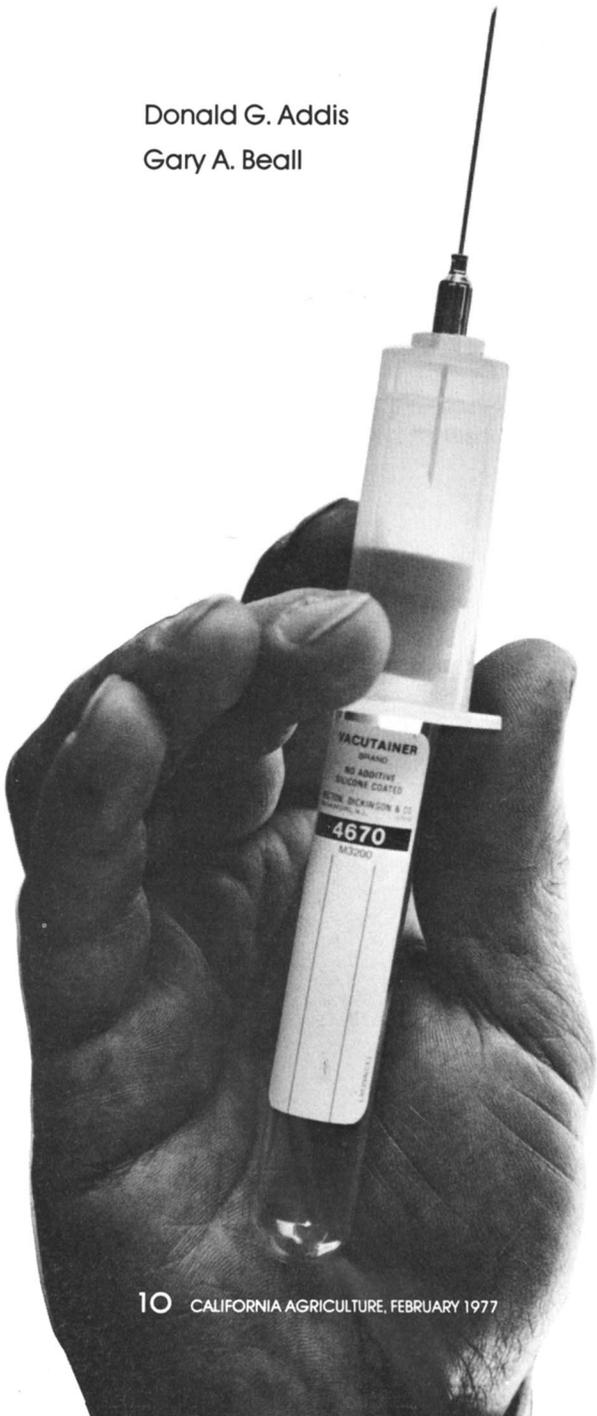


# Antibiotic studies help feedlot calves

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Depending on the particular shipment, 25 to 90 percent of the feeder and stocker cattle coming into southern California desert feedlots get sick. Death losses and culling rates range from 6 to 8 percent among the lighter calves (250 to 400 pounds) and from 1/2 to 2 1/2 percent for larger animals.

The principal problem is a pneumonia/shipping-fever virus complex for which the relatively inexpensive antibiotic oxytetracycline (OTC) is often an effective treatment. However, route of injection, dosage, frequency of retreatment, possible addition of other compounds to increase the effectiveness of OTC, and dosage level per injection site on the animal's body were factors that the University of California Stress Calf Study Group felt could affect the efficiency of oxytetracycline.

This research team designed several studies to determine the best methods for administering OTC. Early studies established that oral administration is not effective, because OTC in feed and water significantly reduces feed intake. The researchers observed that blood serum levels of OTC should be at least 4 micrograms per cubic centimeter (mcg per cc) for effective clinical improvement of sick animals treated with OTC. Measuring the cost of gain, the researchers further concluded that administering antibiotics to all animals upon arrival in the feedlot can be more costly than treating only the animals that become sick.

More recent research by the group has concentrated on injection techniques. Observations that simultaneous injections at several locations instead of a single location on the body produced higher blood serum levels of OTC 12 to 14 hours after treatment led to a study to determine the best dosage per injection site. Another study compared the effectiveness of intravenous, intramuscular, and subcutaneous injections.

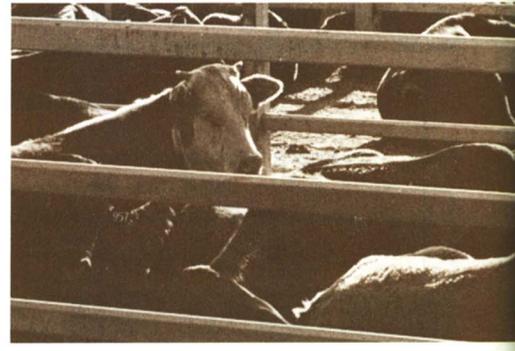
## Dosage per site

In the dosage-per-injection-site study, OTC was administered at a maximum of 5, 10, or 20 cc per injection site. Total dosage for each treatment ranged from 23 to 40 cc per animal and was based on a dosage of 7.5 mg per pound of body weight. (A rate higher than FDA label clearance of 5 mg per pound of body weight was used for experimental purposes and is not a University of California recommendation.) The number of injection sites ranged from two for the

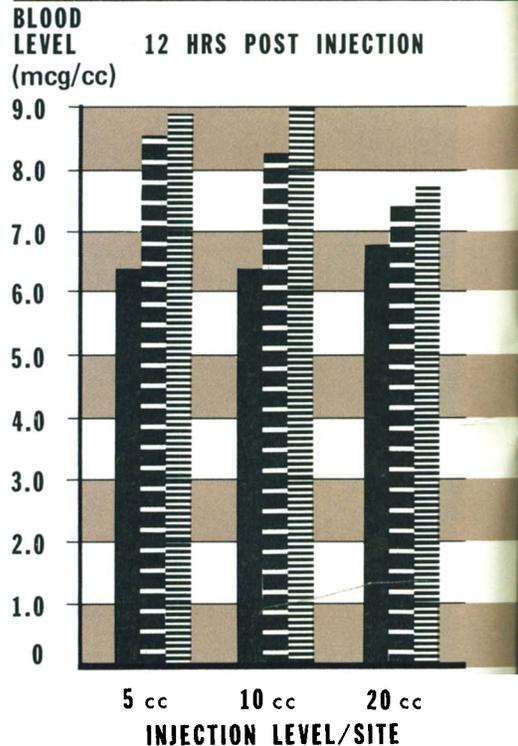
20 cc group up to eight for the 5 cc group.

Twenty-three calves of mixed breeding and weighing from 163 to 266 pounds were used in the study. All of the test animals showed signs of pneumonia and were selected from a commercial feedlot, where they had received no antibiotic treatment for at least seven days. Each group of animals received three identical treatments; the second and third treatments were made 24 and 48 hours after the first. No other medication was administered during the study.

The only significant blood level difference between groups occurred 1 and 10 hours after the first treatment. (Blood samples were taken 1, 3, 5, 6, 8, 10, 12, 16, 24, 36, 48, and 72 hours after the initial treatment.) One hour after treatment, serum levels in the 5-cc-per-site animals were significantly higher than in



Oxytetracycline blood serum levels after first, second, and third injections.



animals receiving 20 cc per site. Ten hours after treatment, the serum level in the 20-cc-per-site animals was significantly higher than in either the 5- or 10-cc-per-site animals. Although not statistically significant, the lowest serum OTC level recorded (3.2 mcg per cc) was at 72 hours in the 5 cc per site.

The OTC blood serum level became critical (below 4 mcg per cc) in all groups at 24, 48, and 72 hours, indicating the desirability of retreatment at these times. However, the level was highest in the group receiving 20 cc per site.

### Injection method

In another study, 127 head of healthy and pneumonic calves, ranging in weight from 210 to 539 pounds, were injected with either 5 or 2.5 mg of OTC per pound of body weight. The injections

were administered either intravenously (IV), intramuscularly (IM), subcutaneously (SQ), or by IV and SQ combined.

A low level of dexamethasone—a prescription antiinflammatory agent—was added to the OTC injected into some of the IM- and SQ-treated cattle. The use of dexamethasone did not increase the serum concentrations of OTC in this study.

The IV injections gave the highest initial OTC blood levels for the first 11 hours after treatment but then dropped rapidly, suggesting the desirability of retreatment after 12 hours.

OTC built up very slowly in the blood serum of SQ-injected animals; the desired blood level of 4 mcg per cc was not reached until 10 hours after treatment. However, from 11 to 24 hours after treatment, these animals maintained a higher blood serum level of OTC than any of the other groups.

Intravenous and subcutaneous injections were combined in one group of animals to see if a more consistent OTC serum level could be obtained. The result of giving one-third of the required OTC dosage IV and two-thirds SQ in one site resulted in a slow absorption rate. OTC did not reach the desired level of 4 mcg per cc until six hours after injection and dropped rapidly thereafter.

Intramuscular injections resulted in a rapid absorption rate, which gave the desired OTC blood level one hour after injection. OTC blood levels peaked at 6 mcg per cc three hours after injection and remained satisfactorily high for the remaining 21 hours.

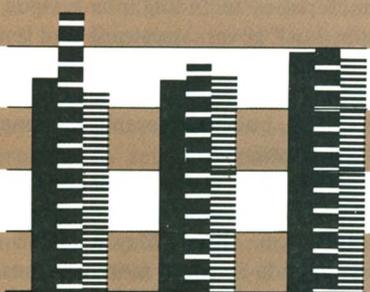
From a practical standpoint, considering time and labor involved, the best approach for administering OTC to sick animals appears to be by intramuscular administration of not more than 10 to 20 cc of OTC per injection site.

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1ST 2ND 3RD

24 HRS POST INJECTION



5 cc 10 cc 20 cc  
INJECTION LEVEL/SITE

