

Fostering lambs by odor transfer

Edward O. Price □ Nancy L. Martin □ G. Craig Dunn □
Martin R. Dally □ Fremont L. (Monte) Bell □ Margaret Sublette

Cloth stockinettes help get ewes to adopt "alien" lambs

Orphaned lambs present difficulties to sheep producers. It is often not profitable to rear "extra" lambs artificially (with milk replacer), and post-partum ewes are reluctant to accept any lambs other than their own. Lambs are sometimes orphaned by the death of their mother but, more frequently, they are rejected by the ewe or are taken from their mother by the shepherd because of an inadequate milk supply. Also, ewes sometimes become separated from their newborn offspring when lambing occurs on pasture.

There are likely to be more extra lambs in the future as improved breeding and management techniques increase the proportion of multiple births. While few ewes have enough milk to support more than two lambs adequately, efforts to increase the number of twin births will probably increase the number of ewes bearing more than two young.

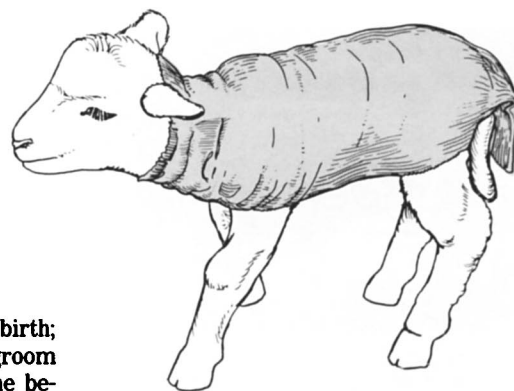
The solution to this problem seems obvious, since many ewes give birth to single lambs but have the potential to raise twins. The question is how to entice these ewes to adopt extra lambs.

Although ewes eventually use visual and sound cues to discriminate between their own and "alien" lambs, they first learn to identify their young by odor. Research has shown that ewes can discriminate between their own and alien lambs after a relatively short period of contact (sniffing, licking, and nuzzling) with their young immediately following birth. Amniotic (birth) fluids are attractive to the

ewe for a few hours after she gives birth; these fluids stimulate the ewe to groom her offspring, during which time she becomes familiar with her lamb's unique odor. Thereafter, lambs without this "own-lamb" odor are almost always rejected.

Since own-lamb odor facilitates maternal behavior, an alien lamb should be more attractive to a foster mother if it carried the odor of her own lamb. Actually, shepherds have used this concept for centuries. In "skin-grafting," as it is called, they remove the pelt of a dead lamb and place it on the lamb to be fostered, like an overcoat. The foster mother smells the own-lamb odor on the alien and thinks it is her own. Although skin grafting is effective, removing the pelt from the dead lamb can be time-consuming and unpleasant, and the hide may putrefy and attract insects in warmer weather. More importantly, a dead lamb is required, limiting the usefulness of this technique to substituting a live for a dead lamb.

We studied a variation that does not require a dead lamb. Since the odor used in identification resides on the lamb's wool, it seemed likely that a cloth "jacket" worn for a time by a ewe's offspring would become impregnated with own-lamb odor. If the cloth jacket were subsequently transferred from the ewe's own lamb to the alien lamb, as in skin grafting, we assumed that the alien lamb would smell enough like her own lamb to cause acceptance.



To test this theory, we fitted 27 lambs, newly born to Targhee-type whiteface ewes, with 4-inch-diameter Stretchtex nylon orthopedic stockinettes (fig. 1) and placed the lambs in individual 4- by 6-foot pens with their mothers at the University of California Hopland Field Station. Of the lambs, 17 were single-born offspring and 10 were from 10 sets of twins. Forty-eight to 72 hours after the ewes gave birth, we gave own-lamb stockinettes to 21 alien lambs and substituted them for own young. The remaining six lambs retained the stockinettes they had originally received and were fostered as controls.

We recorded successful adoptions for 10 of 11 experimental ewes (91 percent) that had given birth to single lambs and 9 of 10 experimental ewes (90 percent) that had given birth to twins. All of the control ewes rejected alien lambs. Such a procedure might be used in a production setting to substitute orphaned for stillborn lambs (fig. 2).

In a second experiment, 39 ewes with single lambs were given a second lamb (add-on procedure). We fitted own and alien lambs with stockinettes within a few hours of birth. In 31 instances (experimental treatment), we exchanged stockinettes between own and alien lambs at the time of fostering, approximately 20 hours after birth (fig. 3). In the remaining eight cases (control treatment), own and alien lambs kept their own stockinettes. Of the 31 experimental ewes, 21 (68 percent) adopted alien young. Only one of the eight control ewes (12 percent) accepted a second lamb.

A third experiment investigated add-on fostering (same procedure as in second experiment) when own and alien lambs had different facial coloration (white versus black). Only 2 of 10 ewes (20 percent)

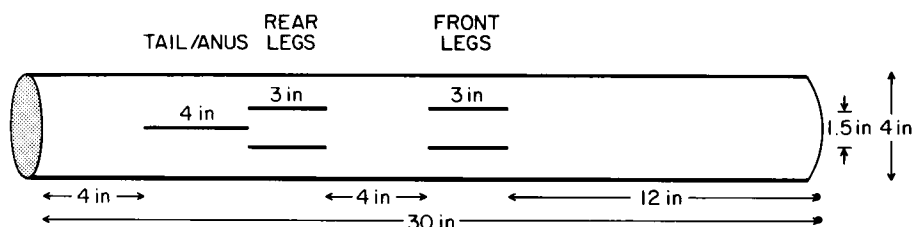


Fig. 1. Sketch of stockinette shows position and length of slits for legs and anogenital area. Openings for umbilical and male genitals are made after stockinette is fitted.

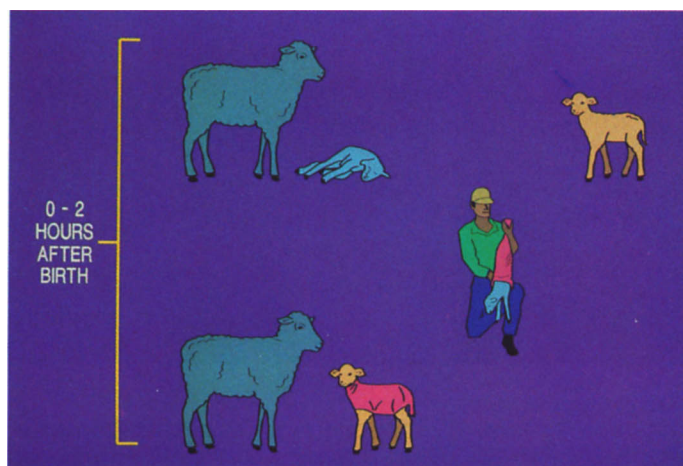


Fig. 2. Use of the stockinette to substitute an orphaned lamb for a stillborn lamb is accomplished by pulling the dead lamb through the stockinette several times. Technique is based on shepherds' trick of putting the pelt of the dead lamb on the "alien" lamb.

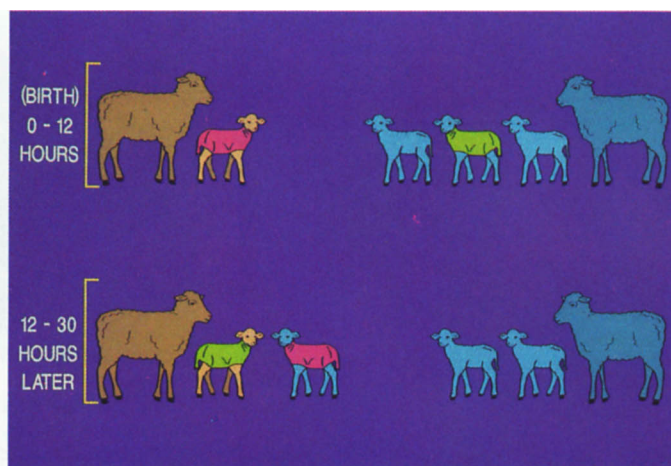


Fig. 3. Odor transfer through use of a cloth stockinette makes possible add-on fosterings. In this process, the stockinette is exchanged between the ewe's own lamb and the alien lamb several times, confusing the ewe as to which lamb is her own.

accepted an alien lamb of different facial coloration than their own lamb, an acceptance rate not that much different from the control group in the previous experiment. These results demonstrate that ewes can use distinguishing visual cues, when available, to discriminate between their own and alien young.

The usefulness of the odor-transfer fostering technique was further tested by several northern California sheep producers. The Sexton Ranch in Willows attempted 41 substitution and 20 add-on fosterings during the 1984 and 1985 lambing seasons. Adoption rates were similar to those we obtained in the Hopland investigations (88 and 70 percent for substitution and add-on fostering, respectively). Weaning weights and average daily gain of natural and fostered lambs did not differ appreciably (table 1). The Patton Ranch near Orland reported that four substitution attempts were all successful.

Seven fostering attempts on another ranch, however, were unsuccessful. In this case, the ewes had lambed outdoors in a wet, muddy field, and their natural lambs either were stillborn or had died from exposure. Dead lambs were exchanged for alien lambs the next day, shortly after the ewes were taken to an unfamiliar barn. Acceptance of the alien lambs was probably impeded by the delay in replacing the dead lambs (up to 24 hours) plus the stress to the ewes of being captured and transported, then housed in unfamiliar surroundings immediately before fostering.

Add-on fostering is more difficult to achieve than substitution fostering, because own-lambs are present as a reference for comparing odors or visual characteristics. In add-on fostering, it is necessary to confuse the ewe as to which lamb is her own.

Adoptions are relatively rapid with the odor transfer technique. In the substitution experiment, 16 of the 19 successful adoptions (84 percent) had occurred within the first 36 hours. Of the 24 ewes that adopted add-on lambs, 20 (83 percent) showed acceptance behavior within 24 hours after fostering.

A number of factors influence fostering success:

- In general, fostering attempts are most successful if they are begun as soon as possible after birth.

- An adoption is declared when the ewe allows the fostered lamb to suckle (that is, she does not avoid the lamb's suckling attempts) and does not show aggression toward it.

- The fostered lamb must remain vigorous. Until adoption occurs, it may be necessary to restrain the ewe a couple of times daily to permit the fostered lamb to suckle.

- First-time mothers more readily accept alien lambs than do experienced ewes.

- Ewes and lambs should be kept in individual pens until acceptance occurs (one to two days), after which they may be

placed in a group pen with other ewes and lambs.

- Stockinettes may be removed from adopted lambs 48 hours after acceptance occurs.

- In add-on fostering, exchanging stockinettes more than once may help to confuse the ewe as to which lamb is her own.

- In replacing stillborn lambs (either single or twin births), the dead lamb should be pulled through a clean stockinette several times, the stockinette placed on the alien lamb, and the fostering begun immediately. The lamb's legs should be tied or taped together for approximately 15 minutes. This prevents the lamb from suckling so that the ewe can become familiar with it first.

Theoretically, the odor-transfer fostering technique should be just as effective for other mammalian livestock species as it is for sheep. In a study conducted at UC Davis, 9 of 10 heifers (90 percent) accepted alien calves within 24 hours when the calves were wearing stockinettes impregnated with own-calf odor. In contrast, only 1 of 12 control heifers (8 percent) accepted aliens in that same period.

In summary, odor transfer by cloth stockinettes is a relatively rapid and inexpensive technique to increase the number of young reared by lactating ewes. It is an excellent example of using the behavioral management of livestock to improve production efficiency and profitability.

TABLE 1. Mean weaning weight, weaning age, and average daily gain of natural and fostered lambs raised at Sexton Ranch, Willows, California, 1984-85

Treatment	Weaning weight	Weaning age	Average daily gain
	lb	days	lb
Substitute lambs* (No. of individuals)	109.9 (8)	147.3 (7)	0.71 (7)
Add-on lambs† (No. of individuals)	93.8 (9)	145.1 (7)	0.58 (7)
Natural lambs‡ (No. of individuals)	96.6 (11)	143.5 (10)	0.60 (9)

* Reared singly.

† Reared as twin (with natural lamb)

‡ Reared as twin (with fostered lamb)

Edward O. Price is Professor, Department of Animal Science, University of California, Davis; Nancy L. Martin is Staff Research Associate, UC Sierra Foothill Range Field Station, Browns Valley; G. Craig Dunn is a student, School of Veterinary Medicine, UC Davis; Martin R. Dally is Staff Research Associate, UC Hopland Field Station, Hopland; Fremont L. (Monte) Bell is Farm Advisor, Glenn and Colusa counties; and Margaret Sublette, formerly employed at the Sexton Ranch, Willows, California, is now with the CMS Sheep Company, Elkton, Oregon.