# "PELIT" Efficacy Trials in Bovine Animals (Permanent Electronic Livestock Identification Tags)



**Robert Kleemeier,** *CEO*
*I.D.Ology*
*Compiled from information reported by*
**L.D. Curkendall**
**Victor Finelli**
**K.E. Lanka,** *Ph.D.*
**T.E. Piper**
**T.A. Schultz,** *Ph.D.*

## Introduction

In the past, electronic identifying transponders (PELITs) have been implanted in a variety of anatomical sites in food producing animals. In the bovidae family, implants in the middle one-third of the ear have been unsuccessful.[1] Sub-scutiform implants at the base of the ear have been more reliable, but would require new slaughter practices, since the muscle behind the ear is routinely used for human food. Sub-scutiform implants of passive transponders (no batteries) are also difficult to read with either a stationary portal or hand-held reader in dairy milking parlors, especially during Dairy Herd Improvement Association (DHIA) testing .

These trials, part of a collaborative effort by a team of researchers from several universities,[2] investigated an alternate site for transponder implants in bovines: the lower leg. Expectations were that a transponder implanted in an animal's leg would not migrate and would be easy to read with either a hand-held or stationary device. These trials focused on two additional issues: the ease of implantation and the survivability of the "leg implants" over time.

An additional study, conducted by a dairyman,[3] evaluated the stress placed on mature dairy cows when a TENS unit, which uses transcutaneous electrical nerve stimulation to lock the animal's skeletal muscles, was used to restrain the cows during injection of the PELIT. For this study, milk production was recorded for five days before the injections and compared to milk production recorded for five days after the injections.

## Method

The research team monitored the injection and scanning of bull and heifer calves used in this study. Calves from one day to six months of age were injected subcutaneously with TX1410 (18mm X 2mm) transponders (one per animal) in the left rear leg between the deep digital flexor tendon and the large metatarsal bone, one to six inches above the dew claw. Subsequent injections of mature dairy cows were performed by a dairyman with the aid of an electronic anesthetizer (TENS unit). In all cases injection sites were scrubbed and needles sanitized between animals, but no records were kept to document which animals were clipped and which were not, so no conclusions can be reached as to the need for this procedural step. The research team and the dairyman both used a Synovex hormone implant gun for injecting the transponders. Each animal was scanned immediately following implantation, and a unique 10-digit alpha-numeric code was recorded in a database containing the animal's visual ID and date of injection. Following the initial implantation, animals were scanned periodically for a total of at least 119 days. At each scanning, transponder numbers were verified against the visual ID previously recorded in the database.

## Trials

Four separate trial sites in the U.S. were used for this lower leg injection study: three dairies and one veal operation. Sites were labeled for the purpose of this trial as "Dairy A," "Dairy B," "Dairy C," and "Dairy D." Dairy C is located in Pennsylvania. Dairies A, B, and D are in California. Dairy B is a veal operation. Animals in the veal operation were scanned up to 119 days. Animals at the three other sites were scanned for a longer time period (more than two years post-implantation on Dairies C and D).

When stress analysis tests were conducted with ten mature cows, milk production was recorded for each milking, 5 days before and 5 days after the transponders were implanted in the animals. Average daily production figures were calculated for both 5-day periods, and are

* *Eau Claire, Wisconsin 54701*

tabulated in Table 2, which also shows the average change in production after each PELIT was implanted.

## Results

Transponder injection trial results are tabulated in Table 1 and shown graphically in Figures 1-9. The first date shown for each dairy is the initial implant date. Subsequent dates represent subsequent scannings. The number of animals represents the total number of animals present at the dairy that should have had working transponders for that scanning date.

**Table 1.** Leg Implant Trial Results

***Dairy A:***

| Date | Elapsed Days | # of Animals | # Working Txps | # of New Failures | % Not Working |
|---|---|---|---|---|---|
| 05/20/92 | New | 68 | 68 | New | 0.00% |
| 07/10/92 | 50 | 123 | 123 | 0 | 0.00% |
| 08/06/92 | 76 | 123 | 122 | 1 | 0.81% |
| 09/25/92 | 126 | 118 | 118 | 4 | 3.39% |
| 12/02/92 | 194 | 117 | 117 | 0 | 0.00% |
| 01/28/93 | 250 | 115 | 115 | 0 | 0.00% |
| 08/15/93 | 449 | 109 | 109 | 0 | 0.00% |
| 03/26/94 | 672 | 95 | 95 | 0 | 0.00% |
| Total | | | | | 4.20% |

***Dairy B:***

| Date | Elapsed Days | # of Animals | # Working Txps | # of New Failures | % Not Working |
|---|---|---|---|---|---|
| 07/16/92 | New | 156 | 156 | New | 0.00% |
| 08/12/92 | 26 | 130 | 129 | 1 | 0.77% |
| 09/24/92 | 68 | 97 | 95 | 2 | 2.06% |
| 11/15/92 | 119 | 62 | 62 | 0 | 0.00% |
| Total | | | | | 2.83% |

***Dairy C:***

| Date | Elapsed Days | # of Animals | # Working Txps | # of New Failures | % Not Working |
|---|---|---|---|---|---|
| 06/03/92 | New | 157 | 157 | New | 0.00% |
| 07/02/92 | 29 | 203 | 199 | 4 | 1.97% |
| 08/03/92 | 60 | 203 | 197 | 2 | 0.99% |
| 09/04/92 | 92 | 202 | 195 | 2 | 0.99% |
| 10/26/92 | 144 | 197 | 194 | 1 | 0.51% |
| 08/03/93 | 425 | 121 | 121 | 0 | 0.00% |
| 06/20/94 | 746 | 146 | 146 | 0 | 0.00% |
| Total | | | | | 4.45% |

***Dairy D:***

| Date | Elapsed Days | # of Animals | # Working Txps | # of New Failures | % Not Working |
|---|---|---|---|---|---|
| 07/07/92 | New | 198 | 198 | New | 0.00% |
| 08/11/92 | 35 | 190 | 187 | 3 | 1.58% |
| 09/24/92 | 79 | 182 | 180 | 2 | 1.10% |
| 01/29/93 | 206 | 148 | 148 | 0 | 0.00% |
| 07/18/94 | 535 | 109 | 109 | 0 | 0.00% |
| Total | | | | | 2.68% |

**Table 2.** "Tens" Unit Implant Trials

AVERAGE MILK WTS. FIVE DAYS BEFORE AND FIVE DAYS AFTER IMPLANTS

| COW # | BEFORE M. WT/DAY | AFTER M. WT./DAY | DIFFER. |
|---|---|---|---|
| 1222 | 54.6 | 53.8 | -0.8 |
| 526 | 61.6 | 58.6 | -3 |
| 286 | 43 | 38 | -5 |
| 292 | 49.8 | 36 | -13.8 |
| 123 | 46 | 52.4 | 6.4 |
| 3000 | 42 | 43.4 | 1.4 |
| 705 | 51 | 50.6 | -0.4 |
| 670 | 38 | 36 | -2 |
| 247 | 31.6 | 36.4 | 4.8 |
| 105 | 31 | 30.8 | -0.2 |
| AVERAGE DIFFERENCE IN MILK PRODUCED OVER 10 DAYS | | | -1.26 |

The number of animals increased at Dairies A and C because additional animals were injected after the initial implantation. Where the number of animals decreased with each scan, death and culling of animals was responsible for the decline. Dairy B (the veal operation) shows a particularly large decrease in animals because *E. Coli* bacteria killed a large number of animals. The number of animals at Dairy C appears to have increased between 08/03/93 and 06/20/94 only because some animals were on pasture on 08/03/93 and were not available for scanning at that time.

The most significant figures are probably the number of new failures at each scanning. Failures ranged between 2.68% and 4.45% of animals implanted (an average of 3.2%), but stopped completely after the first few months. All failures occurred within 145 days, with

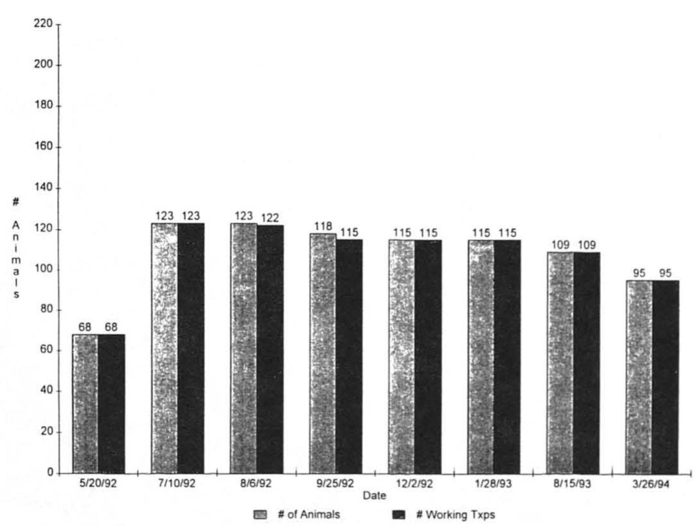



**Figure 1.** Number of Working Implants - Dairy A

**Figure 2.** Number of New Failures - Dairy A

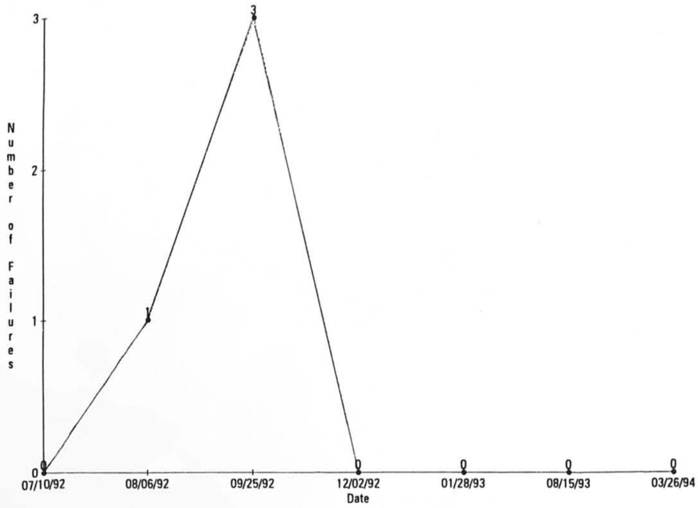



**Figure 5.** Number of Working Implants - Dairy C

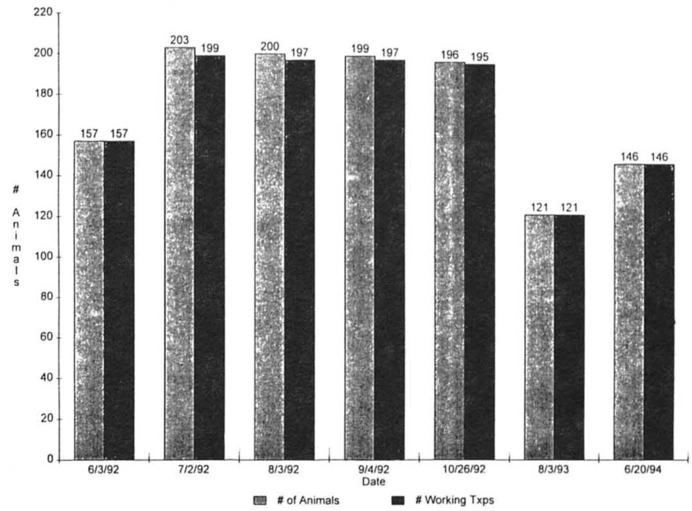



**Figure 3.** Number of Working Implants - Dairy B

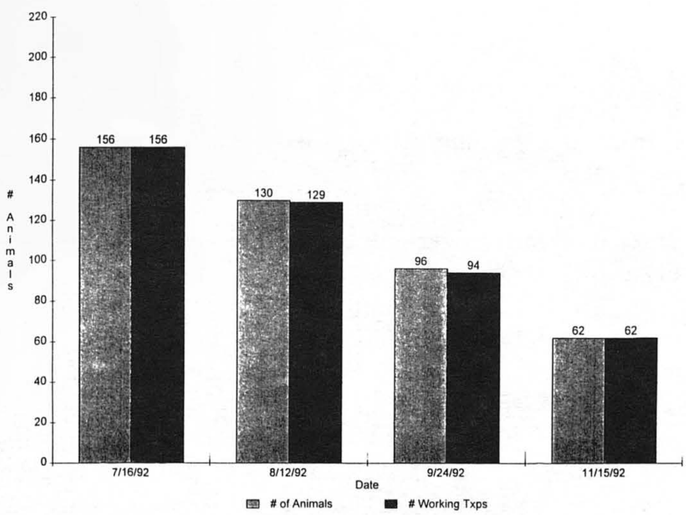



**Figure 6.** Number of New Failures - Dairy C

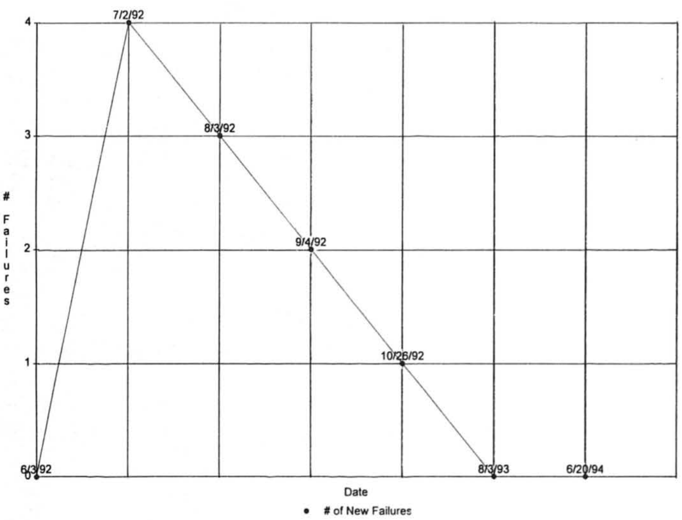



**Figure 4.** Number of New Failures - Dairy B

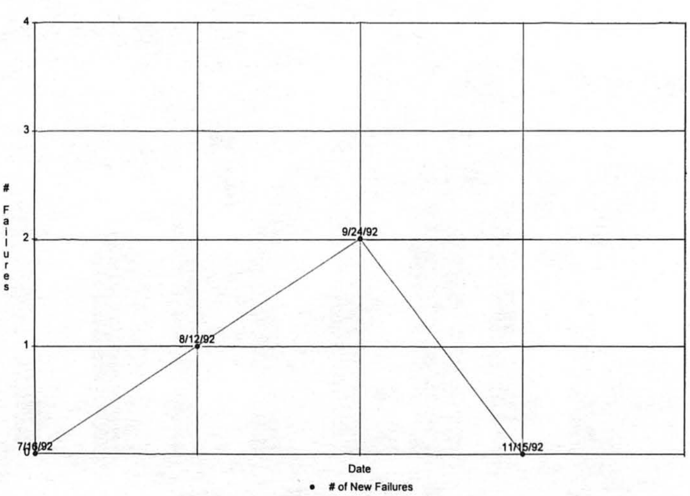
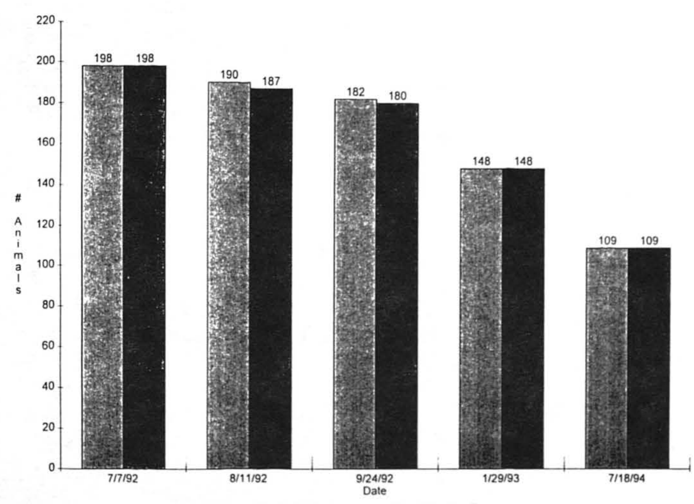



**Figure 7.** Number of Working Implants - Dairy D



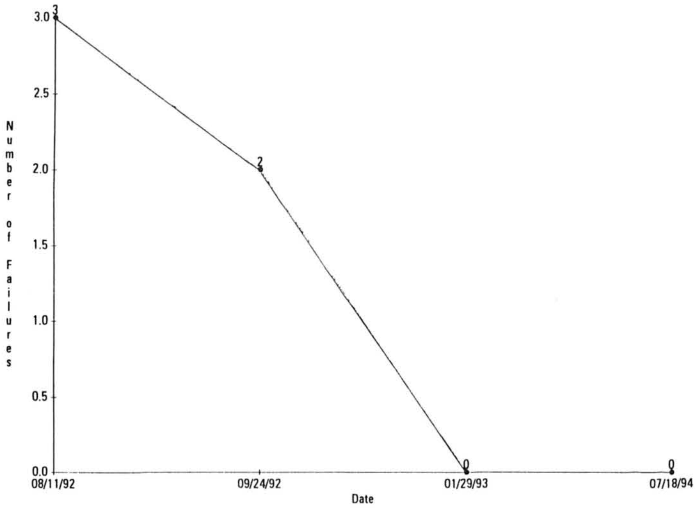



**Figure 8.** Number of New Failures - Dairy D

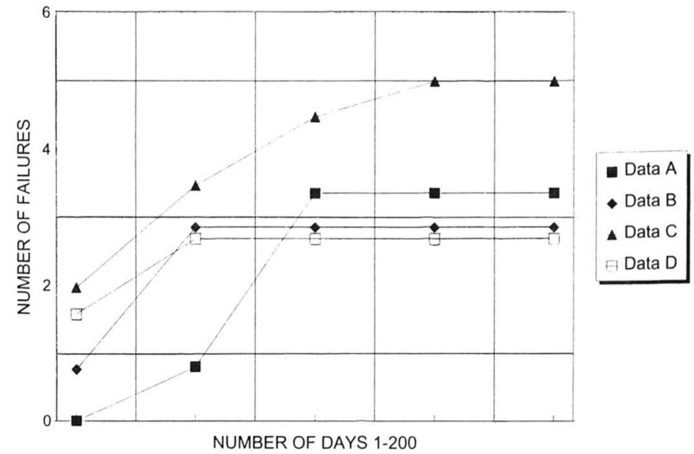



**Figure 9.** Pelit Failure Rate

no subsequent failures experienced in ongoing evaluations. It is therefore presumed that failures were largely due to injection procedures.

The graphs in Figures 1,3,5, and 7 show the animals found at each dairy that should have had working transponders for the date shown. Wherever "Number of Animals" is the same as "Number of Working Transponders," it means there were no failures observed on that date. When "Number of Animals" is lower than "Number of Working Transponders" for any date, the difference represents new failures.

Graphs in Figures 2,4,6,8, and 9 show the number of new failures for each date the animals were scanned. Within the first three months the researchers observed a sharp reduction in new failures at all trial sites. Failures then dropped to zero, with no further attrition or new failures for the duration of the 2-year trial.

Results from stress analysis tests conducted on the mature cows that were injected with the PELIT while using the TENS unit to restrain them are found on Table 2. A slight decrease in milk production was noted over the 10 day trial, but this reduction was less than what would be expected from the trend of the normal lactation curve. The cows did not evidence any trauma or stress during the procedure.

## Conclusions

Implanting PELITs in calves just above the dew claw is an easy procedure — the calves are easy to restrain without equipment, and their skin is loose and thin enough to inject with minimal effort. The procedure is quick, easy to learn, and easier for beginners to master than either type of ear implant. Injection above the dew claw is much less technically difficult than the sub-scutiform injections — nothing to find, just an under-the-skin injection.

Older animals require more elaborate restraining methods or the use of the electronic TENS unit while the cows are in head locks. The thicker, tighter hide on the legs of the mature cows makes injection only slightly more difficult than it is in calves, especially when the TENS unit is used to restrain the animal. For a lifetime identification system, a greater benefit is derived from implanting animals at birth, and using the PELIT as the exclusive identifier. Ear implants, especially sub-scutiform, are difficult to perform on young animals due to the small area of cartilage and thin skin of the ear.

Of the 683 total animals implanted, only one animal showed any sign of an abscess or infection, and that abscess disappeared on its own. The animals at Dairies A, C, and D were housed in a variety of conditions over the 2-year trial — from calf hutches, corrals, and free stall barns, to dirt lots, pastures, and concrete alleyways and stalls. Most of the animals had freshened and were part of the milking herd on the last scan date. They were packed tightly into holding pens two or three times every day, and still no additional transponders failed.

When the TENS unit was used to restrain mature cows for the stress analysis test, no adverse effects or stress were noted during the injection procedure. Milk production was compared before and after the injection, and no more than the normal lactation curve reduction was noted, so it seems safe to conclude that the cows were not being subjected to any detectable stress.

In summary, there are several significant results that point to the efficacy of electronic identification with PELITs in commercial dairy herds.

A. Implanting the transponder in a rear leg, above the dew claw, whether in calves or mature cows, is easy and fast. Larger animals require the use of restraints, such as the TENS unit, to immobilize them during the injection.

B. When cows are electronically immobilized with a TENS unit during the PELIT injection process, no subsequent reduction in milk results; the cows do not appear to experience stress related to either the injection or the restraint.

C. Over the 2-year period of the longevity study, all of the transponder failures occurred within 145 days of injection, which indicates a possible link with the injection technique, rather than with the cow or its environment.

D. All of the transponders that continued to function were later found in their original injection locations. As the researchers had anticipated, a transponder injected above the dew claw in the rear leg of a bovine animal does not migrate.

### References


1. "Electronic ID Implants in Bovine Ears, Anitech International, 1991.
2. K.E. Lanka, Ph.D., University of California, Davis; T.E. Piper, Pennsylvania State University; T.A. Schultz, Ph.D., University of California, Davis; L.D. Curkendall 3. Victor Finelli Dairy, Hilmar, California.




# Abstract

## Repeated oestrus synchrony and fixed-time artificial insemination in beef cows

**C.D. Penny, B.G. Lowman, N.A. Scott, P.R. Scott**
*Veterinary Record* (1997) **140**, 496-498

The feasibility of breeding spring-calving, single-suckled beef cows without the use of natural service was investigated over two breeding seasons by using repeated oestrus synchrony and fixed-time artificial insemination (AI). Initially, cows were oestrus-synchronised with subcutaneous norgestomet implants inserted for 10 days, with an injection of prostaglandin before the implants were removed. The cows were inseminated once 56 hours after the implants were removed, and 12 days later they were re-treated with norgestomet implants to allow a second synchronised service. Twenty-one days after the first synchronised AI, milk samples were taken for progesterone assay and the norgestomet implants were removed. The cows received a second service 56 hours later if the 21-day milk progesterone assay suggested that they were not pregnant. All the cows receiving a second service were retreated with norgestomet implants to allow a third synchronised service as necessary. Pregnancy was later confirmed by rectal palpation. In the first year, 48 cows entered the programme and the pregnancy rates to the first, second and third synchronised services were 56, 69 and 40 per cent, respectively, with 17 per cent of cows barren at the end of the breeding period. In the second year, 69 cows entered the programme and the pregnancy rates were 58, 48 and 33 per cent to the successive services with 20 per cent of cows barren at the end of the breeding period. The accuracy of milk progesterone assay for pregnancy diagnosis was 84 per cent and 87 per cent in the first and second years, respectively.