## Table 15

**The value of diethylstilbestrol implants and aureomycin for steer calves on a wintering, grazing, and fattening program.**

| Lot number | 19 | 21 | 20 | 22 |
|---|---|---|---|---|
| Treatment | Control—Stilbestrol implant Aug. 10, 1960 | Stilbestrol implant May 10, 1960 | Stilbestrol implant Dec. 1, 1959[1] | Stilbestrol implant Dec. 1, 1959[1] and Aureomycin |
| **Wintering, December 1, 1959, to May 10, 1960—162 days.** | | | | |
| Number steers | 10 | 10 | 12 | 12 |
| Initial wt. per steer | 520 | 520 | 524 | 523 |
| Daily gain per steer, lbs. | 1.44 | 1.38 | 1.53 | 1.78 |
| Standard error of mean | 0.06 | 0.07 | 0.06 | 0.07 |
| Daily ration per steer, lbs.: | | | | |
| Sorghum grain | 4.97 | 4.97 | 4.97 | 4.97 |
| Soybean meal | .99 | .99 | .99 | .99 |
| Sorghum silage | 29.83 | 29.83 | 31.17 | 33.31 |
| Salt | .08 | .08 | .14 | .12 |
| Bonemeal | .02 | .02 | .03 | .02 |
| Stilbestrol implants, 24 mgs.[1] | No | No | Yes | Yes |
| Aureomycin, 70 mgs. per head daily | | | | Yes |
| Feed per cwt. gain, lbs.: | | | | |
| Sorghum grain | 345 | 359 | 325 | 279 |
| Soybean meal | 69 | 72 | 65 | 56 |
| Sorghum silage | 2074 | 2157 | 2036 | 1866 |
| Feed costs per cwt. gain[2] | $19.31 | $20.10 | $18.66 | $16.57 |
| **Phase II—Grazing, May 11 to August 2, 1960—83 days.** | | | | |
| Initial wt. per steer | 753 | 744 | 772 | 812 |
| Daily gain per steer, lb. | .63 | .88 | .78 | .53 |
| Standard error of mean | 0.12 | 0.09 | 0.10 | 0.07 |
| Stilbestrol implants, 24 mgs. | No | Yes | See Footnote No. 1 | |
| Aureomycin, 70 mgs. per steer daily | No | No | No | Yes |
| **Phase III—Fattening, August 2, 1960, to November 12, 1960—102 days.** | | | | |
| Initial wt. per steer | 805 | 817 | 837 | 856 |
| Daily gain per steer, lbs. | 2.66 | 2.60 | 2.37 | 2.71 |
| Standard error of mean | 0.10 | 0.20 | 0.13 | 0.14 |
| Daily ration per steer, lbs.: | | | | |
| Ground corn, self-fed | 13.42 | 14.27 | 14.08 | 15.43 |
| Soybean meal | 1.51 | 1.51 | 1.51 | 1.51 |
| Ground limestone | .07 | .07 | .07 | .07 |
| Salt | .05 | .06 | .03 | .05 |
| Prairie hay | 6.29 | 6.32 | 6.41 | 6.45 |
| Alfalfa hay | 2.05 | 1.56 | 2.04 | 2.04 |
| Stilbestrol implants, 24 mgs. | Yes | Implanted May 10 | See Footnote No. 1 | |
| Aureomycin, 70 mgs. per head daily | No | No | No | Yes |
| Feed per cwt. gain: | | | | |
| Ground corn | 505 | 549 | 593 | 570 |
| Soybean meal | 57 | 58 | 64 | 56 |
| Prairie hay | 237 | 243 | 270 | 239 |
| Alfalfa hay | 77 | 60 | 86 | 76 |
| Feed costs per cwt. gain[2] | $15.57 | $16.51 | $18.06 | $16.95 |

1. All steers in lots 20 and 22 were implanted with 24 mgs. of diethylstilbestrol December 1, 1959; four from each lot were reimplanted May 10, 1960, with 24 mgs. and four other animals from each lot were reimplanted August 10, 1960. See Table 16 for gains by phases of each implanted group.

2. Feed prices may be found on inside back cover.



## Table 15 (Continued)

| Summary of Phases I, II, and III, December 1, 1959, to November 12, 1960—347 days. | | | | |
|---|---|---|---|---|
| Final wt. per steer | 1076 | 1082 | 1079 | 1132 |
| Daily gain per steer, all phases | 1.60 | 1.62 | 1.60 | 1.76 |
| Standard error of mean | 0.03 | 0.07 | 0.05 | 0.05 |
| Feed cost per steer | $ 102.08 | $ 103.67 | $ 105.79 | $ 109.77 |
| Feed cost per cwt. gain | $ 18.36 | $ 18.45 | $ 19.06 | $ 18.02 |
| Sale price per cwt., live wt., based on carcass value[3] | $ 21.94 | $ 20.46 | $ 21.60 | $ 23.18 |
| Return or loss per steer above feed cost and initial steer cost at 35¢ per lb. | $ — 46.70 | $ — 54.09 | $ — 56.82 | $ — 42.81 |
| Dressing % | 61.73 | 59.58 | 60.95 | 61.92 |
| Av. carcass grade, USDA[4] | 16.10 | 17.00 | 15.75 | 16.50 |
| Av. marbling score[5] | 8.00 | 7.50 | 8.17 | 7.75 |

3. Sale price per cwt. was based on the following carcass values per cwt.: Choice, $39.50; good, $37; standard, $35.

4. The USDA grade, high standard, was assigned a numerical grade of 15; low good, 16; average good, 17.

5. Degree of marbling: a score of 7 indicates small amount; 8 indicates slight amount, and 9 indicates traces only. The higher the score, the less marbling.

## Table 16

**The effect of implanting steers with diethylstilbestrol at different times during a wintering, grazing, and fattening program.**

| | Number of steers per treatment | Winter gain, lbs., Dec. '59 to May '60, 162 days | Summer gain, lbs., May '60 to Aug. '60, 83 days | Fattening gain, lbs., Aug. '60 to Nov. '60, 102 days | Total gain, lbs., Dec. '59 to Nov. '60, 347 days | Average carcass grade[2] |
|---|---|---|---|---|---|---|
| Implanted in December, 1959, with 24 mgs. | 8[1] | 275 | 53 | 235 | 563 | 16.25 |
| Implanted in December, 1959, and May, 1960, with 24 mgs. each time | 8[1] | 252 | 68 | 245 | 565 | 16.25 |
| Implanted in December, 1959, and August, 1960, with 24 mgs. each time | 8[1] | 278 | 42 | 298 | 618 | 15.87 |

1. Half of the steers in each implant group were from lot 20 and half from lot 22 from Table 15.

2. The USDA grade high standard was assigned a numerical score of 15, low good, 16.

### Improvement of Beef Cattle Through Breeding Methods (Project 286).

**W. H. Smith and J. D. Wheat**

The purebred Shorthorn cattle breeding project was continued during 1960 according to the breeding program adopted when the study was initiated in 1949. Two inbred lines were established and have been continued. The Wernacre Premier line is now in the fourth generation of inbreeding and the Mercury line, in the third generation. The bulls, Wernacre's Premier and Gregg Farm's Hoarfrost, were used as foundation sires to establish these two lines, respectively.

This experiment was initiated to study the inheritance of production traits in beef cattle, to evaluate the effects of inbreeding in cattle, and to explore the feasibility of using inbred lines of beef cattle for the breeding improvement of their production traits. No extensive line crossing has been attempted to date because of the limited number of breeding

## Table 17

### Summary of the 1959 Shorthorn calves.

| Tattoo number | Coefficient of inbreeding | Birth weight | Weaning weight | Weaning score | Days fed | Initial weight | Final weight | Total gain | Average daily gain | Final score | Pounds corn per cwt. gain | Pounds alfalfa per cwt. gain |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mercury Line—Bulls** | | | | | | | | | | | | |
| 923 | 19.14 | 51 | 335 | 2— | 182 | 324 | 675 | 351 | 1.93 | 2— | 567 | 288 |
| 931 | 17.38 | 59 | 345 | 2 | 182 | 350 | 700 | 350 | 1.92 | 2+ | 464 | 240 |
| 941 | 13.67 | 67 | 317 | 2 | 182 | 322 | 736 | 414 | 2.27 | 2 | 402 | 202 |
| 945 | 16.41 | 59 | 285 | 2+ | 182 | 285 | 554 | 269 | 1.48 | 2— | 409 | 379 |
| 949 | 18.75 | 67 | 352 | 2 | 182 | 360 | 745 | 385 | 2.12 | 2+ | 409 | 201 |
| 955 | 16.80 | 62 | 305 | 2— | 182 | 320 | 710 | 390 | 2.14 | 2 | 417 | 209 |
| 959 | 13.67 | 50 | 240 | 2+ | 182 | 247 | 555 | 308 | 1.69 | 2 | 407 | 198 |
| 961 | 18.75 | 76 | 275 | 3 | 182 | 285 | 540 | 255 | 1.40 | 3+ | 449 | 247 |
| 969 | 13.48 | 74 | 367 | 1— | 182 | 422 | 839 | 417 | 2.29 | 2+ | 410 | 211 |
| 977 | 14.46 | 81 | 365 | 2 | 182 | 397 | 830 | 433 | 2.38 | 2 | 356 | 193 |
| 991 | 6.44 | 70 | 253 | 3+ | 182 | 275 | 655 | 380 | 2.09 | 3 | 372 | 193 |
| 997 | 15.72 | 70 | 322 | 1— | 182 | 348 | 780 | 432 | 2.37 | 1— | 381 | 190 |
| Average | 15.39 | 66 | 314 | 2 | 182 | 328 | 693 | 365 | 2.01 | 2 | 420 | 230 |
| **Heifers** | | | | | | | | | | | | |
| 921 | 16.41 | 57 | 325 | 2+ | 182 | 327 | 582 | 255 | 1.40 | 1— | 392 | 416 |
| 927 | 19.24 | 57 | 283 | 2— | 182 | 294 | 540 | 246 | 1.35 | 2 | 449 | 407 |
| 929 | 17.58 | 56 | 352 | 2— | 182 | 358 | 602 | 244 | 1.34 | 2 | 432 | 393 |
| 937 | 17.77 | 60 | 330 | 2 | 182 | 332 | 622 | 290 | 1.59 | 1— | 414 | 379 |
| 947 | 19.14 | 67 | 342 | 2 | 182 | 353 | 610 | 257 | 1.41 | 1— | 434 | 405 |
| 953 | 19.24 | 64 | 350 | 2— | 182 | 345 | 600 | 255 | 1.40 | 2 | 445 | 408 |
| 971 | 15.63 | 60 | 340 | 2+ | 182 | 351 | 665 | 314 | 1.73 | 1— | 342 | 344 |
| 983 | 18.75 | 65 | 350 | 2 | 182 | 378 | 670 | 292 | 1.60 | 2— | 377 | 349 |
| Average | 17.97 | 61 | 334 | 2 | 182 | 342 | 611 | 269 | 1.48 | 2+ | 411 | 388 |
| **Wernacre Premier Line—Bulls** | | | | | | | | | | | | |
| 965 | 18.00 | 75 | 326 | 3 | 182 | 330 | 750 | 420 | 2.31 | 3+ | 456 | 222 |
| 973 | 18.93 | 72 | 430 | 2— | 182 | 458 | 930 | 478 | 2.63 | 2+ | 392 | 188 |
| 975 | 30.12 | 65 | 398 | 3— | 182 | 411 | 770 | 359 | 1.97 | 3 | 451 | 223 |
| 979 | 22.45 | 75 | 437 | 2— | 182 | 465 | 1020 | 555 | 3.05 | 2— | 314 | 186 |
| 985 | 24.80 | 75 | 340 | 2— | 182 | 380 | 828 | 448 | 2.46 | 2— | 374 | 190 |
| Average | 28.58 | 72 | 386 | 3+ | 182 | 409 | 860 | 452 | 2.48 | 2— | 397 | 202 |
| **Heifers** | | | | | | | | | | | | |
| 957 | 31.44 | 73 | 324 | 3 | 182 | 337 | 602 | 265 | 1.46 | 3 | 387 | 392 |
| 967 | 20.11 | 72 | 265 | 3— | 182 | 275 | 602 | 327 | 1.80 | 3+ | 339 | 306 |
| 981 | 29.87 | 80 | 305 | 3+ | 182 | 333 | 645 | 312 | 1.71 | 2 | 356 | 327 |
| 987 | 14.84 | 58 | 287 | 2— | 182 | 303 | 598 | 295 | 1.62 | 3+ | 381 | 346 |
| Average | 24.07 | 71 | 295 | 3 | 182 | 312 | 612 | 300 | 1.65 | 3+ | 366 | 343 |
| **Line-Cross Heifers** | | | | | | | | | | | | |
| 925 | .... | 61 | 325 | 1— | 182 | 332 | 655 | 323 | 1.77 | 1 | 384 | 353 |
| 933 | .... | 56 | 365 | 2 | 182 | 400 | 640 | 240 | 1.32 | 1— | 448 | 417 |
| 951 | .... | 72 | 303 | 2 | 182 | 307 | 572 | 265 | 1.46 | 2 | 302 | 340 |
| Average | .... | 63 | 331 | 2+ | 182 | 346 | 622 | 276 | 1.52 | 1— | 378 | 370 |

animals in the project and the relatively low level of inbreeding which has prevailed in the breeding herds. The line crossing practiced thus far in the study has been largely the result of the fact that bulls of the Wernacre's Premier line have not been available to accommodate the breeding of that line in its entirety during some years. This has necessitated the breeding of a limited number of Wernacre Premier line females to Mercury line bulls.

No abnormalities which could be attributed to inbreeding have occurred in either of the inbred lines. Inbreeding has lowered the weaning weights of calves; however, this breeding plan has had no apparent effects on rate of gain or efficiency of feed utilization on the calves as evidenced by analyses of data collected on these characteristics.

The weight of each cow and the weight of each calf are taken immediately after the time of calving. Summer pasture breeding is practiced and the calves are born in the spring of each year. The calves are not creep fed during the suckling period. Calves are weaned, weighed, and scored for type when they are approximately 6 months old. After a short preliminary adjustment period following weaning, they are placed on individual feeding trials or record-of-performance tests for a 182-day period. Weight gain and feed consumption records are maintained on each calf. The calves are scored for type again as yearlings on completion of their feeding trials.

The full-feed ration for the bulls consists of 75% cracked corn and 25% chopped alfalfa hay; that for the heifers, 55% cracked corn and 45% chopped alfalfa hay.

Production data for the 1959 calves are summarized in Table 17.

Because the Wernacre Premier line was established somewhat earlier than the Mercury line, the Wernacre Premier calves have been more highly inbred than the Mercury calves during the progress of the project. Three line-cross calves produced by Wernacre Premier cows are included in the 1959 calf crop.

The 1960 calves have not completed their feeding tests at the time of this report, so data for them are not included. Thirty calves of the 1960 calf crop are being individually fed.

## Artificially Dried Corn in Cattle Rations.

**D. Richardson, E. F. Smith, B. A. Koch, F. W. Boren, and J. K. Ward**

With improved harvesting machinery, farmers tend to harvest grain earlier to prevent loss by lodging or inclement weather. This often results in grain being too high in moisture for normal storage, and means that it must be stored in an air-tight container or dried, if it is to enter normal storage. There are ways of drying grain with and without heated air.

The wet milling industry for many years has had difficulty in processing corn artificially dried at high temperatures. Opinions vary about the effect that drying grain has on its feeding value. Reports of controlled work to evaluate any effect produced are few. This test was conducted to compare the feeding value of corn dried with and without heated air in beef cattle rations.

### Experimental Procedure

The corn was produced at the Courtland Irrigation Research Farm near Belleville. The drying was done by the University's agricultural engineering department. All the corn came from the same field. Three lots of 10 heifer calves each were used. Sorghum silage was fed as the roughage and each animal received 1 pound of soybean oil meal daily. Minerals and salt were fed free choice. The corn for each lot was dried as follows:

Control. Harvested November 2, initial moisture 25%, final moisture 13.5%, dried 394 hours with 1½ hp Butler natural air-drying system (no heat).



Note: Due to weather conditions, corn for following lots could not be harvested until November 24 and 30.

180°F. Harvested November 24, initial moisture 19.3%, final moisture 13.2%, dried in 250-bushel Tox-O-Wik Batch Dryer with air heated to 180°F.

230°F. Harvested November 30, initial moisture 21.2%, final moisture 12.7%, dried in 250-bushel Tox-O-Wik Batch Dryer with air heated to 230°F.

All corn was sacked and stored. It was ground as needed.

Rumen samples were obtained from each animal to study the concentration and percentage distribution of volatile fatty acids in the rumen fluid.

### Results and Discussion

There was very little scorching of grain even at the highest temperature. However, corn dried with heated air, especially at 230°F., tended to lose its bright yellow color and also to separate from the outer coat on cracking. The animals did not want to eat the corn dried at 230°F.; however, they started eating satisfactorily on the second day and no further serious palatability trouble was encountered. While the grain was in storage, it was observed that mice ate the air-dried corn very readily, some of that dried at 180°F., but very little of the corn dried at 230°F.

There were no significant differences in the total concentration of acetic, propionic, or butyric acids in the rumen fluid or in the proportions of acetic and butyric acids. The proportion of propionic acid increased at higher drying temperatures with levels of 23.2, 26.7, and 28.1 percent respectively, for the control, 180°F. and 230°F. drying temperatures. Differences in the proportions of propionic acid approached significance at the 5 percent level.

Feedlot results are shown in Table 18. Rate of gain was affected by severe weather conditions and cases of founder and foot rot which seemed to be distributed equally throughout each lot.

There were no significant differences in rate of gain, feed efficiency, or carcass characteristics.

Under the conditions of this experiment, the nutritive value of grain for cattle was not affected by artificially drying at high temperatures. However, initial acceptability of the grain was affected. Therefore, it seems advisable not to change abruptly from normal to artificially dried grain while fattening cattle. This could result in lowered consumption or possibly "going off feed."

**Table 18**

**The value of artificially dried corn in beef cattle rations.**

December 10, 1959, to July 11, 1960—215 days.

| | Control | 180°F. | 230°F. |
|---|---|---|---|
| Number heifers per lot | 10 | 10 | 10 |
| Av. initial weight per heifer, lbs. | 466.5 | 466.5 | 465.5 |
| Av. final wt. per heifer, lbs. | 811.5 | 810.5 | 816.5 |
| Av. gain per heifer, lbs. | 345 | 344 | 351 |
| Av. daily gain per heifer, lbs. | 1.60 | 1.60 | 1.63 |
| Total feed consumed, lbs.: | | | |
| Soybean oil meal | 2150 | 2150 | 2150 |
| Corn | 22245 | 22515 | 22265 |
| Sorghum silage | 20025 | 21105 | 20100 |
| Salt | 75 | 72 | 87 |
| Salt and bonemeal, ½ and ½ mix | 127 | 112 | 127 |
| Av. daily feed per heifer, lbs.: | | | |
| Soybean oil meal | 1 | 1 | 1 |
| Corn | 10.3 | 10.5 | 10.4 |
| Sorghum silage | 9.3 | 9.8 | 9.3 |
| Salt | .035 | .033 | .040 |
| Salt and bonemeal mix | .060 | .052 | .060 |