ECONOMIC EVALUATION OF SEASON-LONG AND INTENSIVE-EARLY STOCKING SYSTEMS

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Two grazing systems practiced by farmers and ranchers in the Flint Hills of eastern Kansas are season-long stocking (SLS) and intensive-early stocking (IES). The Kansas Crop and Livestock Reporting Service (KCLRS) reports that the average date for the start of the grazing season in the Flint Hills is April 22, and the average ending date is October 16. This grazing season of about April 1 to October 1 is called the season-long system. KCLRS also reports that intensive-early stocking is frequently used throughout the Flint Hills region. The IES system increases the stocking rate 2 times or more, but grazing occurs for only half the season, usually from about May 1 to July 15.

Data from Previous Research

Researchers in Range Management and Animal Sciences at the Kansas Agricultural Experiment Station have studied the proper grazing intensity of native range for more than 50 years. Research comparing IES with SL grazing on Flint Hills range began in 1972, using

3.3 acres per yearling steer from May 1 to October 1 for SLS and 1.67 acres per yearling steer from May 1 to July 15 for IES. This study ended in 1977. In 1981, researchers began comparing cattle gains with SLS versus IES at three rates, 2-times, 2.5-times, and 3-times the SLS rate of 3.5 acres per steer, weighing approximately 550 pounds each. All pastures were burned in late April each year.

Results of the 1981-86 study (Table 1) show that the 6-year average daily gain was significantly higher for IES than for SLS, and daily gains early in the season were significantly higher than those for the whole season. The average daily gain for SLS was 1.95 pounds per day from May 1 to July 15 and 1.63 pounds from July 15 to October 1, giving an average of 1.79 pounds for May 1 to October 1. In this experiment, about 55 percent of the gain for SL steers occurred during the first half of the season.

Daily gain per steer is less for SLS than for IES, but steers are on grass twice as long. Thus, the gain per steer per season is higher for SL grazing than for IES (Table 2), but the total gain per acre is higher for IES.

Procedure

The data in Table 2 were used in a linear programming model to compare and analyze the two grazing systems and to determine how each could fit into a whole farm plan. A representative northeast Kansas farm situation was used to compare SLS and IES, using information from northeast Kansas Farm Management Association records. This representative farm resource base included 267 acres cropland owned and 518 rented; 161 acres pasture owned and 396 rented; 27 acres alfalfa owned and 37 acres rented; $231,000 in intermediate and long-term assets; $69,000 in intermediate and long-term liabilities; and 1.49 workers including one farm operator. Enterprises included in the model were wheat, corn, grain sorghum, soybeans, alfalfa, corn silage, winter calves, and the two grazing systems that are very common throughout eastern Kansas. Wheat and feed grain base was estimated as the 1985 acreage reported by farmers. Most of the labor is provided by the operator, but family and seasonal hired labor help with the land preparation, planting, and harvesting of crops. This representative farm is typical of general crop-livestock farms in eastern Kansas, with most of the gross income derived from crops. Crop and livestock enterprise budgets, published by the Kansas Cooperative Extension Service, were used to estimate the costs and returns of producing each crop.

Table 1. Average Daily Gains of Steers on Season-Long and Intensive-Early Stocking Experiments by Year.

| Year | Season-long stocking (SLS) | | Intensive Early Stocking (IES) | | |
	May-July	May-Oct.	2x	2.5X	3x
	-lbs-			-lbs-	
1981	1.63	1.96	1.06	1.28	1.35
1982	1.99	1.72	1.98	1.97	1.81
1983	2.12	1.64	2.03	1.70	1.93
1984	NA	1.67	2.12	2.26	2.12
1985	NA	2.00	3.02	2.69	2.55
1986	2.06	1.74	2.51	2.56	2.59
Average*	1.95	1.79	2.19	2.08	2.08

2X=twice SJS rate, 2.5X=2.5times SLS rate, and 3X=three times SLS rate.
*Value is a 4-year average with 1984 and 1985 excluded.

The approach was to use the model to compare the following situations: (1) the combination of crop enterprises and grazing systems that provided the highest returns to operator labor, land, and capital (the base case); (2) allow any combination of crops but only the IES system; (3) allow any combination of crops but only the SLS system; (4) allow any combination of crops but limit available grassland to the amount owned; and (5) limit capital available.

The amount of money borrowed to purchase a steer is the same for either the SLS or IES system. However, the SLS system borrows the money for 3 months longer than IES. Therefore, the interest paid for capital borrowed to purchase steers is greater for SLS.

Results

The results of the base model, which had complete flexibility to select the best mix of crop and cattle enterprises, included a mix of wintering and a grazing system, having steers in both SLS and IES. All steers were purchased in November and wintered; then 70 percent were placed in the IES system (47 percent of the grassland) and 30 percent in the SLS system (53 percent of the grassland). Mixing these systems may be difficult, but analysis indicated that both systems have a place on farms in eastern Kansas. Wheat, grain sorghum, and corn acreages were the amounts allowed by their acreage bases. Other open cropland was used for soybean

roduction. Changing grazing systems or the amount of operating capital had almost no influence on the acreage of crops selected.

Model Restricted to IES. When the model was restricted to having only an IES system, the number of steers purchased increased by 5 percent, and grassland use decreased by 35 percent, compared to the base model. The number of steers purchased was limited by the amount of capital available, and the pasture needed could be rented. The crop acreages remained unchanged from the base model. The returns to operator labor, land, and capital decreased less than 1 percent from the base model.

Model Restricted to SLS. When the model was restricted to the SLS system only, the number of steers remained the same as in the base model, and grassland use increased 94 percent over the base model. Capital use shifted from the purchase of inputs used for crops on rented land to the purchase of steers and renting additional pasture. Less rented cropland (crop acreage decreased 22 percent) was used than in the base model. The result showed a dramatic shift from crop production on rented crop land to the use of more rented pasture for steers. Grain sorghum acreage decreased by 67 percent compared to the base. The returns to operator labor, land, and capital decreased 11 percent below the base model results.

Table 2. Total Gains per Steer by Year for Season-Long and Intensive-Early Stocking Experiments and Average Gains per Steer and per Acre.

| Year | Season-long stocking | Intensive-early stocking | | |
		2X	2.5X	3X
	-lbs-		-lbs-	
1981	239.58	79.57	96.84	101.80
1982	242.50	130.97	130.00	119.62
1983	255.33	120.24	100.26	113.95
1984	234.29	150.44	160.79	150.43
1985	292.85	199.56	177.69	168.88
1986	267.08	191.18	194.53	197.17
Average	255.27	150.33	144.35	142.85
Acres per Steer	3.3	1.7	1.3	1.1
Gains per Acre	77.35	91.1	109.4	129.4

Table 3. Comparison of Prices and Price Margins for Base Case, Season-long, and Intensive-Early Systems.

Price Category	Base	SLS	IES
		-$-	
Purchase Price -Nov.	62.04	67.14	67.14
Selling Price -Jul.	62.04	61.80	63.40
Selling Price -Oct.	60.37	60.37	60.37
Price Margin-SLS	-6.77	-6.77	-6.77
Price Margin-IES	-5.10	-5.34	-3.74

Model Restricted to Owned Pasture. Restricting the availability of grassland in the model to only the amount owned, which was 171 acres, resulted in the IES system being selected over SLS. This shows that if pasture is limited relative to the amount of capital, the best use of the pasture is the IES system. With limited pasture, a higher return is obtained from getting a higher total production per acre of grass, which is possible with the IES system. Crop acreage was unchanged, and the returns to operator labor, land, and capital decreased by 7 percent from the base model.

Model Restricting the Amount of Operating Capital. When the amount of operating capital available was reduced from $93,000 to $48,500, the SLS system was selected over IES. With only $48,500 to purchase cattle and other inputs, only 51 steers were purchased. With more than $48,500 capital, the model selected a mix of the two systems, with size of the IES system increasing relative to SLS as capital became more plentiful relative to grassland. With limited capital to buy steers, a higher return is obtained from getting the highest total gain per steer, which is possible with the SLS system. Crop acreage remained virtually unchanged, and returns to operator labor, land, and capital declined by 16 percent.

Sensitivity to Price Margins. The study also considered the effect of price margin on the selection of grazing systems. Price margin is calculated as the selling price of a steer less its purchase price. A 10-year average price of steers as reported by month for the Kansas City market was used. During this period, the average selling price for the SLS system was $6.77 per hundred weight less than the average purchase price (the price margin was -$6.77). For the IES system, the selling price was $5.10 less (the price margin was -$5.10) than the purchase price per hundred weight (Table 3). The results of the study showed that if the price margin for IES was -$5.34 or less (it becomes a larger negative), it clearly favored the SLS system, and IES was not selected. If the price margin for IES was -$3.74 or higher (becomes a smaller negative), it clearly favored the IES system, and SLS was not selected. If the price margin for IES was between -$5.34 and $3.74, then a combination of the two grazing systems was selected. Review of the 10-year price data showed that in 5 years, the price margin favored SLS and in 5 years, it favored IES.

Summary
1. Both the SLS and the IES systems have a place on eastern Kansas crop and livestock farms.
2. The SLS system uses more grassland per steer than IES, so if plenty of grassland is available but capital is low, SLS is favored. In this case, the manager seeks the highest gain per steer.
3. If grassland is in short supply relative to the amount of capital, IES is better. Stocking pasture more heavily than the SLS rate provides more gain per acre but also requires more capital per acre. The manager seeks the highest production per acre.
4. Price margins are usually negative (selling price is usually lower than purchase price per hundred weight). A small negative price margin favors IES. However, if you anticipate a larger than usual drop in price between the time of purchase and the time of sale after the grazing season, the SLS system is more likely to break even, because there is more weight gain per steer to offset the price decline.

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