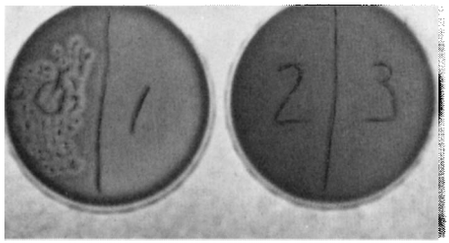
Adding Formalin to milk

RAISING ORPHAN



Bacterial growth from milk treated with 0, 1, 2 and 3 ml. of Formalin per gallon after 72 hours at room temperature.

D. T. TORELL

MANY NEWBORN orphaned lambs die each year because ranchers cannot easily afford to take the time required to keep nursing equipment clean. As a result they often make no attempt to raise the orphaned lambs. Adding a bacteria-killing agent to the lambs' milk would eliminate the necessity of daily washing of equipment and would make orphan-lamb raising a more profitable operation. Formalin, a 37% solution of formaldehyde, has been used for many years as a bactericide and as a preservative, but it has never before been recommended for use in milk fed to lambs.

The purpose of this study was to test the effectiveness of adding a minute quantity of formalin to orphan lambs' milk—the proper amount to prevent growth of bacteria, yet not enough to harm the lambs or affect the palatability of the milk.

Lamb feed study

Orphaned lambs were allotted either to the control, or the formalin-treated group at birth. They were grouped by age with four or five lambs of similar age in each of four pens. The pens were $5 \times 6\frac{1}{2}$ ft, with shavings for bedding. After being fed 200 ml of cow colostrum, all lambs were self-fed Lamb Milk Replacer at barn temperature (mean high 56°F and mean low 34°F) in especially designed one-gallon capacity feeders (described later). Two control groups were fed untreated milk and all equipment was washed once each day. The other two groups were fed formalin-treated milk in the proportion of 1 part formalin to 800 parts milk and the equipment was washed only once each week.

The milk replacer was reconstituted by adding 2 pounds of powder to 3 quarts of warm water. Milk not consumed by the control groups was added to the formalin groups' milk before it was treated with formalin. Consumption in each group was not measured but it appeared to be similar in the two treatments.

A 250-watt heat lamp was left on continuously for two weeks in each pen (36 inches off the floor close to the nursing area).

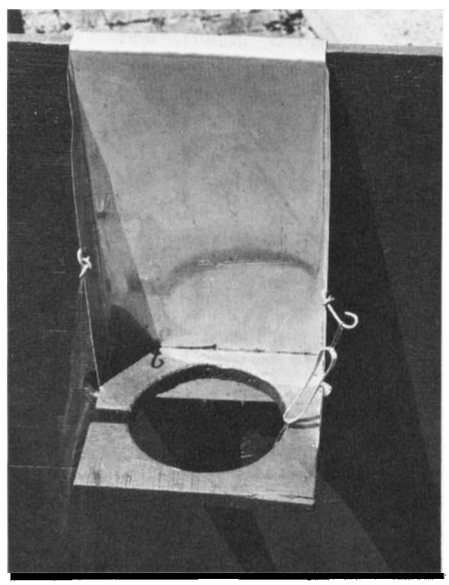
Orphans are usually not recognized until they have been stressed; five of the lambs started on this experiment died within 2 days as a result of this initial stress. Of those surviving the initial period, one in the control group died of enteritis at 30 days of age, and one in the formalin group died of an unknown cause at 70 days of age. Eight control lambs and six formalin-treated lambs survived to the end of the experiment.

The lambs were weaned when they started to consume a fair amount of pelleted brewers' grain (malted barley) and leafy alfalfa hay, and their milk consumption decreased. During the weaning process, water was available in a bucket; the milk was diluted with additional water, and the amount of diluted milk was decreased so they had to drink more from the bucket. This took place over a 5- to 6-day period.

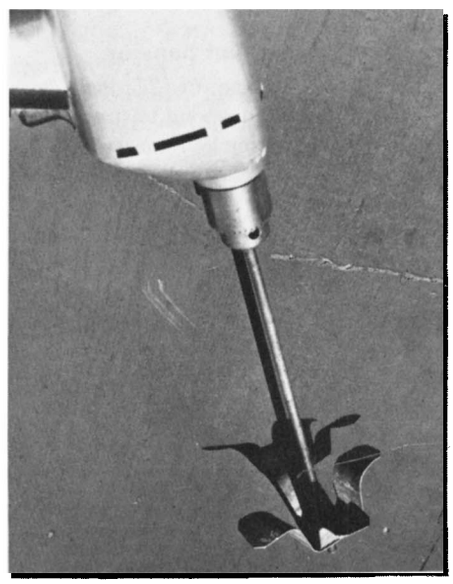
During this period, the leafy alfalfa hay was also decreased so that the lambs ate more of the malted barley. (We are not recommending brewers' grain barley as the feed for this period, but it is what was available to us. It contained 15.6% digestible protein and 18.1% crude fiber.)

The graph shows the average daily gain between birth and weaning, weaning and docking, docking to the end of the experiment, and body weight at the end of the experiment.

While these gains were analyzed statistically, and there were no significant differences at the 10% level, the number of lambs used was too small to effectively test the two methods from the standpoint of growth.

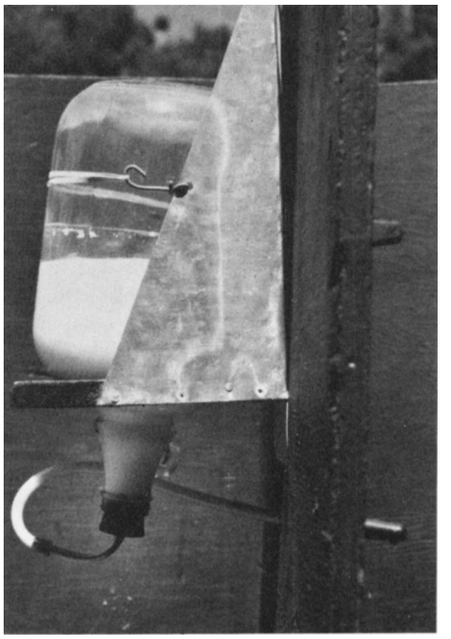


Closeup photo showing details of lamb bottle holder.



Stirring rod to reconstitute milk replacers.

helps in LAMBS



Hopland Lamb Nursing System (side view—nipple to right).

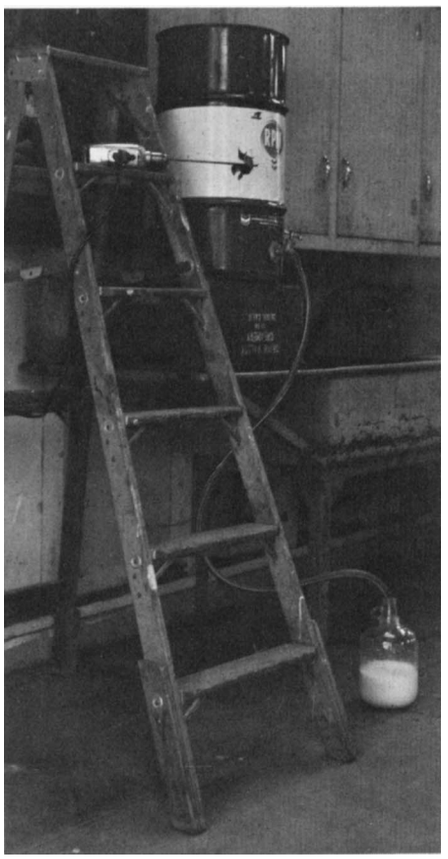
Formalin concentration studies

Whole pasturized milk was divided into jars. Formalin was added at the rate of 1 part formalin to 800, 1000, 1300, 2000, and 4000 parts milk; one jar was formalin-free (one gallon equals approximately 3800 ml). After 72 hours at room temperature the milk was put into blood agar plates by the streaked-plate method. The plates were incubated at room temperature for another 24 hours. There was no bacterial growth in milk from any of the formalin treated jars; however, on the eleventh day, mold had started to grow on the 1:4000 milk but streaked-plates showed no bacterial growth (see photo).

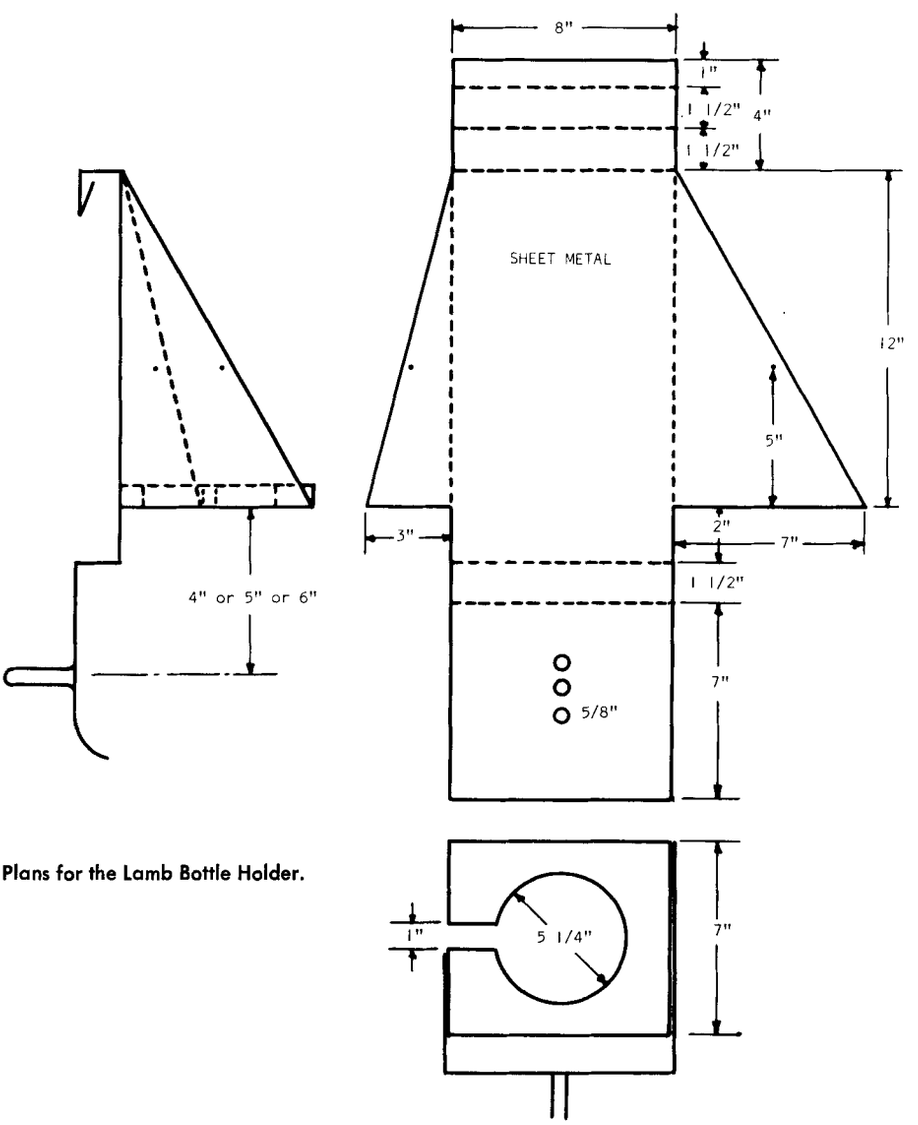
The lambs in this experiment consumed milk with five times as much formalin (1:800) as was needed to prevent bacterial growth in the milk for a 7-day period. This indicates that 1 ml of formalin (1:3800) per gallon of milk would be sufficient, especially at barn temperatures, to keep bacteria growth to a minimum and yet allow a good growth rate with a once-a-week washup.

Equipment

A lamb nursing system was designed to eliminate some of the problems of lamb feeding. Photos show the system,



Milk mixing container and dispenser.



Plans for the Lamb Bottle Holder.

which consists of a gallon jug inverted into a holder with a tube and nipple attached.

With this system, the milk is in the nipple so the lambs need to suck only slightly to get a milk flow. The lamb learns to nurse immediately after being held to it once or twice.

The separation of the milk—fat to the top and some of the milk solids to the bottom—has been a problem, even with the newer lamb replacers. This problem was eliminated with this system. The lamb's nursing produces a vacuum in the jug and when the lamb releases the nipple, air bubbles up thus mixing the milk.

The nipple assembly is a Lam-Bar nipple and tube slipped onto a $\frac{5}{16} \times 4$-inch tube bent at a 90° angle. This is then put through a No. 6 one-hole rubber stopper which fits most 1-gallon jugs. The nipple is placed within the pen at approximately the neck level of the jug, about 14 inches from the floor.

A stirring rod attached to an electric drill (see photo) makes an effective method of mixing dry milk powder with water. If a faucet is installed close to the bottom of the mixing container (plastic garbage can or a 120-pound grease barrel, as shown in photo), the jugs can be filled easily without awkward dipping or pouring.

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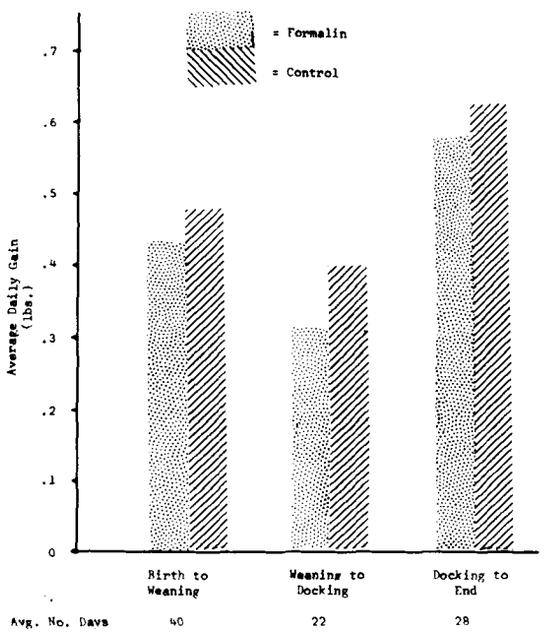
AVERAGE DAILY GAIN BETWEEN BIRTH AND WEANING, WEANING AND DOCKING AND DOCKING TO END OF EXPERIMENT FOR FORMALIN-TREATED AND CONTROL ORPHAN LAMBS ON BOTTLE FEEDING



CHEMICALLY CONTROL ROOT GROWTH IN CONTAIN

TOK FURUTA W. CLAY JONES

Copper naphthenate, or copper sulfate, in a suitable carrier appears useful to eliminate growth of roots on the surface of the root ball of nursery plants in containers. Neither chemical presented a problem with soil ball integrity when transplanting, nor did they inhibit root growth following transplanting. While uptake was not determined, phytotoxicity due to excess copper uptake was not observed.

TWO COPPER COMPOUNDS previously reported to "pinch" roots—copper naphthenate and copper sulfate—and four herbicides known to influence root growth were used to determine their effect on root and top growth of plants grown in containers. The sides and bottom of 1-gallon plastic containers were coated with each chemical. Various dosages were tested. While the containers were wet, they were filled with a soil mixture consisting of 50% loam soil, 23% redwood shavings, 13.5% sand and 13.5% peat moss. Test plants of *Eucalyptus viminalis* or *Jacaranda acutifolia* were then planted.

Following 10 weeks of growth in the 1-gallon containers, plants were harvested for determination of root and top growth. The root systems were divided into two parts—those roots on the surface of the root ball, and the remainder—and the dry weight of each part determined separately. The tops were measured for linear growth and the dry weight of the total growth was determined.

At the same time, plants were transplanted into untreated 5-gallon containers to determine the influence of the chemical treatment on subsequent growth of roots and tops. It was of particular interest to determine the growth of roots from the 1-gallon root ball.

Growth in 1-gal containers

Visual inspection during the test and data on root growth in the 1-gallon containers treated with the two copper compounds confirmed that both chemicals were effective in preventing growth of roots on the surface of the root ball for both species tested (photos 1 and 2 and table 1). Of the two, the copper naphthenate treatment appeared to be slightly more effective. The copper sulfate was mixed with Wilt-Pruf, a polyvinyl chloride material that is used as an antitranspirant. Some surface roots appeared on these copper sulfate-treated containers. These roots were limited in extent and were usually enlarged. It is likely that incomplete coverage caused this development.

The herbicide treatments were not as effective as the copper compound treatments in preventing the growth of roots on the surface of the soil ball. Also, species variations in reactions to the various herbicides were observed. Plants of *Jacaranda acutifolia* were more sensitive to the chemicals than the plants of *Eucalyptus viminalis*. Significant reductions in the amount of surface roots of Jacaranda occurred with all the materials. However, only one herbicide was ef-