CHICO—A round nut of excellent color and quality at Davis. It sheds pollen late, after the peak of its pistillate flower receptivity. It is therefore suitable as a pollinizer for moderately early leafing varieties which shed their pollen early, such as Ashley, Marchetti, Lompoc, Serr, Gustine, and Vina. Size of nuts will be too small if pruning is neglected because trees will overbear, but satisfactory sizes have been maintained on good soils by consistent pruning. This selection is introduced primarily as a pollinizer but it may also be suitable as a main producing variety in some districts. It is named after Chico, the Sacramento Valley city near which it has produced well.

VINA—A pointed nut somewhat similar in shape to Hartley but with a less flattened base. This selection has consistently produced large crops of high-quality nuts at Davis and in other parts of the Sacramento and San Joaquin valleys. It is tolerant of high summer temperatures and seems to have some blight resistance, although this characteristic has not been fully verified. It needs consistent pruning to prevent overbearing and consequent reduction of quality. Several young orchards in the Vina-Red Bluff area have performed well, hence the proposed name, Vina.

MIDLAND—A Payne-type nut. This selection is a sister of Vina, but is a more vigorous grower and a little slower in coming into full bearing than Vina. It therefore does not require pruning as heavily as Vina, while a young tree. It has produced good crops of high quality at Davis but does not seem tolerant of very high temperatures and therefore is probably not suitable for the hottest parts of the interior valleys. It matures after the early varieties and therefore can be used for extending the harvest season. Its apparent adaptability to the middle section of the central valley including the Davis, Sacramento, and Stockton districts, suggested the name.

AMIGO—A round-type nut with high kernel quality but a poor seal in some years at Davis. A sister of Chico, it also sheds pollen late in relation to the peak receptivity period of its pistillate flowers and is therefore valuable as a pollinizer for other varieties. Being moderately late in leafing, it is suitable for pollination of varieties such as Hartley, Midland, Pioneer, Tehama, and Pedro. It is a good producer, with many clusters of four nuts. Although the variety can be faulted because the seal is too poor for in-shell sale in some years when grown in the valley districts, its introduction is warranted because of the need for a late-shedding pollinizer. It is probably the most suitable and profitable variety now available to meet that need. The name was chosen because of its meaning, "friend," and because it was decided to give Spanish names to those varieties especially valuable as pollinizers.

PIONEER—Another sister of Vina, producing Payne-shape nuts. This one has borne heavy crops at Davis when eight to ten years old but is not as fruitful as Vina in the early bearing stage and so does not require such heavy pruning for crop control. So far it has never been badly injured by blight. Since the kernel percentage is not high but the shell and seal are satisfactory, this walnut is probably more suitable for sale in-shell than for cracking. The fairly late leafing makes it suitable for the upper Sacramento Valley and similar situations. A pollinizer is needed. The name was suggested because the selection seems able to produce with somewhat less cultural care, especially pruning, than more highly fruitful varieties.

TEHAMA—A Payne-type nut maturing in mid-harvest season. This selection is suitable for the upper end of the Sacramento Valley and other districts with similar frost and blight hazards. It is highly fruitful and suitable for both in-shell sale and for cracking. Consistent pruning is needed to prevent overbearing in young trees. Although highly fruitful, a pollinizer is desirable to help set adequately heavy crops, especially on young trees. The name was suggested because of apparent suitability of this selection for the walnut districts of Tehama County.

PEDRO—A large, fairly heavy-shelled nut maturing usually a little after the mid-harvest season. It is moderately late in leafing, but consistently produces many catkins and sheds pollen over a long period. It can be used as a pollinizer for most early varieties such as Ashley, Lompoc, Marchetti, Serr, Gustine, and Vina. Also it can be used as a main producing variety where late leafing and moderately late maturity are desired. Very high summer temperatures have injured shell and kernel quality some years in the hotter districts. The name, Pedro, is in keeping with the plan to use Spanish names for varieties which are good pollinizers.

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Responses

Synovex-H has consistently stimulated daily gain and improved feed efficiency of feedlot heifers. However, this hormone does not inhibit the estrus cycle in heifers (which is responsible for excessive animal activity restricting feedlot performance during periods of hot weather). Melengestrol acetate (MGA), a new, synthetic high-potency hormone compound had previously been reported to increase feeding performance when added to the daily ration—and in the two tests reported here, also effectively controlled estrus. Both MGA and Synovex-H significantly increased daily gain and improved feed efficiency over the control animals. The MGA-fed heifers shrank less in transit than either the Synovex-H or control groups, although dressing percentage was about the same for all groups. Tenderness and fat content of rib and bottom round steak were not affected. The size of the rib eye from the MGA-fed heifers was slightly smaller than from the control or Synovex-H groups.

TABLE 1. BASIC RATIONS AND NET ENERGY VALUES
Ration Percentages Test 1 and 2*

Ingredients	A	B	C	D
	%	%	%	%
Alfalfa hay cottonseed hulls	10	17	28	40
Barley	50	46	39	28
Milo	26	23	19	18
Supplement, 60%	5	5	5	5
Molasses	6	6	6	6
Fat	3	3	3	3
Total	100	100	100	100
Net energy for maintenance†	78.72	76.55	70.61	69.53
Net energy for production‡	45.38	43.56	39.24	37.83

* Test 1 fed rations A, B, and C; test 2 fed rations A, B, C, and D.
† NEm—Megacalories of net energy for maintenance per 100 lbs. of feed.
‡ NEp—Megacalories of net energy for production per 100 lbs. of feed.

TABLE 2. AVERAGE ENERGY VALUES OF FEED CONSUMED

Treatments	Test 1		Test 2	
	NEm*	NEp†	NEm*	NEp†
Control	76.03	43.77	76.39	43.13
Synovex-H	76.25	43.42	76.27	42.46
MGA—lot 1	76.44	44.15	76.28	43.02
MGA—lot 1A	74.21	41.92		

* NEm—Megacalories of net energy for maintenance per 100 lbs of feed.
† NEp—Megacalories of net energy for production per 100 lbs of feed.

of feedlot heifers to

MGA FEEDING AND SYNOVEX-H IMPLANTING

C. A. PERRY · D. ADDIS · H. STRONG · R. G. LOY
A. W. BRANT · T. M. LITTLE

TWO FEEDING TESTS were conducted in the Palo Verde Valley, Riverside County, to compare the performance of a group of heifers fed MGA (at 0.4 mg per head per day), and heifers implanted with Synovex-H, with the performance of a nontreated control group of animals. In the first trial (started in January 1966) the heifers were fed in groups, by treatment, and results are reported as group averages for each treatment. In the second test (started in April 1966), animals were randomly sorted into groups and individually identified with a colored and numbered plastic ear tag in each ear. The rate of gain, area of rib eye, thickness of back fat, and final-quality carcass grade were determined for each animal.

Meat quality was further evaluated from rib and bottom round steaks taken from choice grade carcasses of each treatment by the Food Technology Laboratory, University of California, Davis. The Lee Kramer shear test was used to determine tenderness between meat samples after cooking. The fat and moisture contents of the meat were also determined. Moisture loss from thawing and cooking was measured.

Cattle selection

The heifers selected for the test were No. 1 Okie Hereford crossbreds, grading "good," and weighing between 350 and 500 lbs. One shipment of calves originated in Oklahoma and arrived in Blythe, California, during September and October 1965. A second shipment was received during October and November 1965 from Louisiana and Texas. The cattle arrived in good condition showing no signs of undue stress. They had shrunk between 8.4% and 9.3% in transit.

Upon arrival they were vaccinated for infectious bovine rhinotracheitis (IBR), bovine virus diarrhea (BVD), blackleg and malignant edema, and treated with thiabendazole for internal parasites. The heifers were sprayed with Co-Ral for grub and external parasite control. Vitamin A was given at the rate of 600,000 IU per head, intermuscularly. An intermuscular injection of stilbestrol was administered to the first shipment of heifers to induce abortion of pregnant animals.

A basic 28% concentrate plus 72% roughage feed made up the growing ration. Gains during the 105-day growing period averaged between 1.4 and 1.5 lbs per head per day.

Feeding procedures

The same basic ration was fed to all test groups. Eight pounds of MGA Premix-100 were added per ton of the protein, mineral, and vitamin supplement mixture before pelleting. The MGA supplement was fed at the rate of 1 lb per head per day to supply 0.4 mg of MGA by incorporating it into the basic ration. The same supplement without MGA was fed at the same rate to the Synovex-H and control-group heifers.

A feeding program was followed to finish off the heifers at about 850 lbs. Heifers weighing up to 550 lbs were started on a 60% concentrate plus 40% roughage ration, and 600-lb heifers were on a 70% concentrate plus 30% roughage ration. The concentrate level was increased to 90% for the last 60 to 75 days of feeding. Table 1 lists the basic ration and the net energy values for maintenance and production. Table 2 shows the average net energy values of the total amount of feed consumed by each group.

Shrink

Heifers were sorted and shipped to Los Angeles for slaughter as they reached market weight and finish. In-transit shrink was calculated for each load. Cattle from test 1 were marketed in May and June 1966. They were loaded at about 6:00 a.m. and arrived at the Alpha Beta Packing Plant, Huntington Beach, at about noon. Temperatures ranged from 70°F at night to 95°F during the day. Travel time was one hour longer for cattle in the second trial, and the temperature during the July–September marketing period ranged from 80°F at night to 107°F during the day.

In-transit shrink averaged 3.58% for all heifers in test 1 and 4.98% in test 2. The customary marketing conditions for live cattle out of Palo Verde Valley included early-morning weighing with a 5% shrink (at that time). There were noted differences in shrink between groups. The control cattle shrank 4.42% compared with 4.2% for the Synovex-H and 3.88% for MGA-fed heifers.

The rate of gain for each heifer in test 2 was calculated from the individual live weight at the start of the trial and the hot carcass weight at slaughter. Final empty body weight was calculated by using the formula: hot carcass weight × 1.47 + 70.

Results

Incorporating the high-potency synthetic hormone, MGA Premix-100, into a pelleted supplement proved to be a satisfactory method of feeding 0.40 mg of MGA per head per day.

In both trials the control and Synovex-H groups showed signs of estrus throughout the feeding period whereas the daily intake of 0.40 mg of MGA successfully suppressed estrus in the MGA groups.

Feed conversion, rates of gain, and carcass data for both tests are summarized in table 3. The control animals in both tests made the slowest gains and poorest feed conversion. Heifers treated with Synovex-H gained the fastest in both tests, but not significantly more than the MGA-fed heifers. Both Synovex-H and MGA stimulated a significant increase in gain over the controls (17% and 14%, respectively). Feed conversion was improved by 9.9% and 9.6% in the faster gaining heifers. There was no difference in the percentage of carcass yield. However, the control and MGA cattle graded significantly higher than the Synovex-H

cattle. All cattle improved over the feeder grade of average-good to medium- and low-choice. A few carcasses were graded prime in the control and MGA groups.

The area of the rib eye at the 12th rib of the MGA-fed heifers consistently measured less than the control or Synovex-H heifers and the difference was significant. Back fat thickness varied less with no real difference.

Carcass quality was further analyzed for tenderness, shrink due to thawing and cooking, and for moisture and fat content between samples after cooking. Except for the total moisture, there was a wide variation in measurements within each treatment. An analysis of variance showed no significant difference (at the 5% level) between treatments, with respect to fat content and tenderness. Shear pressures (in lbs-per-square-inch required to cut the meat) were within range for tender meat.

Rib steaks were significantly more tender than the bottom round as determined by the Lee Kramer shear test. Shrink due to cooking and thawing was generally greater in round steak. However, it was found that the control group showed the same amount of cooking shrink in both the ribs and rounds (table 4).

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Assistance in conducting these tests was obtained from: Upjohn Company, Kalamazoo, Michigan; Cattle Feeders of Palo Verde Valley and Alpha Beta Packing Co. of Huntington Beach; and from Dr. George Crenshaw, Extension Animal Health Specialist, and Cheryl Waul, Department of Food Science and Technology, University of California, Davis.

TABLE 3. RATE OF GAIN, FEED CONVERSION AND CARCASS GRADE

	Test 1 January to May, June				Test 2* April to July, September		
	Control	Synovex-H	MGA 1	MGA 1A	Control	Synovex-H	MGA
Number heifers	21.00	21.00	42.00	93.00	46.00	89.00	88.00
Avg. initial wt. lb	667.60	675.20	671.60	568.90	528.20	531.00	534.40
Avg. days on feed	96.00	95.00	88.00	127.00	138.00	124.00	127.00
Avg. sale wt lb	871.90	914.70	874.90	884.70	807.90	826.60	830.80
Avg. daily gain lb	2.13	2.52	2.29	2.49	2.03[a]	2.38[b]	2.33[b]
Feed per 100-lb gain lb	963.90	792.60	857.90	775.80	929.20	836.80	839.20
Daily feed consumption— % of avg. body wt.	2.66	2.51	2.54	2.65	2.82	2.93	2.86
Percent feed efficiency	83.50	106.70	94.90	94.80	77.30	86.10	86.20
In-transit shrink %	3.71	3.68	3.35	4.24	5.14	5.73	4.06
Dressing percentage †	63.36	63.44	63.10	61.85	63.57	64.04	64.33
Percent choice grade	65.00	65.00	80.00	75.00	59.50	48.80	64.10
Avg. grade index ‡	5.15	5.05	5.33	5.14	5.14[c]	4.41[d]	5.05[c]
Rib eye area, sq inch	11.23	11.89	11.36	10.58	11.63[e]	11.33[e]	10.84[f]
Fat thickness, inches	0.36	0.47	0.40	0.49	0.43	0.46	0.49

* Highly significant (P> .01)—Differences are significant if comparable means do not have a common superscript.
† Dressing percentage determined as percent hot carcass weight of sale weight.
‡ Grade Index: Prime 10, 9, 8; Choice 7, 6, 5; Good 4, 3, 2.

TABLE 4. CARCASS QUALITY—LABORATORY DATA OF RIB AND ROUND STEAKS*

	Rib Steak			Bottom Round Steak		
	Control	Synovex-H	MGA	Control	Synovex-H	MGA
Loss during thaw, %	2.3[a]	1.5[b]	1.7[b]	3.2	3.2	4.4
Cooking shrink, %	15.0	14.1	15.1	15.4[c]	21.8[d]	21.7[d]
Moisture content of meat after cooking, %	57.0	59.7	60.6	59.1	58.2	59.5
Fat content, %	12.2	11.0	9.3	9.0	8.9	7.7
Tenderness lbs/sq in pressure	14.2	15.4	13.6	16.9	21.1	18.9
Avg. weight of carcass, lb	512.0	521.0	532.0			
Avg. grade index	5.9	5.6	5.6			

* All values are averages of recorded data.

Significant differences at 5% level: [a], [b], [c], [d]—differences are significant if comparable means do not have a common superscript:

1) Thaw Loss—
   Ribs: MGA and Synovex-H significantly lower than control
   Rounds: No significant differences
2) Cooking Shrink—
   Ribs: No significant differences
   Rounds: MGA and Synovex-H significantly higher than control
3) Moisture Content of Meat after Cooking—
   Ribs: MGA significantly higher than Synovex-H or control
   Rounds: No significant differences
4) Fat Content—no significant differences
5) Ribs were significantly more tender than rounds, but there were no significant differences within these two groups.

Effects of *on*

Ground water recharge through water spreading was studied in the channel of the Santa Ana River, Orange County, where riverbed gravels are apparently an outcrop of the Talbert formation. In sections of the channel where water was ponded, the intake values were reduced to approximately 2% of the intake in a section of the channel where the water was flowing, and which had no surface sediments. The average intake rate of the entire spreading area was about 1.2 acre-feet per day. The intake of the pond was 0.088 acre-feet per day per acre, and the intake of the channel with flowing water was 5.9 acre-feet per day.

THE USE OF UNDERGROUND STORAGE for water has become an operation of major importance in recent years. The problems depend upon the characteristics of the aquifer in which the water is stored, the water source, and the area where the water is spread to recharge the aquifer.

Little can be done to modify the storage aquifer, but information about its properties can be helpful for full utilization. The source of water for such operations is usually fixed and the spreading operation must allow maximum storage at the lowest cost. The usual method of water spreading has been to impound the water in relatively shallow ponds in the recharge area. Deep pits or wells are sometimes used.

This report presents information on infiltration rates of shallow spreading ponds in areas with, and without, surface sediments to show how much the surface sediments affect the spreading efficiency of such ponds.

The data were obtained in cooperation with Orange County Water District from their water spreading operation in the Santa Ana River. The recharge area is the river channel starting at the mouth of the Santa Ana Canyon and extending downstream six miles. The river channel is 500 to 1000 ft wide and has a slope of 17 ft per mile. The riverbed consists of fluviated outwash with a high water conducting capacity. This material is a sub-