counties of California for many years. Calves are born with this malady and it is demonstrated by malformations of bones in the animal which have a severe to slight crippling effect. Calves may have twisted backs or necks, twisted or bowed legs, cleft palates or combinations of all of these effects.

For years it has been felt that the lupine plant, when eaten during certain stages of pregnancy, is causing this disease. Ranchers of the area have changed their breeding season and moved their cattle from pastures which they know are contributing to the problem, to reduce the number of calves affected. A test was designed in 1967 on the Ted Ramelli Ranch, Plumas County, to de-

termine whether the lupine was in fact causing the crooked calf disease. This ranch had a history of crooked calves, with as many as 25 per cent of a calf crop showing some stages of this malady.

#### Plumas ranch

The Ramelli Ranch is located in Sierra Valley of Plumas County with a summer range 10 miles north of the ranch. The summer range lies west of Frenchman Reservoir and is heavily infested with lupine. The cattle were pastured in this area from July 1 to September 30 of the 1967 grazing season. Elevation of this range is around 6,000 ft. Part of the range is privately owned while the remainder is under U. S. Forest Service permit. The privately owned field was inspected in May, 1967, and a low-grow-

ing variety of lupine, identified as *Lupinus sellulus* was found. In the large pasture there was a larger lupine which has been identified as *Lupinus caudatus*. The privately owned pasture was large enough to hold 20 head of cows and the large pasture had enough area for the remainder of the herd.

Through the years the Ramelli herd has been on a rate-of-gain trial and each cow has been individually identified with a hot iron number on her loin. From this group of cows, 10 head of first-calf heifers and 10 head of second-calf heifers were randomly selected for the control group. This was done because it was felt this malady is more prevalent in the younger animals. However, in the remaining group of cattle there was another 10 head in each of these ages of heifers. The two groups were separated and the bulls turned in with the cows for breeding on May 25. These cattle went to the summer range on July 1, 1967, and were returned to the ranch September 30.

### Inspection

Cows were inspected at regular intervals and feed samples were taken when the cattle first went on the range. In the July 28 inspection it was noted the cows were eating much of the lupine (*Lupinus caudatus*), in the large pasture while it was in the soft dough seed stage. The September 30 inspection showed they had eaten about two-thirds of the tops of the lupine plants. The feed and water samples taken at the beginning of the pasture season were run for heavy metals to see if these would be found in excess amounts. There were none to be found.

On November 11, the cows were pregnancy-tested and most were found between the four-to-six-month period of pregnancy. Cows were fed through the winter on meadow and alfalfa hay raised in Sierra Valley. They started calving on March 1st. On April 5, 1968, cows with crooked calves were identified. All cows having these calves were found to be from the group on the lupine (*Lupinus caudatus*) which had been believed to be causing the trouble (see table).

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# HERBICIDES and sprinkler irrigation in vegetable crops

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### DCPA

DCPA (Dacthal) is one of the very insoluble, low volatility, herbicides that can be activated by sprinkler irrigation following regular surface application. DCPA is particularly important to California onion growers. The herbicide apparently moves into the shallow root zone of germinating weed seeds. Surface applications of DCPA followed by sprinkler irrigation can cause injury to tomato, lettuce and melon seedlings, although incorporating DCPA mechanically for weed control in lettuce and peppers greatly reduced the phytotoxicity to these crops. Onions are more resistant to DCPA, however, and many summer weeds can be effectively controlled by surface application of DCPA followed by sprinkler irrigation, particularly in the deserts of southern California.

More research is needed to determine the exact amount of irrigation necessary to activate DCPA while allowing optimum safety to onions. In one test in the Antelope Valley, 2 acre-inches of water applied during the initial sprinkler set showed no detrimental effects. In another test on sandy soil in the Moreno Valley, 7 acre-inches applied during the first ten days was not excessive.

### Diphenamid

Diphenamid (Enide or Dymid) is used for weed control principally in direct-seeded tomatoes and peppers in California. It has given more consistent weed control under sprinkler irrigation than incorporation by disking. Diphenamid

has a solubility of 260 ppm in water, and is listed as non-volatile. Some recent controlled-irrigation experiments indicated that 2 acre-inches applied during the first irrigation may be more than desirable in one soil type (clay loam in San Benito). In another test on sandy soil at Moreno, 7 acre-inches of sprinkler-applied water was far in excess, severely damaging tomatoes direct-seeded at 2 to 8 pounds per acre. In two additional sprinkler trials on sandy soil, no injury to tomatoes was observed at 2 acre-inches and 2.4 acre-inches. High temperatures have been observed to increase the activity of diphenamid in Kern County. Since irrigation can reduce soil temperature, sprinkler irrigation may therefore modify the activity of diphenamid; although this has not been demonstrated experimentally in the field.

### Trifluralin

Trifluralin (Treflan) is more easily activated by overhead sprinkler irrigation in freshly worked soil than on a hard surface as are some other low solubility herbicides. With a solubility of 0.5 ppm trifluralin has a relatively high volatility ( $2.0 \times 10^{-4}$  mm of Hg). Some loss will occur if sprinkler irrigation is not applied soon enough after the application of trifluralin. The critical interval is not known, but recent field data indicate that this period is greater than two hours on desert soils during the summer. Company labels suggest waiting no more than four hours to incorporate trifluralin.

A number of precision sprinkler irri-