# PRELIMINARY EVALUATION OF WHEAT VARIETIES IN THE WHEAT GRAIN/STOCKER CATTLE ENTERPRISE[1]

Gerald Horn[2], Gene Krenzer[3], Dan Bernardo[4] and Bobby McDaniel[5]

## Story in Brief

Fall-weaned steer calves (204 head) and 16 wheat pastures were used to determine the effect of wheat variety (Karl, 2163, 2180 and AGSECO 7853) and stocking density on cattle performance, grain yield, net returns to the wheat grain/stocker cattle enterprise and subsequent feedlot performance of the cattle. Grain yield was not influenced by variety but decreased rapidly with increasing stocking density. Weight gain/head decreased linearly as stocking density increased. With the exception of 2163, beef gain/acre reached a plateau at a stocking density of .6 head/acre or 1.7 acres/head. Beef gain/acre ranged from 61 to 131 lb (70 lb difference) across all varieties and stocking densities. Net return from cattle ranged from $14 to $48/acre and peaked at stocking densities of 1.75 to 1.90 acres/head. Total net returns from cattle plus grain ranged from $1 to $64/acre, and decreased fairly rapidly with increasing stocking density. The varieties differed in rate of decline, with increasing stocking density, for cattle weight gain/head and beef gain/acre, net return/acre from cattle and total net return. Rate of weight gain in the feedlot was not influenced by daily gain during the 112-day, fall/winter grazing period on wheat pasture.

(Key Words: Wheat Varieties, Growing Cattle, Net Returns.)

## Introduction

Wheat varieties have traditionally been selected based on data obtained from small, ungrazed field plots. Selection has been based primarily on grain yield, disease resistance, lodging, test weight and other grain-related production characteristics. Forage production from small, ungrazed plots has also been measured by mechanical clipping methods, and recent studies have shown that there is at least a twofold difference in forage production among high-grain yielding wheat varieties. Very few grazing trials have been conducted to evaluate different wheat varieties. Development of the Wheat Pasture Research

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[2]Professor [3]Professor, Agronomy [4]Professor, Agricultural Economics [5]Herd Manager

Unit near Marshall has, at long last, allowed us to initiate grazing studies with the explicit objective of evaluating different wheat varieties from both biological (i.e., production) and economic standpoints. Results from the first year's study, which was conducted during the 1992/93 wheat pasture year, are reported in this paper.

## Materials and Methods

Four hard-red winter wheat varieties (Karl, 2163, 2180 and AGSECO 7853) were chosen during the summer of 1992 for inclusion in the study. All four are semidwarf varieties with early to very early maturity, have tolerance to soilborne mosaic virus and were rated better than average for leaf rust resistance at the time. The rationale for selection of the varieties and the specifics of the cultural practices employed in the clean-till plantings were reported by Horn et al. (1993).

Wheat was seeded between September 9 and 15, 1992, and variety was grazed for 112 days (November 18, 1992 to March 10, 1993) at four stocking densities as shown below.

| Stocking density | | | | |
|---|---|---|---|---|
| Steers/acre: | .50 | .61 | .72 | .83 |
| Acres/steer: | 2.00 | 1.64 | 1.38 | 1.20 |
| Initial lb of live wt steer/acre: | 241 | 294 | 347 | 400 |

Two-hundred and four (204) fall-weaned steer calves of predominantly Angus or Angus x Hereford breeds were used in the study. The calves originated near Harlem and Chinook, Mt. The calves were initially vaccinated on November 2 and within 24 hours of arrival with (1) modified live virus (MLV) strains of IBR, BVD and bovine RSV plus a Leptospira pomona bacterin, (2) an intranasal IBR/$PI_3$ vaccine and (3) a Pasteurella haemolytica bacterin-toxoid, "One-Shot". During the receiving program the calves had free-choice access to large roll bales of bermudagrass hay and were hand-fed 2 lb/head/day of a high-protein soybean meal based supplement that contained added vitamin E, selenium and Deccox. Nine days after the initial vaccination the calves were revaccinated with (1) MLV strains of IBR, $PI_3$ and bovine RSV, (2) a 5-way Clostridial bacterin-toxoid and (3) "One-Shot" and were given an injection of ivermectin. The steers were implanted with Synovex-S immediately prior to placement on wheat pasture on November 18.

During the wheat pasture grazing period the calves had free-choice access to a high-calcium (15 to 17% calcium) commercial mineral mixture ("Wheat Pasture Pro Mineral", Farmland Industries, Inc.), but received no other supplemental feed other than limited amounts (about 10 lb/head/day) of alfalfa hay during periods of snow cover of wheat. The area received a heavy snow on

December 5 and was extremely wet throughout the study. The calves were never removed from wheat pasture except to periodically weigh them. Weights of individual steers were measured after overnight shrinks of 14 to 16 hours without feed and water.

After a short grazeout period on wheat pasture, the steers were placed on feed at a commercial feedyard (Cimarron Feeders; Texhoma, OK) on April 2. Steers from each pasture (i.e., each variety/stocking density combination) were placed in each of four feedlot pens which resulted in about 50 steers/pen and were fed to a common target end point whereby approximately 60% of the carcasses would grade choice. The steers were reimplanted with Synovex-S during initial processing at the feedlot, and were adapted to a steam-flaked grain (corn and milo) finishing diet (NEg of 68 Mcal/cwt DM). Corn was replaced with steam-flaked wheat on July 4. Days on feed ranged from 127 to 157 days.

An economic analysis was conducted to evaluate the profitability of wheat and stocker production on the four varieties across stocking densities. First, regression analysis was applied to the grain yield and livestock performance data to estimate response functions relating grain yield and cattle gain to stocking density. Both linear and quadratic functions were evaluated with dummy variables to incorporate varietal effects. Quadratic functions did not improve goodness of fit. These relationships were then used to estimate net return from the production of wheat and stocker cattle on each of the four varieties over the range of stocking densities evaluated (.5 to .83 head/acre). Grain yield was measured on June 17 by cutting two swaths the entire length of each pasture with a Gleaner A combine equipped with an 8-foot header.

All net return estimates represent a return above operating costs and do not include a land charge or fixed costs of machinery ownership. No attempt was made to partition wheat production costs between the wheat and cattle enterprises; therefore, all costs of establishing the wheat pasture (cultural cost, fertilizer, etc.) were allocated to the wheat enterprise. Prices applicable to the 1992-93 production year were employed in the analysis.

Total operating costs for the wheat enterprise were estimated from a recent survey of producers in central Oklahoma and averaged $66.60/acre. Harvest and hauling cost were dependent upon grain yield. A wheat price of $2.85/bushel was employed, which represents the average Oklahoma cash price during the June, 1993 to July, 1993 period.

All livestock prices used in the analysis represent average prices received at Oklahoma for steer calves in November and feeder steers in March. Steer calves were purchased in November at an average weight of 482 lb for $97.12/cwt. The sale weight was estimated as the sum of the calf weight (482 lb) and seasonal gain (estimated from the cattle gain equation). To adjust sale price to the end-weight, the following procedure was used. Livestock prices are reported in 100-lb ranges (e.g., 500 to 600 lb steers); therefore, the reported price was assumed to reflect the midpoint of each range (e.g., 550 lb). Sale

prices for cattle between these midpoints were determined by interpolating between the two midpoints which bound the sale weight. Prices used to estimate sale weights were: 500 to 600 lb, $99.62/cwt; 600 to 700 lb, $92.23/cwt; and 700 to 800 lb, $84.84/cwt.

Total operating costs for the stocker enterprise varied slightly across varieties and stocking densities. Stocker production costs averaged $530.53/hd, including the $468.36 calf cost and a $17.32/head interest expense. The remaining operating costs ($44.85/head) included expenses for feed, minerals, veterinary services, marketing, hauling and labor. Hauling and marketing charges varied based upon sale weight, and a death loss of 2% was assumed.

## Results and Discussion

Because of potentially large year-to-year (or environmental) effects, grazing trials in general need to be conducted over several years. This is particularly important were varieties are being evaluated. The 1992/93 wheat pasture year was extremely wet. Therefore, these results must be considered as only preliminary and in relation to the type of year in which the study was conducted.

Response of the cattle, as measured by gain/head during the total 112-day grazing period, to increasing stocking density is shown by variety in Figure 1. On native range, this response is generally characterized by an initial plateau

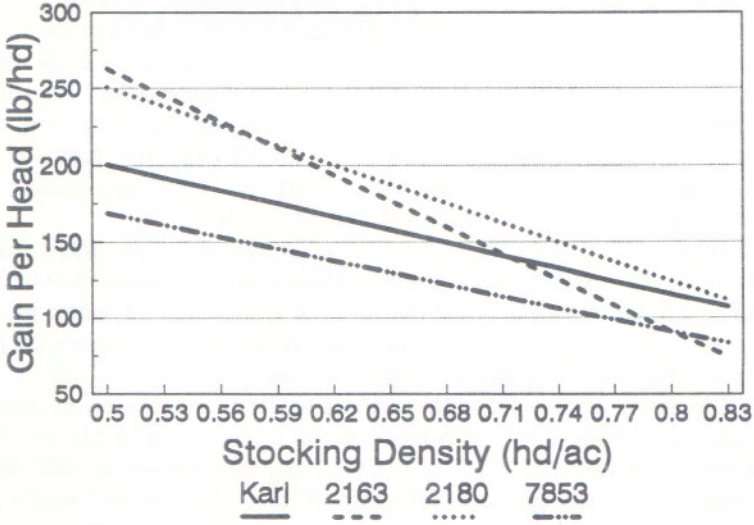


**Figure 1. Response of total gain/head during 112-day grazing period to stocking density.**

region following by a linear decrease as stocking densities are further increased. We did not observe a plateau region in this study, but rather weight gains of the cattle decreased with increasing stocking density. Weight gains at the lowest stocking density were greater for steers grazing 2163 as compared with Karl and AgSeCo 7853, but decreased more rapidly as stocking density increased. Weight gain/acre ranged from 61 to 131 lb (Figure 2). With exception of 2163, weight gain/acre tended to increase to a plateau and then decrease as stocking density increased further. The response of weight gain/acre from 2163 versus Karl and AgSeCo 7853 was the same as that for gain/head (i.e., it was greater at the lowest stocking density but decreased more rapidly with increasing stocking density). In general, weight gain/acre for Karl, 2180 and AgSeCo 7853 peaked at a stocking density of about .6 head/acre or 1.7 acres/head.

Grain yield was not influenced by variety, and decreased linearly with increasing stocking density as did net return/acre from wheat grain. Net return from cattle ranged from $14 to $48/acre (Figure 3), and tended to peak at stocking densities of about .57 head/acre (1.75 acres/head) for Karl and 2180 and at .53 head/acre (1.9 acres/head) for 2163 and AgSeCo 7853. As stocking density increased, the rate of decline in net return from cattle was greater for 2163 than the other varieties. Total net returns from cattle plus grain (Figure 4) did not exhibit peak values and decreased fairly rapidly with increasing

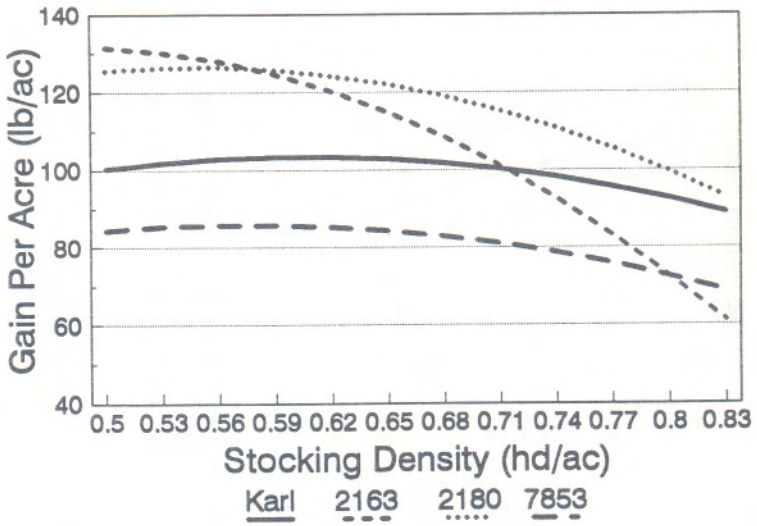


**Figure 2. Response of total beef gain/acre during 112-day grazing period to stocking density.**

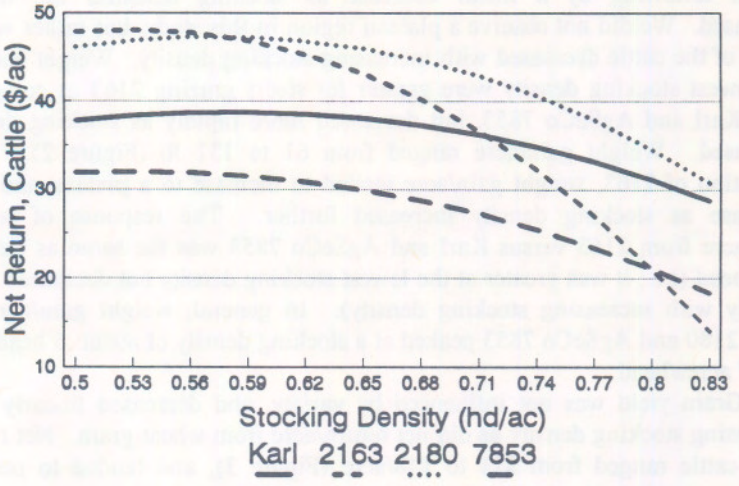


**Figure 3. Net return from cattle ($/acre) above operating costs versus stocking density.**

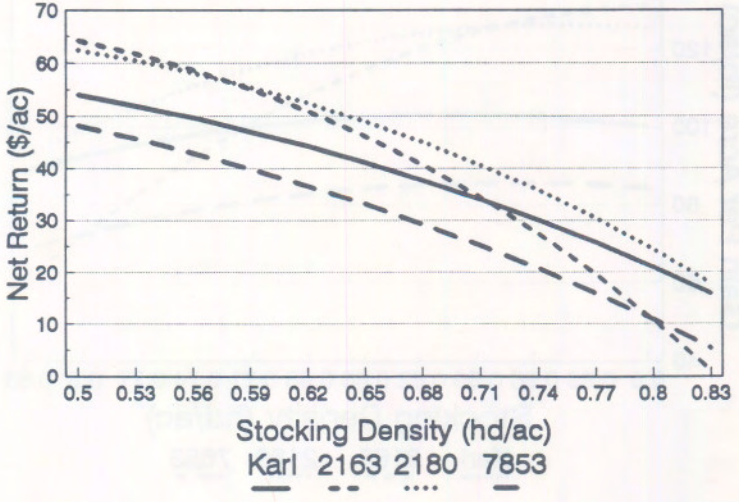


**Figure 4. Net return from cattle plus grain ($/acre) above operating costs versus stocking density.**

stocking density. The rate of decrease was greater for 2163 than the other varieties.

Mean initial and final weights of the four different pens of cattle in the feedlot ranged from 571 to 752 lb and 1150 to 1289 lb, respectively. Mean daily weight gain in the feedlot ranged from 3.71 to 4.29 lb and feed efficiency (feed:gain, DM basis) ranged from 5.05 to 6.25. Forty-seven to 73% of the carcasses of each pen graded choice and 90 to 100% of the carcasses had yield grades of 3 or better. Most of the carcasses weighed 750 to 899 lb. Only two carcasses weighed from 536 to 599 lb, and eight (pen 1) weighed from 900 to 950 lb. Therefore, distribution of carcass weights was excellent.

Potential relationships between rate of weight gain in the feedlot and rate of weight gain during different periods on wheat pasture were examined by regression analysis. The periods on wheat pasture were: Period I (November 18 to January 27, 70 days); Period II (January 27 to March 10, 42 days); Overall (November 18 to March 10, 112 days) Weight gains of individual cattle on wheat pasture ranged from .49 to 3.23 (Period I), -1.14 to 3.33 (Period II ) and -.05 to 2.77 (Overall). While the relationship between feedlot ADG and wheat pasture ADG (Period II) was significant ($P<.01$), the relationships between feedlot ADG and wheat pasture ADG (Period I and Overall) were not ($P>.18$). Feedlot ADG of individual steers decreased by only .0874 lb for each one pound increase in wheat pasture ADG during Period II in accordance with the following equation: Feedlot ADG = 4.26 - .0874 (wheat pasture ADG).

## Literature Cited

Horn, Gerald. et al. 1993. Wheatland Stocker Conf. p G1-G10.