TABLE 1. PREWEANING AND POSTWEANING GAIN COMPARISONS FOR STEER CALVES IMPLANTED WITH 12 MG DIETHYLSTILBESTROL

	Control	Implant
No. steers	17	17
Initial age (days)	114	113
Initial wt (lbs)	328	330
Weaning age (days)	262	261
Weaning wt (lbs)	620	645
Nursing ADG (lbs)	2.11	2.22
Slaughter age (days)	486	485
Slaughter wt (lbs)	1010	1071
Feedlot ADG (lbs)	2.33	2.51
Carcass wt (lbs)	649	691***
Carcass WDA (lbs)	1.34	1.43*

* <.05
*** P<.001

TABLE 2. CARCASS TRAITS

	Control	Implant
No. prime, choice, good	1, 14, 2	1, 15, 1
Marbing score†	12.5	13.0
USDA cutability grade	3.8	3.9
Fat over ribeye (inches)	.73	.79
Adj. fat over ribeye (inches)‡	.67	.69
Ribeye area (inches)	12.0	12.3
Adj. ribeye area (inches)	11.6	11.7
Kidney, heart & pelvic fat %	3.9	4.0
Lbs USDA retail cuts/days of age	.65	0.68**

** P < .01
† Modest 12, Moderate 15
‡ Adjusted to 600 lb carcass

(P<.01) more pounds of retail cuts per day of age (USDA cutability equation).

These three-way-cross calves carried more fat than is desirable, which resulted in the poor cutability grades of 3.8 and 3.9. The carcass weight and grades indicate a longer feeding period than usual for the area. Even so, the carcass weights and pounds of cuts per-day-of-age were excellent.

When the fat thickness and ribeye area measures were adjusted to a 600-lb carcass, they were very close: 0.67 in fat and 11.6 sq in ribeye, respectively, for the controls compared with .69 in and 11.7 sq in for the implanted calves. This indicates the effect of treatment for these measures could be explained in part on the basis of increased rate of gain.

This experiment conducted under Glenn County conditions supported research in other areas and served as a demonstration to local cattlemen in the use and economic benefit of implanting suckling steer calves with 12 mg DES.

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Experimental animals were provided by Glen Eidman and Ken Sexton, Nye Ranch, Willows, California, and assistance in collection of data was obtained from the Nevada Nile Ranch, Inc., Feedlot, Lovelock, Nevada, and Minch's Wholesale Meats, Inc., Red Bluff, California.

PREPLANT FUMIG
for sugar beet
ON CABBAGE

Photo 1. Cabbage plants growing in soil fumigated with 30 gpa of 1,3-dichloropropene two weeks previous to the first harvest.

Photo 2. Cabbage plants growing in nonfumigated soil two weeks previous to the first harvest.

ATION *nematode*

Preplant fumigation with 1,3-dichloropropene and related chlorinated C_3 hydrocarbons and Agel TG-67 significantly increased cabbage yields over the untreated check where the nematode Heterodera schachtii was present in high numbers. Some weed control was also obtained with the Agel formulation. The high nematode populations present in the soils in the fumigated plots at the end of the growing season showed the need for rotation or annual fumigation if a susceptible crop is to be grown on infested land.

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THE SUGAR BEET NEMATODE, *Heterodera schachtii* Schmidt, 1871 has a host range which includes a number of vegetables in the families Cruciferae and Chenopodiaceae. Little information is available about how much cabbage yields in the United States have been reduced by this pest. Soil samplings from a field in San Diego County, after the third consecutive cabbage crop had been harvested, showed it was heavily infested with *H. schachtii*. A large-scale trial was initiated in the field to evaluate the benefits of two pre-plant fumigants on control of *H. schachtii* on cabbage yields: 1,3-dichloropropene and related chlorinated C_3 hydrocarbons (DD mixture, Telone, or Vidden D) at 20 and 30 gpa; and 240 lbs per acre of Great Lakes Chemical Company's Agel TG-67 (methyl bromide 67%, chloropicrin 31.75%, gel 1.25%) without tarp; and the nonfumigated checks. Plots were 21 by 450 ft, replicated three times. All materials were applied September 26. Shanks were spaced 12 inches apart; injection depth was 10 to 12 inches and soil temperature at this depth was 67° F. The sand content of the soil was 77 per cent, silt 15, and clay 8. Moisture content was near field capacity.

Immediately after the materials were applied, the soil was thoroughly cultipacked in two directions to compact the soil surface and retard loss of fumigant from the soil surface. Two weeks after fumigation, the beds were listed on 38-inch centers, 16 inches wide on the top. Two rows of cabbage (variety Medium Cannonball) were direct-seeded on 12-inch centers on the top of each bed in early December, and plants were thinned three weeks after emergence. Water was supplied by furrow irrigation.

Plots were sampled three times, after treatment for nematodes and plant growth. All plots were harvested four times and all harvesting was done by the grower's personnel without special directions about which heads should be harvested. This procedure was used to assure uniformity of harvest procedures within the experimental plots. At each harvest date, all of the marketable heads in each plot were cut, and the heads were counted, packed, and cartons weighed. Heads remaining after the final harvest were counted. Nut grass (*Cyperus rotundus* L.) was present in the field and the degree of control of this weed was noted.

The results of the nematode samplings, the plant weights, and the root weights are shown in table 1. Plants growing in all the plots with fumigated soil were larger and greener shortly after the plants emerged. Within a month after emergence, the plants in the 1,3-D-fumigated soil were approximately twice the size of those in the nonfumigated soil. Those in the Agel plots were larger than the checks and a greater stand of plants was evident in this treatment than in any of the other treatments. Partial nutgrass control was obtained for the first month after fumigation with the gel formulation but greater control would probably have been obtained if a plastic tarp had been used at the time of fumigation with the Agel.

At the second sampling date, two months after emergence, the number of white females per root system was the greatest on the roots from fumigated plots; however, the root systems from the fumigated plots were approximately twice the size of those in the check plots. Therefore the numbers of white females per gram of root system was considerably lower than that in the checks. The plant root systems at this time were relatively shallow (3 to 4 inches) and it is probably in this area of the soil profile where the least control was initially obtained from the preplant fumigants.

Photo 3. (A) Check. (B) 20 gpa 1,3-dichloropropene the day of first harvest.

TABLE 1. NEMATODE AND PLANT SAMPLING DATA FROM THE PREPLANT SOIL FUMIGATION TRIAL FOR THE CONTROL OF H. SCHACHTII ON CABBAGE

	1st sampling (1 mo. old)	2nd sampling (2 mo. old)		3rd sampling (at maturity)	
	Average plant wt gms	Adult (white) ♀s per gm of root*	Average larvae/ 50 ml of soil	Average larvae recovered from 20 gm of roots†	Average wt of root system gms
20 gpa 1,3-D	3.2	31	366	54,072	33.8
30 gpa 1,3-D	3.7	32	615	18,792	37.2
240 lbs/acre Agel TG67	2.4	41	642	9,180	30.0
Check	1.7	50	1356	186,776	26.0

* Root weights from all fumigation treatments were approximately twice those in the check plot (photo 4).

† Four root systems per plot were randomly selected, washed gently, chopped and a 20 gm sample was selected from each of the 3 replications. Numbers are the average of the 3 replications.

TABLE 2. NUMBER OF HEADS AND WEIGHTS OF CABBAGE FROM FUMIGATED AND NONFUMIGATED PLOTS

Treatment	Harvest dates	No. of heads	Total wt of heads	Average wt of heads	Heads not harvested
			gms	lbs*	%
(1)	3/4	445	905		
20 gpa 1,3-D	3/18	2,763	5,656		11
	4/1	2,790	5,279		
	4/8	836	1,465		
Total		6,834	13,305	1.9	
(2)	3/4	640	1,233		
30 gpa 1,3-D	3/18	3,269	6,733		8
	4/1	2,957	5,566		
	4/8	618	1,044		
Total		7,484	15,576		
(3)	3/4	73	132		
240 lbs Agel— 2:1 mix	3/18	1,092	2.124		
Methyl bromide-chloropicrin	4/1	2,497	4,660		23
	4/8	1,041	1,828		
Total		4,703	8,744	1.9	
(4)	3/4	0	0		
Check	3/18	22	42		71
	4/1	0	0		
	4/8	640	1,262		
Total		662	1,304	1.9	

* The number of heads of cabbage were packed by size into various numbers per carton; however, the average number per carton was used to calculate the average weight per head.

Larvae in the soil around the root systems after the final harvest were at least twice as plentiful in the checks as in any of the fumigated pots (table 1). White females and cysts per 20 gm of roots ranged from a high of 186,776 in the checks to a low of 9,180 in the gel treatment. The 1,3-dichloropropene treatments contained more white females and cysts per gm of root than did the gel treatment; however their root systems were larger than those from the gel treatments, indicating possible early phytoxicity from the higher dosage of the fumigation treatments. Root weights taken after final harvest were 13 to 30 per cent higher in the fumigation treatments.

The harvest data from the experimental treatments are presented in table 2. The earliest harvests and the greatest total harvests occurred with the 30 gpa rate of 1,3-D which yielded the most heads and left the fewest undeveloped heads remaining in the field after the final harvest. Photos 1 and 2 illustrate the state of plant development in the 30 gpa 1,3-D treatments and the checks prior to the first harvest. Photo 3 illustrates the same treatments in the field before any heads were harvested.

The Agel treatment did not yield as many heads as did the 1,3-D treatments and the heads reached maturity later. A large percentage of the heads remaining in the field in the Agel plots could have been harvested and marketed had the plots been harvested a fifth time, whereas those remaining in the 1,3-D treatments and checks were for the greater part culls.

Results from this large-scale trial have demonstrated that control of the sugar beet nematode by soil fumigation increased yields by as much as 11 times and brought about an earlier and more uniform harvest. Head sizes were the same for all treatments since they were selected for optimum size for market at all harvest dates. Refumigating before each planting, is necessary because of the nematode buildup at the end of the growing season, even where the best yield responses were obtained.

The 1,3-dichloropropenes and related chlorinated hydrocarbons (DD mixture, Telone, or Vidden D) are currently cleared for preplant fumigation for control of cyst nematode on cabbage and are recommended for this purpose by the University of California. The experimental Agel-TG67 is not registered and cannot be recommended for usage at this time.

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Photo 4. Top row—plants from the nonfumigated check sampled two months after planting; Bottom row—plants sampled on the same date growing in the 30 gpa 1,3-D plots.