GRAZING CATTLE ON WINTER CEREAL PASTURE ON THE SANDY SOILS OF SOUTH-CENTRAL KANSAS

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Summary

Rye, wheat, and triticale pasture were evaluated during the winters of 2000-01, 2001-02, and 2002-03 for their ability to increase cattle weight from late fall through mid-spring. Large-scale studies were conducted on two 80-acre sites divided into either 25- or 40-acre pastures. Cattle at these sites were stocked at one head per acre, with an average initial weight between 500 and 550 lb. At the Sandyland Experiment Field, small-scale studies were conducted by using the same winter cereals for forage, but at greater stocking rates, ranging from two to three head per acre. Supplemental feeding, as necessary, included summer annual forage hay, prairie hay, and grain consisting of wheat middlings and processed grain sorghum. Winter cereals were planted at 100 lb/acre in September of each year. Rye provided the best pasture in terms of cattle weight gain and needed the least supplemental feeding. Wheat was next in producing pounds of beef, and triticale produced less gain than either rye or wheat. These data suggest that rye and wheat were able to support greater stocking rates than triticale.

Introduction

Annually, forage in Kansas supports more than 1.5 million beef cows and calves, 0.8 million dairy cows, and 4 to 5 million yearling cattle. Cattle and the production of forage and grain for feed represent a significant portion of agricultural revenues in Kansas. Dryland grain production in the Lower Arkansas Basin is variable due to both soil type and climate. Typically, adequate moisture is available for good pre-flowering vegetative growth, but available soil moisture, erratic rainfall, and high temperatures often severely impact grain yield. Winter cereal vegetative growth and early reproductive growth are normally good because of adequate rainfall and moderate temperatures.

More efficient and consistent use can be made of available moisture if dryland producers focus on harvesting vegetative growth instead of grain. Using summer annual forages and winter cereals as forage for hay and grazing directly connects to the market for which most of their production is already geared, cattle. These forages, and systems integrating their use, are well adapted for cattle production, are less expensive than traditional grain production, and decrease risk. Forage/grazing systems are not without additional costs and risks, however, requiring inputs ranging from machinery to fencing. Forages used for pasture require additional investments and are labor and time intensive.

The primary objective of this study was to determine actual cattle weight gain on dryland winter-cereal pasture and develop production systems/best management practices to optimize cattle production.

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Experimental Procedures

All costs were the same each year for each pasture, with the exception of seed costs. Rye seed costs were $7 per acre, wheat $10 per acre, and triticale $20 per acre. Rye, wheat, and triticale pastures were all treated identically, with the exception of stocking rates during the 2001-02 year. Wheat pasture was planted to 'Jagger' except for one field of 'Betty' during the 2001-02 grazing year, triticale pasture was Trical 2+2, and rye pasture seed variety was not stated.

Fertilization each year consisted of 100 lb/acre 18-46-0 and 50 lb/acre N broadcast as urea (46-0-0). Fertilizer was incorporated with the final tandem disking before planting winter cereals. In rotations where summer annual forage was planted, the 18-46-0 was applied before planting the summer annual forage.

Sites at the Sandyland Field were all fine, sandy loams. Two 80-acre, off-site locations were established. Each was split into three 25-acre pastures and treated and planted as were the small-scale Sandyland sites. One site was a loamy fine sand and the other a fine sandy loam. The only difference between the off-site and Sandyland studies was stocking rate. Sandyland heifers were stocked at greater rates than the large-scale studies (rates are provided in data tables).

Cattle were penned for 36 to 48 hours and fed/watered before initial weighing. Cattle were weighed individually immediately before being turned out onto assigned pastures. All cattle weights were taken individually throughout the study, directly after cattle were rounded up.

Each year, tillage consisted of tandem disking two times, with fertilizer incorporation before final tillage. Winter cereals were planted by using a double-disk drill with a target seeding rate of 90 lb/acre.

2000 – 2001 Grazing Season

Heifers were turned out on November 29 and pastured for 68 days. As the result of poor pasture conditions, cattle were placed in a drylot and fed for 38 days (February 5 – March 16). Cattle were then pastured for an additional 61 days (March 16 – May 16). Total days on winter pasture was 129 days.

2001 – 2002 Grazing Season

Extremely dry fall/early winter conditions prevented turning cattle out until April 11. Cattle were turned out on irrigated corn stalks for 141 days before grazing the cereal pastures. Cattle were pastured on winter cereals for 43 days (April 11 – May 23). Stocking rates were determined by qualitative examination of growth (height and degree of tillering) and are presented in Table 3.

2002 – 2003 Grazing Season

At the Sandyland site, rye, wheat, and triticale pasture were preceded by a summer annual forage on some lots, a winter-cereal/summer-feed rotation. Another treatment was continuous wheat pasture after summer fallow. Rye was seeded after mechanical summer fallow, and cattle were turned out on the 3 acres of rye, plus 9 acres of sorghum stubble. Stocking rates for each treatment are listed in Table 4.

At the JLC Ranch, the stocking rate was one acre per head. One pasture (Table 5) had been in continuous wheat, with mechanical summer fallow. The other treatment was in continuous wheat/rye pasture, with mechanical summer fallow.

Dry conditions prevented pasturing cattle until February 19. Sandyland cattle were pasture for 78 days, until May 8. The lesser stocking rate at the JLC Ranch permitted an additional 14 days of pasturing, until May 22.

Results

2000 – 2001

Winter gain was not different between rye and wheat, but triticale pasture significantly outperformed both rye and wheat, by about 0.1 lb/head daily for the initial 68-day grazing period (Table 2). After cattle were returned to their respective pastures on March 16, rye pasture significantly outperformed both wheat and triticale pasture during the 61-day period. Triticale outperformed wheat. It was expected that triticale would outperform both rye and wheat during spring grazing. Rye pasture likely benefited from greater than normal spring precipitation.

2001 – 2002

During 2001-2002, extremely dry conditions from August through March (6.6 inches or 50% of the long-term average) prevented turning cattle out until April. Before the grazing study, cattle were placed on a circle of irrigated Bt corn stalks and were supplemented with summer annual forage hay.

Rye and wheat were able to support greater stocking rates than the triticale pasture (Table 3). Daily gain was significantly greater for rye and triticale than wheat pasture, although, in part, the gain of cattle grazing triticale may have been supported by the greater amount of grain provided to them. When stocking rates were used to determine lb/acre daily, however, gains on rye were still significantly better than wheat, and wheat outperformed the triticale pasture. Both Jagger and Betty wheat pasture increased the gain/acre by 80% compared with triticale. This study evaluated only spring grazing, so this data does not support the suitability of Betty wheat for late fall/early winter pasture.

2002 – 2003

After production of a summer annual forage, winter-cereal pasture resulted in less cattle weight gain/acre than did winter cereals after summer fallow (Table 4) at the Sandyland site. Allowing cattle to graze grain-sorghum stubble in addition to rye allowed for a stocking rate (0.3 acres rye pasture per head) that was greater than could be achieved for the other treatments. This treatment resulted in less gain/head but a greater lb/acre gain.

In the experiment at the Sandyland site, for pastures following summer annual forage production, the amount of hay supplemented per heifer was less for the rye pasture than for the triticale and wheat pastures (Table 4). Also, the amount of supplemental hay required was less when heifers pasturing rye after summer fallow were given access to the grain-sorghum residue.

At the JLC Ranch, Table 5, wheat pasture produced significantly greater weight gain than the rye/wheat pasture (3.02 vs. 2.28 lb/head daily).

General Discussion

Stocking rates affected average daily gain/acre (Tables 3 and 4). Increased stocking rates resulted in significantly greater weight gain/acre and did not significantly decrease gain per head. More supplemental feeding was necessary, but increased production offset the cost.

Over the period of the study, rye provided better, more consistent weight gain and supported greater stocking rates than wheat or triticale. Cattle gain on wheat pasture was less than on rye pastures, but wheat pastures were significantly better than triticale. As expected, dry conditions limited the pasture season and increased the need for supplemental feeding.

Although greater stocking rates sometimes required more supplemental feeding, beef production per acre was significantly greater at the greater stocking rates. The ability of triticale to support cattle performance was affected by soil moisture more than were the other cereals.

Under conditions of adequate soil moisture, triticale supported stocking rates greater than did wheat (Table 4). Under moisture-limiting conditions (Table 3), however, the ability of triticale to support stock was less than that of wheat.

Under the dryland conditions on the sandy soils represented in the study, rye produced the best gains and was able to support the greatest stocking rates. Wheat and triticale pasture resulted in less gain overall. Under conditions of good soil moisture, wheat and triticale pasture productivity was close to the same. When soil moisture was limited, however, wheat pasture outperformed triticale pasture.

Table 1. Monthly Precipitation Totals at Sandyland Experiment Field

Month	2000-2001	2001-2002	2002-2003	Long-Term Average
	------------------- inches -------------------			
July	5.2	4.6	1.5	3.1
August	0.05	1.1	3.1	2.4
September	0.8	3.4	1.3	2.2
October	4.6	0.0	7.1	2.3
November	0.5	0.0	0.1	1.0
December	0.6	0.06	0.4	0.9
January	2.7	0.6	0.3	0.8
February	2.3	0.9	0.6	1.0
March	1.7	0.5	5.0	2.3
April	1.5	1.9	2.5	2.4
May	6.7	1.4	3.5	3.8
Total	19.95	13.7	25.4	18.3

Table 2. 2000-2001 Winter Grazing Study at Sandyland Experiment Field and Off-Site Fields

Item	Rye	Triticale	Wheat
Number of heifers	52	52	52
Number of pens	3*	3*	3*
November 29 – February 5 grazing			
Grazing days	68	68	68
Initial weight, lb	509	514	539
Final weight, lb	558	569	587
Gain, lb/head	49[a]	55[b]	48[a]
Gain, lb/head daily	0.73[a]	0.81[b]	0.71[a]
Drylot, February 5 – March 16			
Final weight, lb	544	541	567
Gain, lb/head	-14[a]	-28[b]	-20[ab]
Gain, lb/head daily	-0.37[a]	-0.74[b]	-0.52[ab]
March 16 – May 16 grazing			
Grazing days	61	61	61
Final weight, lb	680	661	660
Gain, lb/head	136[b]	120[b]	93[a]
Gain, lb/head daily	2.22[c]	1.96[b]	1.52[a]

*One 2-acre pasture stocked at 0.5 acres/heifer and two 27-acre pastures stocked at 1.11 acres/heifer.
[abc]Within a row, means not having the same superscript letter differ ($P<0.05$).

Table 3. 2001-2002 Winter Grazing Study at Sandyland Experiment Field

Item	Jagger Wheat	Betty Wheat	Rye[*]	Triticale[#]
Number of heifers	6	6	10	4
Stocking rate (acres/head)	0.5	0.5	0.3	0.7
Grazing days	43	43	43	43
April 11 weight, lb	616[b]	562[a]	602[b]	584[a]
May 23 weight, lb	676[b]	622[a]	672[b]	652[b]
Weight gain, lb/head	60[a]	60[a]	70[b]	68[b]
Daily gain, lb/head daily	1.40[a]	1.40[a]	1.62[b]	1.58[b]
Gain, lb/acre	120[b]	120[b]	232[c]	97[a]
Gain, lb/acre daily	2.8[b]	2.8[b]	5.4[c]	2.3[a]
Grain fed, lb/head	108	108	108	323

[abc]Within a row, means not having the same superscript letter differ ($P<0.05$).
[*]Variety not stated.
[#]Trical 2+2.

Table 4. 2002-2003 Winter Grazing Study at Sandyland Experiment Field

	After Summer Annual Forage			After Summer Fallow	
	Rye	Triticale	Wheat	Wheat	Rye + GSR[a]
Number of heifers	3	3	3	6	9
Stocking rate, acres/head	0.8	0.8	1.0	0.5	0.3
Grazing days	78	78	78	78	78
Initial weight, lb (Feb. 19)	644	634	755	649	644
Final weight, lb (May 8)	818	809	930	838	768
Gain, lb/head	174	175	175	189	124
Gain, lb/head daily	2.23	2.24	2.24	2.42	1.59
Gain, lb/acre	218	219	175	378	416
Gain, lb/acre daily	2.79	2.80	2.24	4.84	5.30
Bales[b] fed	2	4	5	9	7

[a]3 acres rye plus 9 acres grain-sorghum residue, with an average grain yield of 75 bushels/acre.
[b]Bale weight = 1200 lb.

Table 5. 2002-2003 Winter Grazing Study at JLC Ranch

	After Summer Fallow	
	Wheat	Wheat/rye
Number of heifers	18	75
Stocking rate, acres/head	1.0	1.0
Grazing days	92	92
Initial weight, lb (Feb. 19)	674	664
Final weight, lb (May 22)	952	874
Gain, lb/head	278	210
Gain, lb/head daily	3.02	2.28
Gain, lb/acre	278	210
Gain, lb/acre daily	3.02	2.28