

# What is the best fit for your soil resources?

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Brian Peterson

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## Midwest farms have combined pasture and row crops



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## Where has all the pasture gone?



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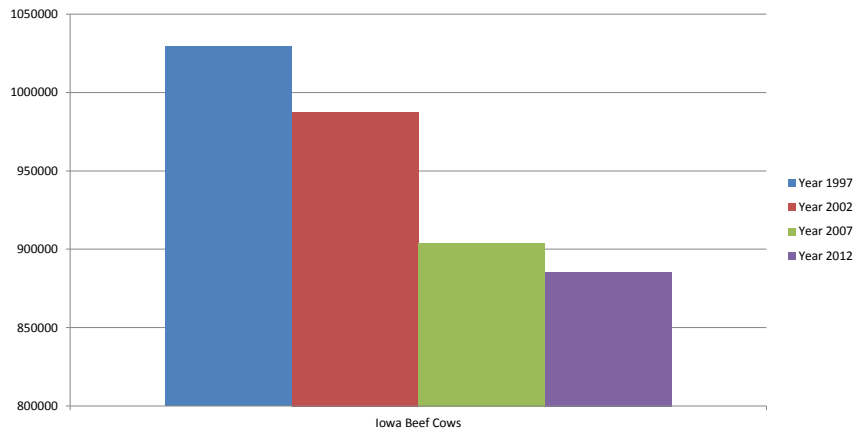
## Acres of cropland pasture

	1997	2012
• Iowa	2001198	223963
	– Reduced 88%	
• Missouri	5247558	567132
	– Reduced 89%	
• Nebraska	1840068	322093
	– Reduced 75%	

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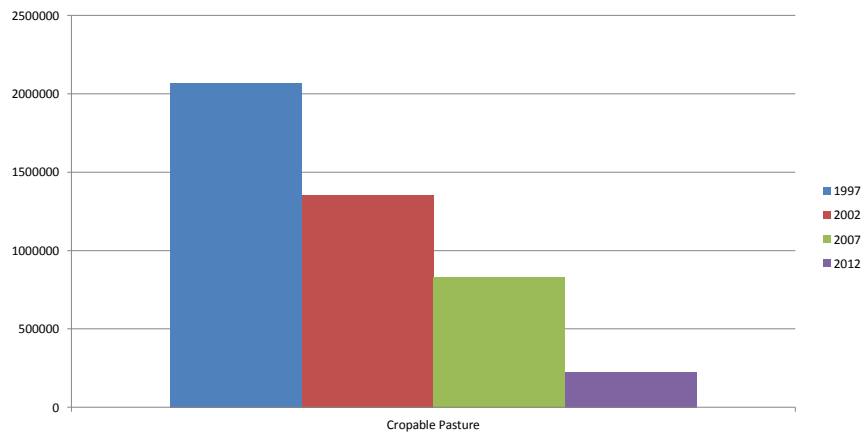
## Iowa Beef Cow Herd (Number of Cows, USDA Census)



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## Decline in cropable pasture (Acres, Census of Agriculture)



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## What did those lost acres mean in cow numbers?

- Change in beef cow inventory 1997-2012
- Iowa reduced 13.9 %
- Missouri reduced 20.2%
- Nebraska reduced 13.6%

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## What has happened since 2012?

- Beef Cow Inventory January 2012 vs 2015
- Iowa increase + 3.7%
- Nebraska +3.1%
- Missouri +10.5%

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## Forage on the side hills, crops on the ridge



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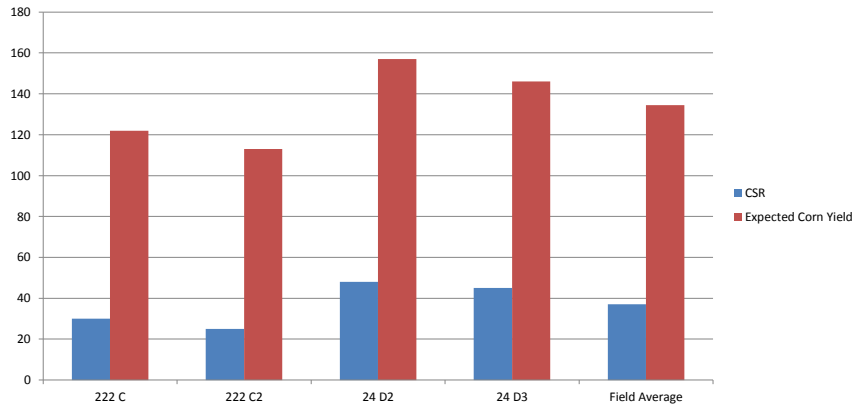
## Why so much less grass?

- Corn and soybean price explosion
- USDA commodity programs and insurance subsidies favor row crops
- Aging farmer base
- Capital requirements, price volatility
- Larger farm equipment – large fields

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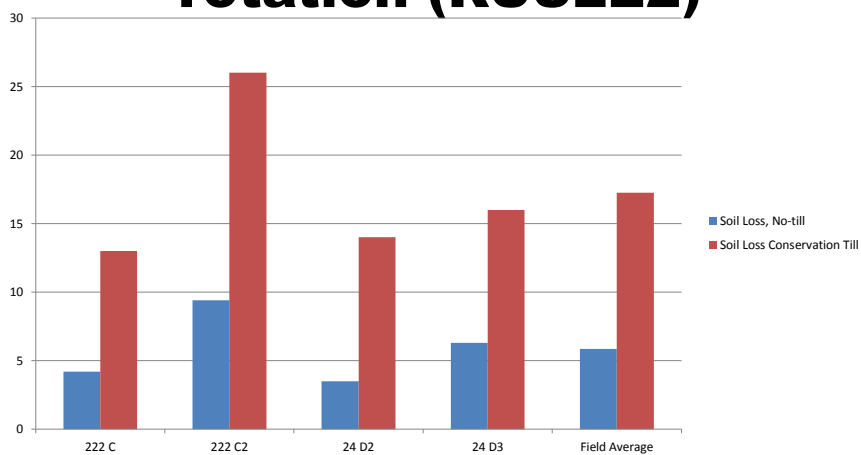
## Corn and soybeans rotation is not best use of some marginal soils (Iowa CSR2)



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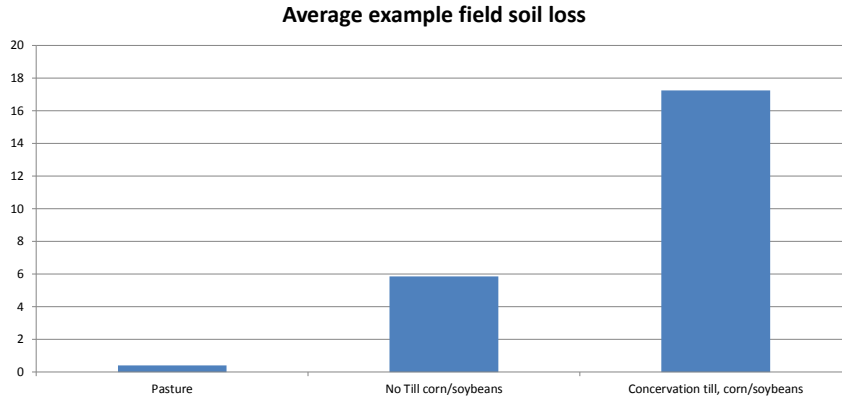
## Soil loss – corn/soybean rotation (RUSLE2)



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# Nothing compares to well managed pasture (RUSLE2)



## Land Use Analyzer

Ag Decision Maker

Recent Updates | Information Files | Decision Tools | Teaching Activities | Voice of Media | Outlook & Profitability

Whole Farm > Cost & Return > Budgeting & Analysis

**Crop and livestock land use analyzer**

Due to rolling terrain and highly variable soil characteristics, land in some regions of Iowa has a variety of possible uses related to agriculture as well as conservation and recreation. Landowners and operators must take a long-range view when making decisions about the highest and best use of their land. Their primary agricultural alternatives are:

- Harvested crops, including corn, soybeans, small grains and forages
- Pastures to support livestock enterprises, such as cow/calf, stocker cattle and sheep flocks
- Long-term retirement such as the Conservation Reserve Program (CRP)

The figure below shows the mix of pasture and CRP uses in Iowa, and how they changed from the 2007 Census of Agriculture to the 2012 Census. Total pastureland declined by 21 percent in five years. Most of the decline came in "tilable" pastureland, that is, land that could be converted from pasture to harvested crops without improvements. CRP acres also decreased, by 36 percent.

**Figure 1. Acres in Pasture and CRP Iowa**

Source: 2012 Census of Agriculture, U.S. Department of Agriculture

Landowners have several considerations that will influence their choices of land use.



## How does it work?

### Instructions

1. Enter general information about prices and acres in the Summary sheet.
2. Enter information about soils in the Soil Information sheet.
3. Enter information about proposed crop rotations in the Crops Budgets sheet.
4. Enter information about proposed pasture use in the Pasture Budgets sheet.
5. Enter information about CRP use in the CRP Budget sheet.
6. Enter information about livestock enterprises in the Livestock Budgets sheet.
7. Enter information about land conversion practices needed in the Land Conversion sheet.
8. Enter information about permanent conservation structures needed in the Conservation Structures sheet.
9. Return to the Summary sheet and enter information about alternative land uses in the Summary Comparison.

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## Basic price inputs

Crop and Livestock Land Use Analyzer			
Ag Decision Maker -- Iowa State University Extension and Outreach			
For details on this Decision Tool, see AgDM Information File C1-15. <a href="#">A Tool to Compare Land Use Alternatives</a>			
Place the cursor over cells with red triangles to read comments.			
<b>Note: Input values can be entered or revised in the beige shaded cells only. All other cells are locked</b>			
<b>General Information</b>			
<a href="#">Link to FAPRI long-term price forecasts</a>			
<b>Long-Range Selling Prices</b>			
Corn	\$	3.40	per bushel
Soybeans	\$	8.50	per bushel
Oats	\$	3.00	per bushel
Alfalfa hay	\$	80.00	per ton
Alfalfa-grass hay	\$	70.00	per ton
Oat straw	\$	65.00	per ton
Corn stover	\$	35.00	per ton
550-lb. steer calves	\$	175.00	per cwt.
750-lb. steers	\$	160.00	per cwt.
Cull cows	\$	70.00	
<a href="#">Link to livestock planning prices in Ag Decision Maker</a>			
County in which land is located		Lucas	
Average Conservation Reserve Program payment in 2014	\$	121.43	
Annual Conservation Reserve Program payment expected	\$	150.00	per acre
Interest rate to charge on annual operating capital		7%	%
Interest rate to charge on intermediate capital		6%	%
Wage rate for crop production	\$	12.00	\$ / hour
Wage rate for livestock production	\$	12.00	\$ / hour
<b>Summary Comparison</b>			
<b>Alternative Land Uses</b>		<b>Alternative A</b>	<b>Alternative B</b>

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# Soils information and productivity

1 **Soils Information**

2 Soils information can be obtained from farm soil maps, or from the Web Soil Survey site. <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

3 Instructions about how to obtain information for your own farm from the site can be found at: <http://www.extension.iastate.edu/agdm/wholefarm/html/c2-87.html>

Unit	Parcel 1	Parcel 2	Parcel 3	Parcel 4	Parcel 5	Parcel 6	Parcel 7
4 County	Lucas	Lucas	Lucas	Lucas	Lucas	Lucas	Lucas
5 Soil Map Series (SMS)	23c	131c	364b	423d2	792d	822d2	993d2
6 Slope class (letter from SMS): enter A (none), B, C, D, E, F	c	C	C	D	d	D	D
7 Soil Series (see Web Soil Survey)	ARISPE	PERSHING	GRUNDY	BUCKNELL	ARMSTRONG	LAMONI	GARA-ARMSTRONG
8 Total Acres	143	30	15	19	21	10	27
9 Number of acres	143	30	15	19	21	10	27
10 Percent slope	%	5-9%	5-9%	2-5%	9-14%	9-14%	9-14%
11 Erosion class	Wtd. Average	SLI	SLI	SLI	MOD	SLI	MOD
12 T-factor	tons/ac/yr	3.0	3	3	3	3	3
13							
14 Corn Suitability Rating 2	CSR2	37	55	49	75	13	18
15 Projected corn yield with good management	bu./acre	155	188	182	194	118	129
16 Projected soybean yield	bu./acre	44.9	54.5	52.9	56.3	34.4	37.5
17 Projected oats yield	bu./acre	77.4	94	91	97	59	65
18 Projected alfalfa-brome yield	lbs/acre	8,656	11,333	10,222	11,778	5,778	6,667
19 Projected bluegrass yield	lbs/acre	4,723	6,123	5,530	6,518	3,160	3,555
20 Projected tall grass yield	lbs/acre	7,874	10,270	9,283	10,863	5,135	5,925
21							



# Budgets for livestock, crops and pasture

2 **Beef Cow-Calf Enterprise Budget**

3

4 Calves weaned per cow unit-% 9.2%

5 Cull cows sold annually-% of cows in herd 15%

6 Heifers retained annually per cow unit-% 15%

7 Years bulls kept 3

8 Number of cows kept per bull 30

9

10 **Per Cow Unit per Year**

	Quantity	Weight-cwt.	Price	\$/cow unit
11 Steer calves	0.46	6.00	\$ 175.00	\$ 483.00
12 Heifer calves	0.31	5.25	\$ 157.50	\$ 256.33
13 Cull cows	0.15	13.50	\$ 70.00	\$ 141.75
14 Cull bull	0.0111	20.00	\$ 87.50	\$ 19.44
15 Total income				\$ 900.53

16

17 **Breeding Stock**

	No. / Unit	Lb of DM / day	/Lb. body wt	Value / Head	
18 Cow with calf	0.92	0.03	\$ 1,800	\$ 1,656	
19 Dry cow	0.08	0.025	\$ 1,500	\$ 120	
20 Breed heifer	0.15	0.03	\$ 1,700	\$ 255	
21 Heifer yearling	0.15	0.03	\$ 1,000	\$ 150	
22 Bull	0.03	0.03	\$ 3,000	\$ 100	
23 Total breeding stock investment per cow unit				\$ 2,281	
24 Annual interest and insurance cost			7%	\$ 159.67	
25 Annual bull purchase cost	0.0111		\$ 3,000	\$ 33.33	
26 Annual replacement heifer cost	-		\$ 1,000	\$ 0	
27 Total breeding stock annual cost				\$ 193.00	



# Look up your farm



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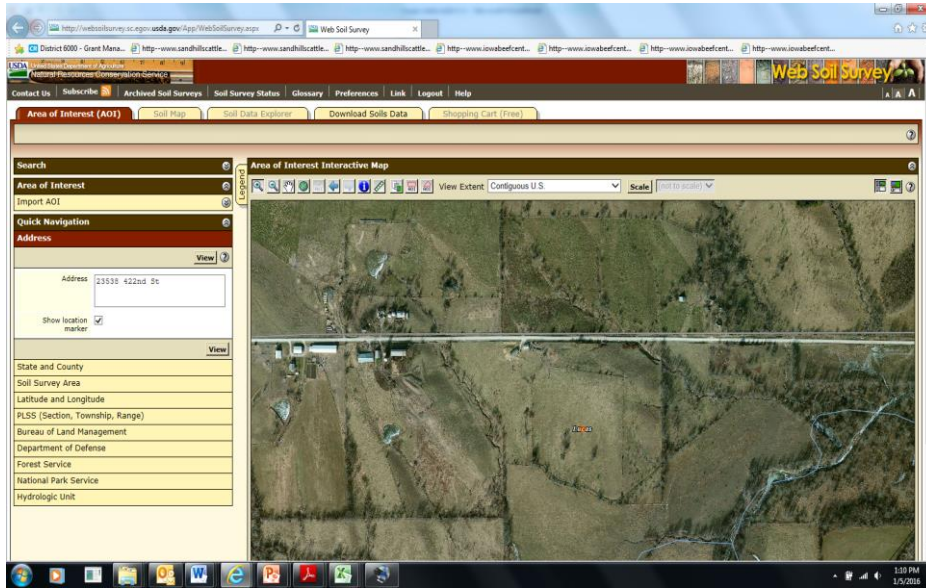


## Sellers farm example

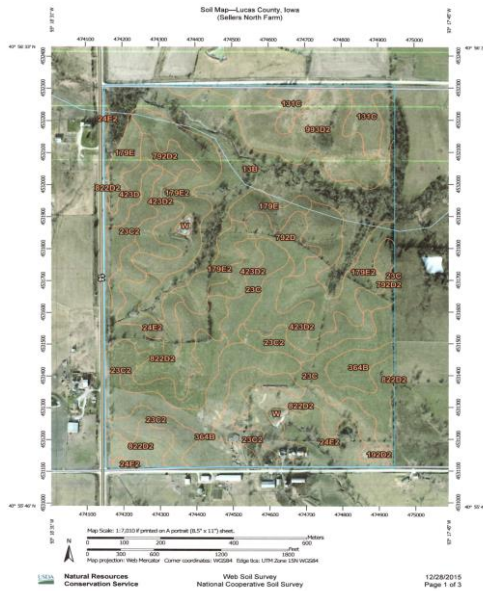
- The farm historically has been a mix of row crop, crop rotation and pasture
- Since 2000 100% forage
- Have used EQIP in past, currently in CSP, and have placed river bottom in WRP

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Soil Map—Lucas County, Iowa

Sellers North Farm

## Map Unit Legend

Lucas County, Iowa (A117)			
Map Unit Symbol	Map Unit Name	Acres in ADI	Percent of ADI
13B	Zook-Clemiz-Vesener complex, 0 to 8 percent slopes	37.8	16.0%
23C	Artsco silty clay loam, 5 to 9 percent slopes	15.3	6.5%
23C2	Artsco silty clay loam, 5 to 9 percent slopes, moderately eroded	36.4	11.2%
24E2	Ishery clay loam, 14 to 18 percent slopes, moderately eroded	14.0	5.9%
131C	Peru silt loam, 5 to 9 percent slopes	6.9	2.9%
179E	Gara loam, 14 to 18 percent slopes	6.9	2.9%
179E2	Gara clay loam, 14 to 18 percent slopes, moderately eroded	32.1	13.6%
162D	Adair clay loam, 9 to 14 percent slopes, moderately eroded	1.0	0.4%
364B	Grundy silty clay loam, 2 to 5 percent slopes	18.9	8.0%
423D	Bucknell silty clay loam, 9 to 14 percent slopes	2.6	1.1%
423D2	Bucknell silty clay loam, 9 to 14 percent slopes, moderately eroded	15.2	6.4%
762D	Armstrong loam, 9 to 14 percent slopes	4.2	1.8%
762D2	Armstrong clay loam, 9 to 14 percent slopes, moderately eroded	0.6	0.2%
822D2	Larson silty clay loam, 9 to 14 percent slopes, moderately eroded	27.3	11.8%
993D2	Gara-Armstrong complex, 9 to 14 percent slopes, moderately eroded	20.8	8.9%
W	Water	1.0	0.4%
Totals for Area of Interest		235.9	100.0%

USDA Natural Resources Conservation Service

Web Soil Survey National Cooperative Soil Survey

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## Breakdown

- 235 acres, all in pasture (north farm)
- 75 acres E and B slopes
  - Lower slopes, along streams
- 74 acres B and C slopes
  - Ridge tops, side hills
- 79 acres D slopes
  - Side hills

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## Soil erosion implications (Soil loss per acre, tons)

• Slope class	No till	Tilled
• C	4.0	11.0
• D	5.4	22
• E	9.8	27

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## Example output, comparisons

	D	E	F	G	H
	Alternative A	Alternative B	Alternative C	100% Pasture	100% CRP
	CS	CSOHH	CS		
38 Annual Net Returns to Land					
39 From harvested crops	\$ 10,069	\$ 2,010	\$ 4,872	\$ -	\$ -
40 From CRP	\$ -	\$ -	\$ -	\$ -	\$ 15,053
41 From livestock	\$ -	\$ -	\$ 5,506	\$ 11,195	\$ -
42 Minus:					
43 Annualized costs for conservation structures	\$ 159	\$ 113	\$ 100	\$ -	\$ -
44 Annualized conversion costs	\$ 1,116	\$ 1,116	\$ 1,387	\$ 272	\$ -
45 Annual Net Return after Conservation & Conversion Costs	\$ 8,794	\$ 781	\$ 8,890	\$ 10,923	\$ 15,053
46 Annual Net Return, \$ per acre	\$ 61.50	\$ 5.46	\$ 62.17	\$ 76.39	\$ 105.26
47					
48					
49 Soil Loss					
50 Soil Loss T-value, Tons per Acre per Year	3.0	3.0	3.0	3.0	3.0
51 Conservation structure	Contoured	Contoured	Contoured		
52 "No-till" tillage practices followed	Yes	Yes	Yes		
53 Estimated Soil Loss per Year	4.8	4.8	4.8		
54					
55					
56					

Estimated soil loss exceeds T-value. Estimated soil loss exceeds T-value. Estimated soil loss exceeds T-value.

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## Do an accurate comparison

- Real world numbers
  - Don't just use the example costs – use your own
  - Budgets for beef cow and row crop enterprises
  - Cost to convert back to pasture
  - Cost to continue in row crop

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## Whole farm return, 550 lb feeders

Feeder price	Return to land per acre
\$170	\$67.14
\$180	\$85.64
\$190	\$104.13
\$200	\$122.63

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## Whole farm, corn-soybean rotation

Grain price	Return to land per acre
• \$3.00 corn, \$8.00 SB	\$34.89
• \$3.50 corn, \$8.50 SB	\$75.05
• \$4.00 corn, \$9.25 SB	\$119.44

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## Return per acre, D slopes, 550 lb feeders

Feeder price	Return to land per acre
\$170	\$33.76
\$180	\$47.45
\$190	\$61.14
\$200	\$74.82

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## Return per acre, D slopes, corn-soybean rotation

- | • Grain price            | Return to land per acre |
|--------------------------|-------------------------|
| • \$3.00 corn, \$8.00 SB | -\$19.95                |
| • \$3.50 corn, \$8.50 SB | \$18.35                 |
| • \$4.00 corn, \$9.25 SB | \$58.75                 |

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## What should rent be?

- 2.5 – 3 % of land value?
  - Low grade land SC Iowa - \$2750 per acre
  - \$68-82/acre
- 2015 Iowa cash rent survey?
  - \$145 low 1/3 crop ground
  - \$72 improved pasture
  - \$46 unimproved pasture

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### Estimated Farmland Rental Rates – Iowa<sup>1</sup>

Year	Cropland				Pasture			
	Cash Rent, \$/acre	Change, Percent	Land Value, \$/acre	Rent as % of value	Cash Rent, \$/acre	Change, Percent	Land Value, \$/acre	Rent as % of value
1994	98.60	--	1,517	6.5%	26.40	--	480	5.5%
1995	99.60	1.0%	1,581	6.3%	28.10	6.4%	450	6.2%
1996	105.00	5.4%	1,810	5.8%	28.90	2.8%	575	5.0%
1997	110.00	4.8%	1,700	6.5%	31.10	7.6%	615	5.1%
1998	113.00	2.7%	1,860	6.1%	34.00	9.3%	665	5.1%
1999	112.00	-0.9%	1,900	5.9%	31.00	-8.8%	680	4.6%
2000	115.00	2.7%	1,940	5.9%	29.00	-6.5%	700	4.1%
2001	117.00	1.7%	1,980	5.9%	30.00	3.4%	730	4.1%
2002	120.00	2.6%	2,040	5.9%	30.50	1.7%	760	4.0%
2003	122.00	1.7%	2,120	5.8%	31.00	1.6%	800	3.9%
2004	126.00	3.3%	2,310	5.5%	32.50	4.8%	880	3.7%
2005	131.00	4.0%	2,760	4.7%	36.00	10.8%	1,070	3.4%
2006	133.00	1.5%	3,100	4.3%	38.00	5.6%	1,400	2.7%
2007	150.00	12.8%	3,600	4.2%	39.00	2.6%	1,780	2.2%
2008	170.00	13.3%	4,260	4.0%	42.00	7.7%	2,070	2.0%
2009	175.00	2.9%	3,980	4.4%	43.00	2.4%	1,850	2.3%
2010	176.00	0.6%	4,450	4.0%	40.00	-7.0%	2,030	2.0%
2011	196.00	11.4%	5,600	3.5%	46.00	15.0%	2,520	1.8%
2012	235.00	19.9%	6,810	3.5%	46.00	0.0%	2,800	1.6%
2013	255.00	8.5%	8,000	3.2%	49.00	6.5%	3,220	1.5%
2014	260.00	2.0%	8,750	3.0%	50.00	2.0%	3,400	1.5%
2015	250.00	-3.8%	8,200	3.0%	50.00	0.0%	3,400	1.5%

<sup>1</sup>Prepared from data collected by the USDA, National Agricultural Statistics Service.

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## Obstacles to starting new pastures

- Water
  - EQIP, look at many options
- Fencing
  - Cost share, look at electric internal fencing
- Cost of seeding establishment
  - Look at EQIP, etc

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# Estimated costs of pasture and hay production, A1-15

Page 2 Estimated Costs of Pasture and Hay Production

Table 1. Summary of pasture improvement costs. <sup>a/</sup>

	Initial Cost Per Acre					Killed Sod, No-Till Renovation
	Grass Improve- ment	Grass Seeding	Legume- Grass Mix	Inter- Seeding	Frost Seeding	
Machinery	\$18.20	\$60.30	\$60.30	\$28.20	\$23.00	\$28.20
Lime and fertilizer	67.20	163.00	145.00	106.50	106.50	106.50
Herbicide	13.13	0.00	0.00	6.56	9.84	0.00
Sod suppression				6.56	0.00	0.00
Burn-down existing sod				0.00	0.00	10.00
Seed	0.00	28.30	60.90	35.15	42.25	48.70
Labor	7.02	21.65	21.65	8.19	7.02	8.19
Total Cost per Acre	\$105.55	\$273.25	\$287.85	\$191.17	\$188.61	\$201.59
Total Cash Cost per Acre	\$88.53	\$220.90	\$235.50	\$172.98	\$168.69	\$183.40
Expected Life in Years		10	5	5	5	7

Annual Pasture Cost Per Acre

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## Estimated costs for livestock fencing – D1-75

Table 5. Construction costs for electrified polywire fence (for interior use)  
(Based on a 1,320 ft. fence)

Item	Amount	Cost per unit	Total cost
Wood posts (4-in diameter)	2	\$ 9.00	\$18.00
Fiberglass posts (1/2-in x 4 ft)	33	1.75	57.75
Insulators	2	.80	1.60
Post clips	42	.30	12.60
Polywire	1,320 ft	.03	39.60
Energizer	.25	110.00	27.50
Cut-out switch	1	7.50	7.50
Ground/lightning rods	4	16.00	64.00
Labor and equipment	2 hr	16.25	32.50
Total			\$ 261.05
Total per foot			\$ 0.20
Cost for adding 1 strand of polywire (wire, clips, insulators)		53.80	53.80 or .04 per ft.

Table 6. Annual average ownership cost by fence type (Based on a 1,320 ft. fence)

Item	Woven Wire	Barbed Wire	Hi Tensile Non-Electric (8-strand)	Hi Tensile Electric (5-strand)	Electrified polywire
Estimated useful life (yr)	20	20	25	25	4
Average annual maintenance (% of initial cost)	8%	8%	5%	5%	5%
Depreciation	\$ 128	\$ 97	\$ 65	\$ 47	\$ 65
Interest on investment (4%)	102	78	65	47	10
Maintenance	204	156	182	59	13
Total cost/year	\$ 434	\$ 331	\$ 214	\$ 150	\$ 88
Total cost/foot/year	\$ 0.33	\$ 0.25	\$ 0.16	\$ 0.12	\$ 0.07

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## **How can we maintain or increase cow numbers with less grass acres?**

- Increase pasture production and utilization with better management
- Use a combination of grazing and feeding
- Use of cover crops for soil benefits, potential livestock feed
- Use of crop residues and coproducts

## **Improve pasture production**

- Move more often, proper rest period
- Increase utilization from 30 to 60%
- More plant diversity
- Maintain adequate residual grass height
- Extending grazing season

## Utilization Rates

	Full Season	Spring
Continuous Grazing	30-35%	30-35%
14 Days (2-4 Paddocks)	35-40%	40-50%
6-8 Days (3-7 Paddocks)	45-55%	50-55%
2-3 Days (6-15 Paddocks)	55-60%	55-60%
Daily (25-35 Paddocks)	60-70%	55-60%
2/Day (45-60 Paddocks)	70-75%	55-60%

## Combination of grazing and feeding

- Strategic supplementation on grass
- Higher stocking rates spring, drylot or sacrifice paddock in summer, graze early fall
- Combination of perennials, annuals and residue

## **Grazing or harvesting corn crop residue**

- Corn stover underutilized asset
  - 180 bushel corn per acre – 2880 lbs. husks and leaves, available to graze or harvest
- Need cooperation between crop farmer and livestock owner
  - Research shows well managed grazing does not reduce subsequent yield
- Harvesting requires replacing nutrients removed

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## **Potential to graze or harvest cover crops**

- Need to balance agronomy and livestock nutrition goals
- Most likely to get yields in spring on late summer/early fall cereal grains
- Insurance, soil, agronomic and livestock interactions with harvest/grazing dates

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## Iowa producers looking for different cow-calf management systems

- Extended grazing
- Traditional 50/50 hay and graze
- Limited grazing or drylot/confinement
- New Leopold Cow Systems project

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## Cow herd is expanding – how do we keep profitable?



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## **Iowa Beef Center Cow Systems Project**

- Funding from Leopold Center (3 years)
- 27 cooperators in Iowa
- Looking at factors that make different cow calf production systems work

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## **What could the impact be of more diversity?**

- Decreased soil erosion
- Improved water quality
- Balance risk with more income streams

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## Cow calf systems use forages from marginal soils



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## Resources

- Ag Decision Maker
  - Livestock Enterprise Budgets
  - Crop Budgets
  - Estimated Costs of Pasture and Hay
  - Crop and Livestock Land Use Analyzer
- <http://www.extension.iastate.edu/agdm/>

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## Questions???

- Iowa Beef Center  
– [iowabeefcenter.org](http://iowabeefcenter.org)

- Joe Sellers  
– 641-203-1270

– [sellers@iastate.edu](mailto:sellers@iastate.edu)

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