Profit Drivers in Cow-Calf Production

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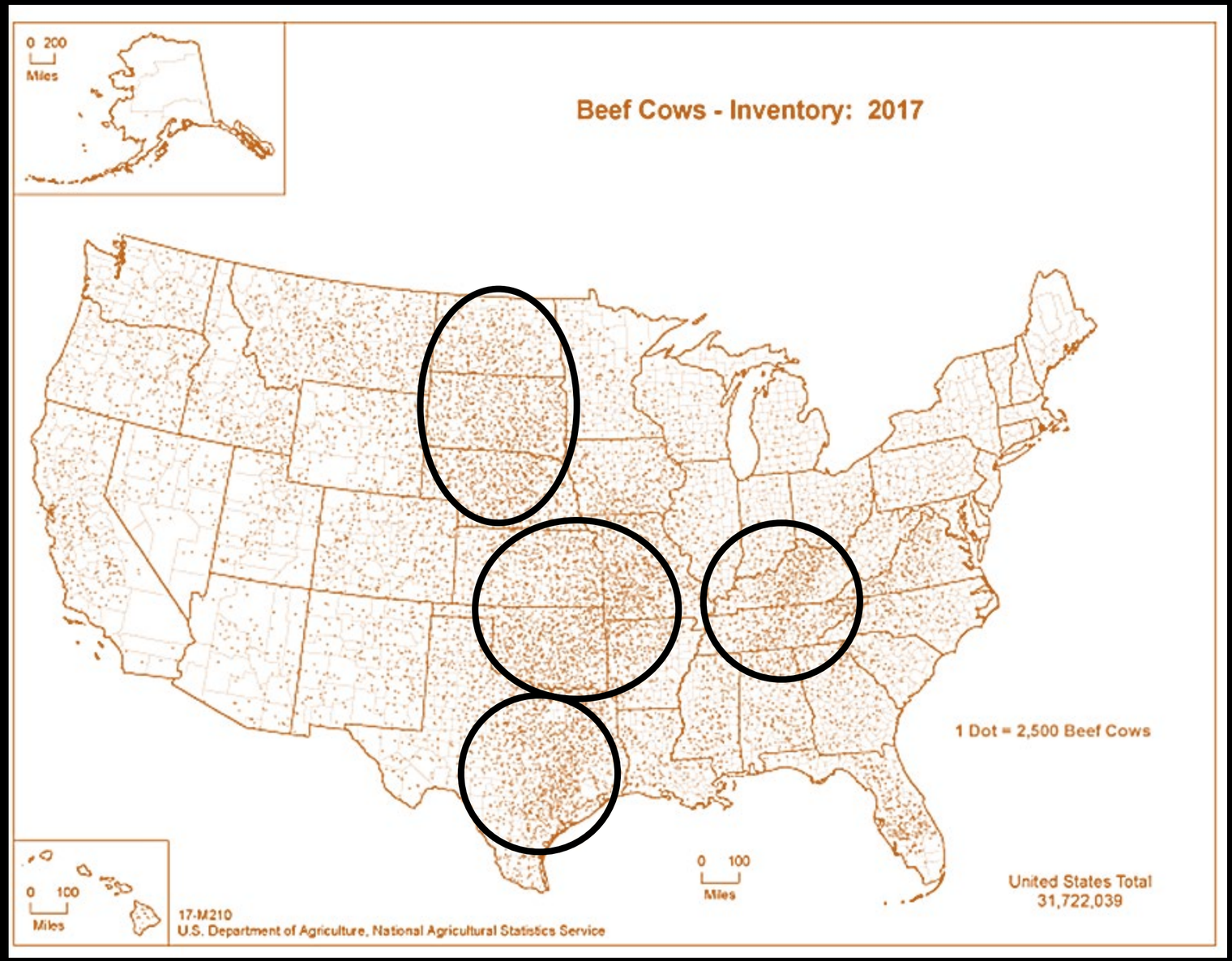
Learn at Lunch

U.S. Beef Industry



U.S. Beef Industry

adapted from GAO report

Cow-calf

Breeds cows to produce calves using a bull or AI program.

Raised by mother until weaned (6-10mths) ~500lbs

Preconditioned (high intensive feeding program for 1-2mths) and sent to feedlot ~750lbs.

Stocker

Buys calves and supplies feeder cattle to feedlot sector.

Fed on forage until approx. 600-800lbs.

Feedlot

Buys feeder cattle and supplies fed cattle to beef packing houses.

Fed high energy rations of corn, protein supplements, and roughage until approx. 950–1300lbs.

Beef Packing

Buys fed cattle and supplies beef to wholesalers, retailers, and other processors.

Produces boxed beef

or

case-ready consumer cuts.

Other Processors, Wholesalers, & Retailers

Buys beef.

Smaller consumer cuts.

Grocery Chains
Hotels
Restaurants
Institutions

Trends in Beef Production

INCREASED BACKGROUNDING

12% increase in use of backgrounding prior to marketing for cow-calf producers.

RETAINED OWNERSHIP

An increase of 10% in ownership retention since 2008.

FEEDLOT MIGRATION

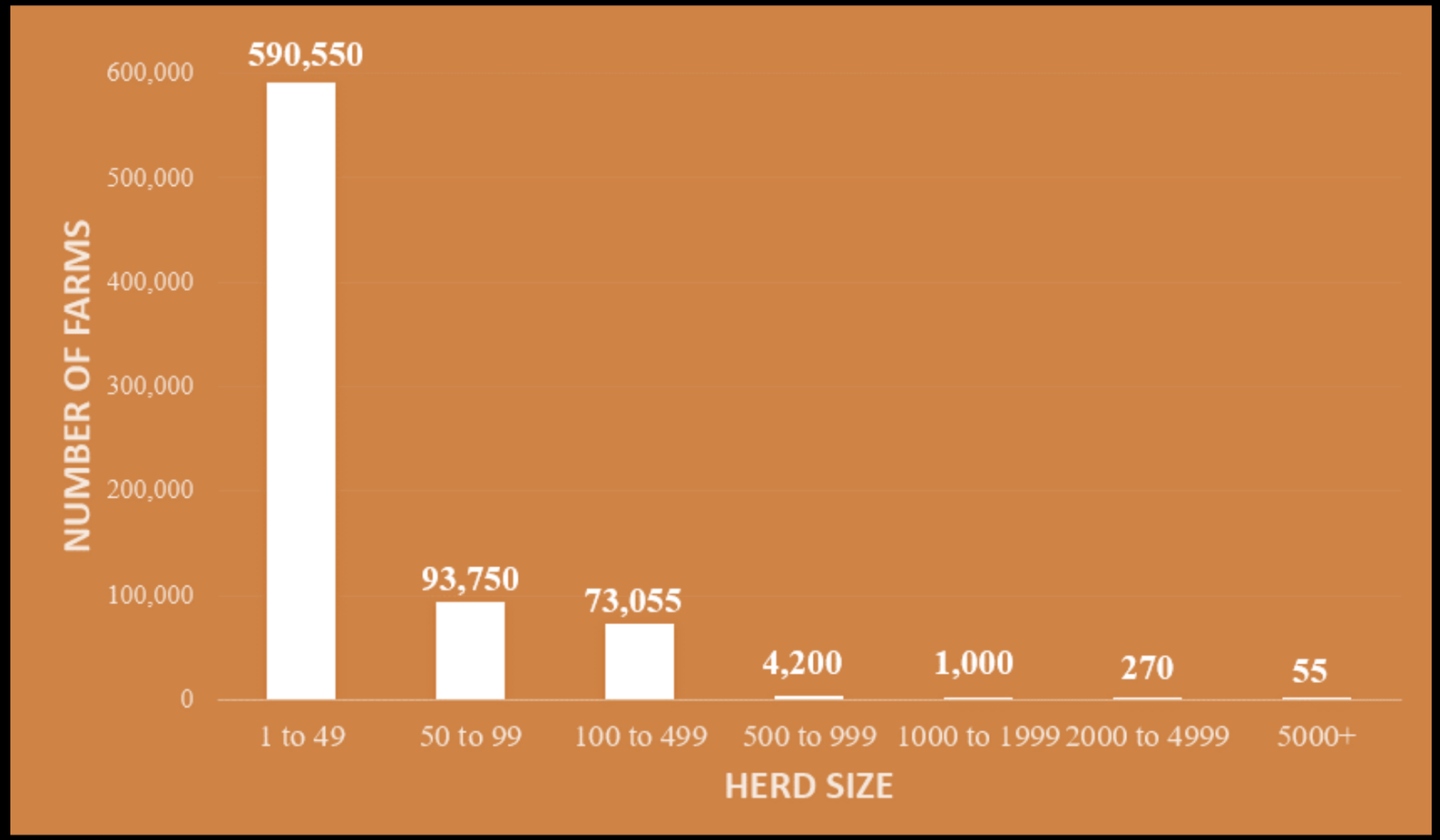
86% of feedlot production is located in the plains region.

CONSOLIDATION

More than 105,000 cow-calf farms have been lost since 1997.

Cow-Calf Economies of Scale

NUMBER OF U.S. COW -CALF FARMS BY HERD SIZE



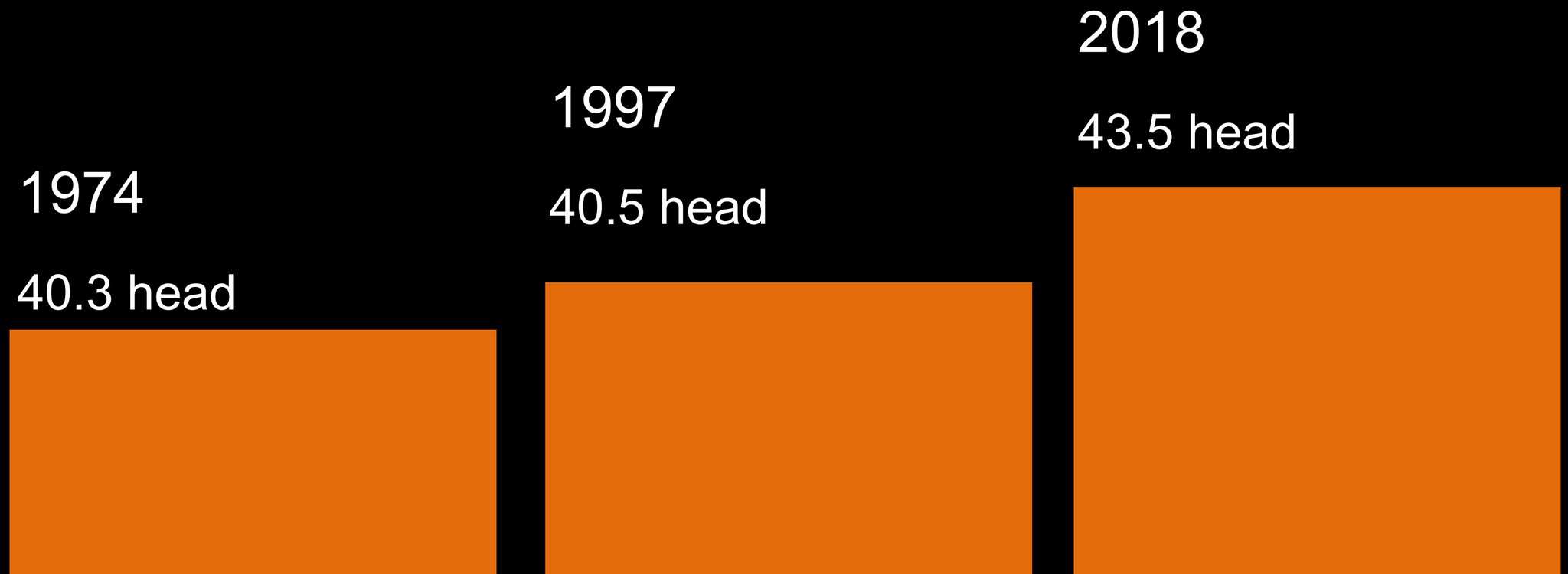
USDA 2018

43

Average Herd Size

U.S. Herd Size Over Time

An 8% increase in herd size over 44 years.



So what is happening at the cow-calf level?

- Wanted to know what might be influencing herd size and profitability for cow - calf producers across the U.S.
- Use ARMS data from the ERS to compare efficiency, profitability, and management decisions.
- Especially interested in the management decisions: feed use, grazing, retainment, cow weight, marketing strategy, etc.
- But COVID…
- Shrink study to look at Kansas cow -calf producers.

Kansas Beef Industry

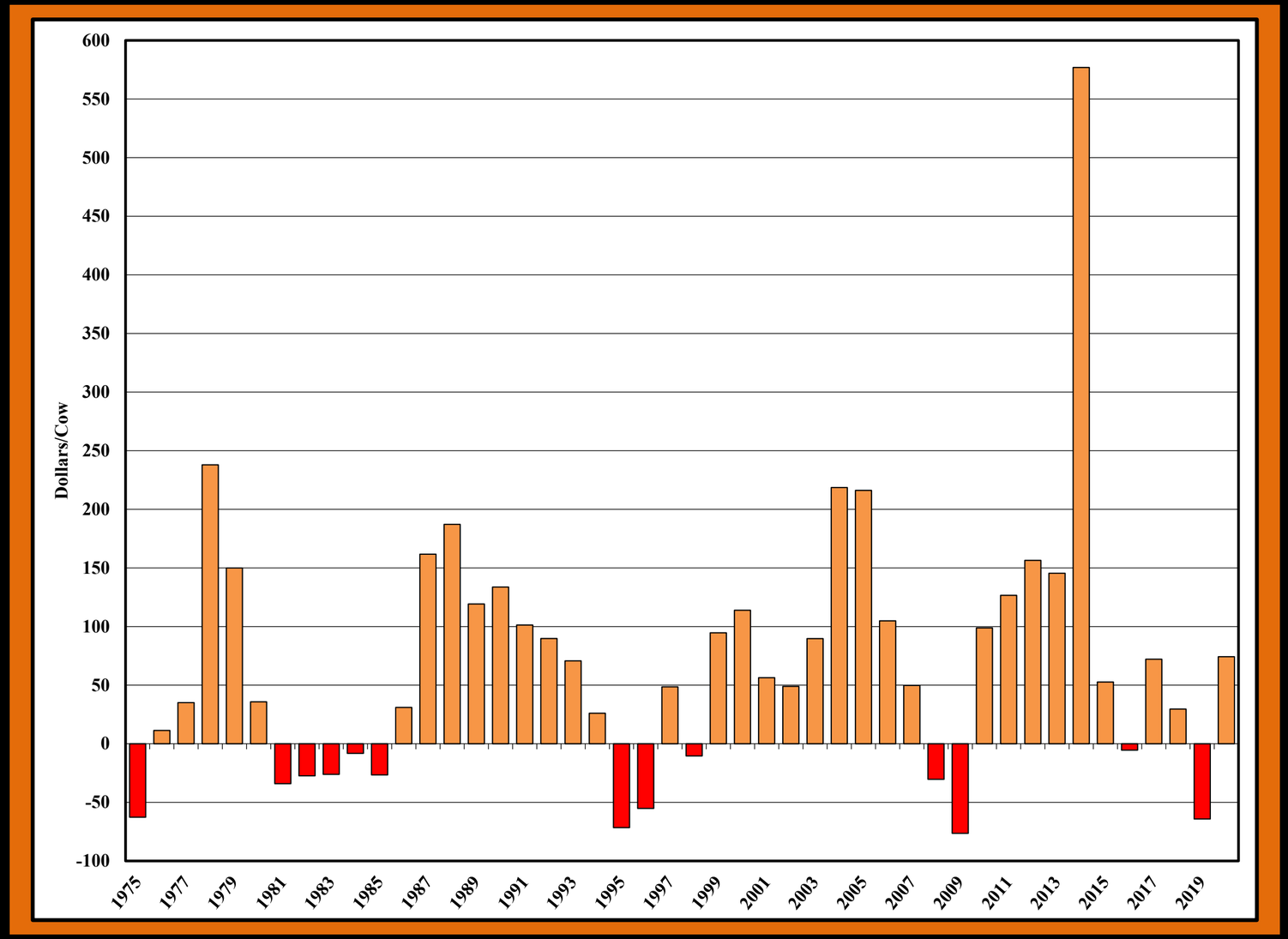
$8.27 billion
Cash receipts

5.69 Billion pounds
Red meat produced

$6.30 Billion
Direct output

Variability in Income

KFMA Returns Over Variable Costs



What makes Kansas cow-calf producers more **efficient**, and what factors are driving profitability?

Research Objectives

1. Estimate the overall, scale, allocative, and technical efficiency of Kansas cow-calf producers.

2. Determine if certain production characteristics and marketing decisions impact efficiency, and identify characteristics that impact profitability.

Literature

DEA

- Data Envelopment Analysis

SFA

- Stochastic Frontier Analysis

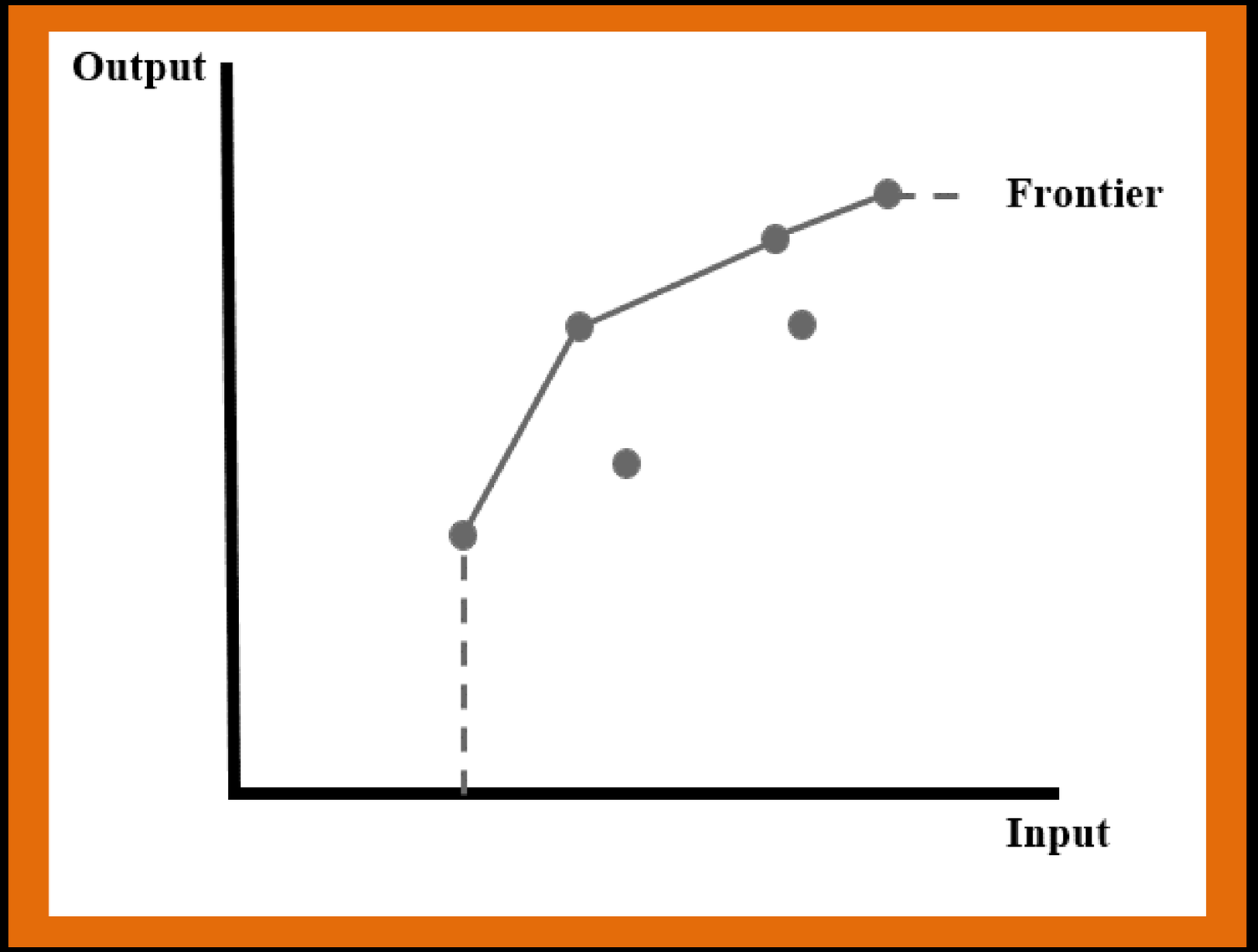
Methods

Calculate overall, allocative, technical, and scale efficiency.

Use a regression (tobit model) to determine the relationship between farms (in)efficiency scores on a set of chosen farm characteristics.

Determine the relationship between efficiency, inputs, and profitability.

Methods: DEA



Data

- Kansas Farm Management Association
  - Whole-Farm
  - Enterprise

Year	Sells Calves	Sells Feeders	Total Firms
2018	95	79	174
2019	73	74	147
2020	72	111	183

Data

2020	Sells Calves		Sells Feeders	
	n= 72		n=111	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Number of Cows per Farm	132.8	94.1	155.1	125.9
Gross Income per Cow[a]	791.4	156.7	937.6	151.8
Feed Costs per Cow[a]	499.6	133.1	639.2	129.8
Labor Costs per Cow[a]	22.4	35.3	25.2	33.2
Utilities and Fuel per Cow[a]	29.2	17.8	31.3	21.2
Veterinary Expenses per Cow[a]	37.6	23.1	55.0	29.9
Net Income per Cow[a]	-129.1	213.0	-192.6	282.7
[a] variable is in unit of dollars per cow				

Efficiency Results

- Producers selling feeders were on average more allocatively efficient across all years (2018-2020)
  =.82

- Producers selling calves were on average more scale efficient across all years (2018-2020)
  = .84

- Producers selling feeders were more technically efficient in 2018 and 2019, but those selling calves were more technically efficient in 2020 but only marginally.
  = .83

Efficiency Results

		2018		2019		2020	
		N = 95	N = 79	N = 73	N = 74	N = 72	N = 111
Efficiency Measure		Calves	Feeders	Calves	Feeders	Calves	Feeders
Overall	Mean	0.458	0.490	0.541	0.561	0.581	0.571
	SD	0.139	0.137	0.166	0.147	0.147	0.139
	Efficient Firms	1.05%	1.27%	1.37%	1.35%	1.39%	0.90%

Correlations

- Aid in understanding the importance of efficiency measures and their relationship with profitability.
- Net income per cow was correlated positively with overall efficiency across all group in all years
- Technical efficiency was relatively more important in explaining profitability than scale and allocative efficiency for both marketing strategies across all years

Net Income & Efficiency Simple Regressions

- Simple regressions were estimated for each marketing strategy in each year, looking at how efficiency scores impact net income per cow.
- For both marketing strategies across all years, overall efficiency was estimated to have the greatest impact on net income per cow.
- Scale efficiency had a greater impact on net income per cow for producers marketing feeders than those marketing calves across all years.

0.10 increase of Overall Efficiency

$168 Increase of Net Income

Top & Bottom Efficient Firms Summary Results

	2020	
	Calves	
Variable	Top	Bottom
Number of Cows	143.1	92.95
Gross Income	793.59	782.23
Feed Cost	470	575.34
Labor Cost	165.26	246.44
Utilities and Fuel Cost	20.73	34.62
Veterinary Cost	29.01	48.51
Net Income	-41.28	-260.04
Leverage	0.24	0.52
% of Income from Beef Cow Production	15%	16%
% of Land Owned	28.5%	38.3%
Off Farm Income	42,243	94,681
Total Farm Assets	3,377,871	2,311,561
Technical Efficiency	1	0.65

Input & Efficiency Tobit Results

- Log of the inputs (feed, labor, utilities and fuel, and veterinary costs) on the each of the four efficiency measures in log form (technical, allocative, scale, and overall).

	Technical		Allocative		Scale		Overall	
	Calves	Feeders	Calves	Feeders	Calves	Feeders	Calves	Feeders
Feed Costs	0.0985	0.1253	0.2477***	0.0657	0.5955***	0.7279***	0.9479***	0.8822***
	(0.1072)	(0.0981)	(0.0662)	(0.0715)	(0.0389)	(0.0413)	(0.0305)	(0.0373)
Labor Costs	-0.2948***	-0.4528***	-0.3453***	-0.2546***	-0.0337	-0.0188	-0.6911***	-0.6999***
	(0.0934)	(0.0756)	(0.0576)	(0.0541)	(0.0339)	(0.0314)	(0.0265)	(0.02829)
Utility & Fuel Costs	-0.2366***	-0.1261***	-0.0554	-0.1057***	-0.0250	-0.0028	-0.2494***	-0.2108***
	(0.0598)	(0.0377)	(0.0357)	(0.0271)	(0.0210)	(0.0157)	(0.0165)	(0.0142)
Veterinary Costs	-0.1167***	-0.0994***	0.0327*	0.0229	0.0033	0.0093	-0.0360***	-0.0322***
	(0.0338)	(0.0228)	(0.0185)	(0.0161)	(0.0109)	(0.0093)	(0.0086)	(0.0084)

Numbers in parentheses are standard errors. Single, double, and triple asterisks (*) denote significance at the 10%, 5%, and 1% level, respectively

Results Summary

- Cow-calf producers that sell calves were almost always less technically and allocatively efficient than producers that sold feeders.
- Producers selling calves were more scale efficient that those that sold feeders across all years (2018-2020).
- While there was a larger difference in technical efficiency averages between the two marketing strategies, the overall efficiency averages for the two groups were more similar.
- Comparing the highest (top) twenty technically efficient producers to the lowest (bottom) twenty:
  - Average herd size for the top twenty producers was much higher.
  - The gross income per head was, on average, nearly one hundred dollars higher across all marketing strategies, and time, for the most efficient firms

Practical Take-Aways

- Ways to improve feed efficiency
  - More grazing days – But on what?
  - Less feed fed
  - If feeding, utilize more efficient methods
    - Avoid round bales
      - If using round bales, roll out a little at a time
      - Use cone feeder
- Ways to improve labor efficiency
  - Tied to feed

Conclusions

- The beef industry has continued to shift towards consolidation of farms in addition to more cow-calf producers utilizing backgrounding and retaining ownership longer.
- Increased competition, or increased demand for competing proteins (and alternative meat) has continued to place pressure on prices, forcing producers to be increasingly vigilant about minimizing production costs.
- Additionally, inefficiency of scale may continue to cause consolidation of the industry as scale inefficient firms exit the industry.

Limitations & Future Work

- This study brings a better understating of production efficiency to the present-day cow-calf sector and provides insight into the areas that producers may continue to focus their efforts to improve efficiency and profitability.
- Supplemental survey data
- Relatively low number of observations in the KFMA data set for cow-calf producers in each marketing strategy, it can be difficult to truly estimate the drivers of efficiency.

Questions & Discussion

Please take the webinar survey:
https://okstatecasnr.az1.qualtrics.com/jfe/form/SV_bkMHTad3TRx1sJE

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