Managing Cattle with Limited Forage

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What do your cows weigh?

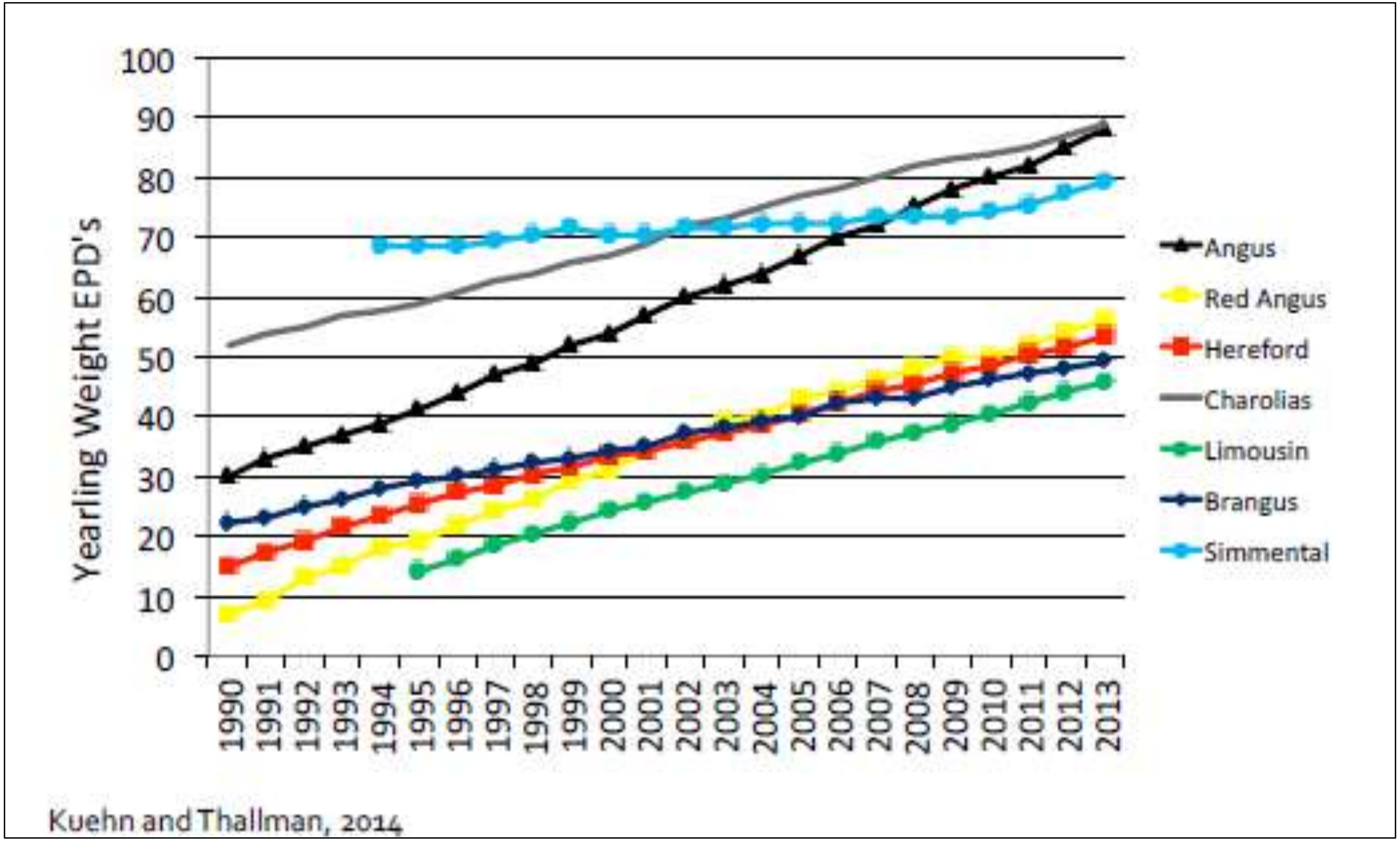
Have their mature weights increased over the years?

- In order to determine the optimum stocking rate, you must have an idea of the weight of your cows.

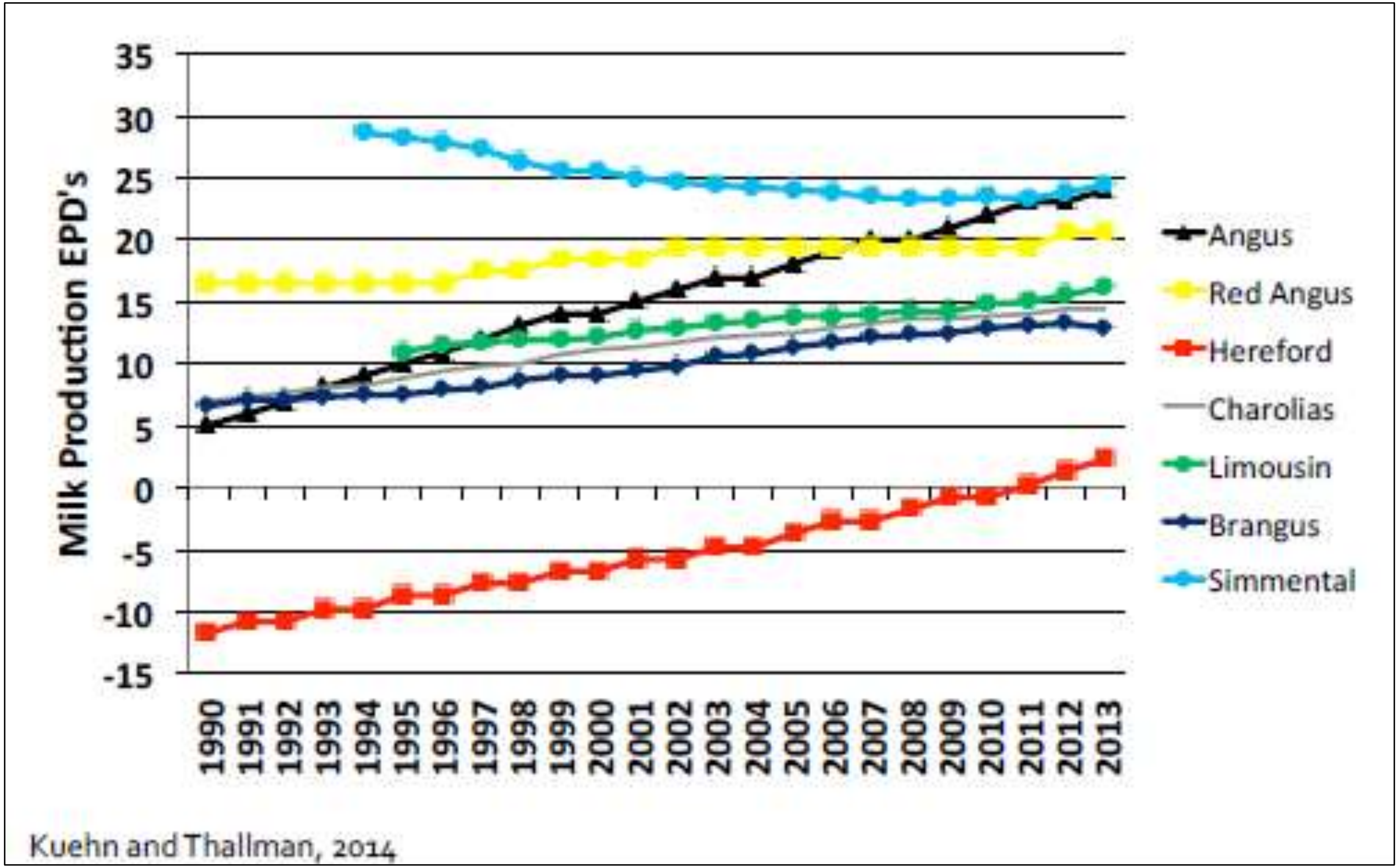
Industry Trends

- Selection for increased weaning and yearling growth has been steady since 1990 according to most breeds' genetic trend data.
- Similarly, milk EPD in some breeds has consistently increased while other breeds' genetic trend is negative or static.

Genetic Trend for Yearling Weight



Genetic Trend for Milk Production



Mature Weights of Cows by Sire Breed

Breed	5-year-old weight, lbs*
Hereford	1,419
Angus	1,410
Red Angus	1,409
Simmental	1,404
Gelbvieh	1,323
Limousin	1,391
Charolais	1,371

*Adjusted to BCS of 5.5

50 lbs Difference in Average Bodyweight!

U.S. Meat Animal Research Center, Germ Plasm Evaluation Program, Cycle VII

How does cow size and milk production effect maintenance requirements?

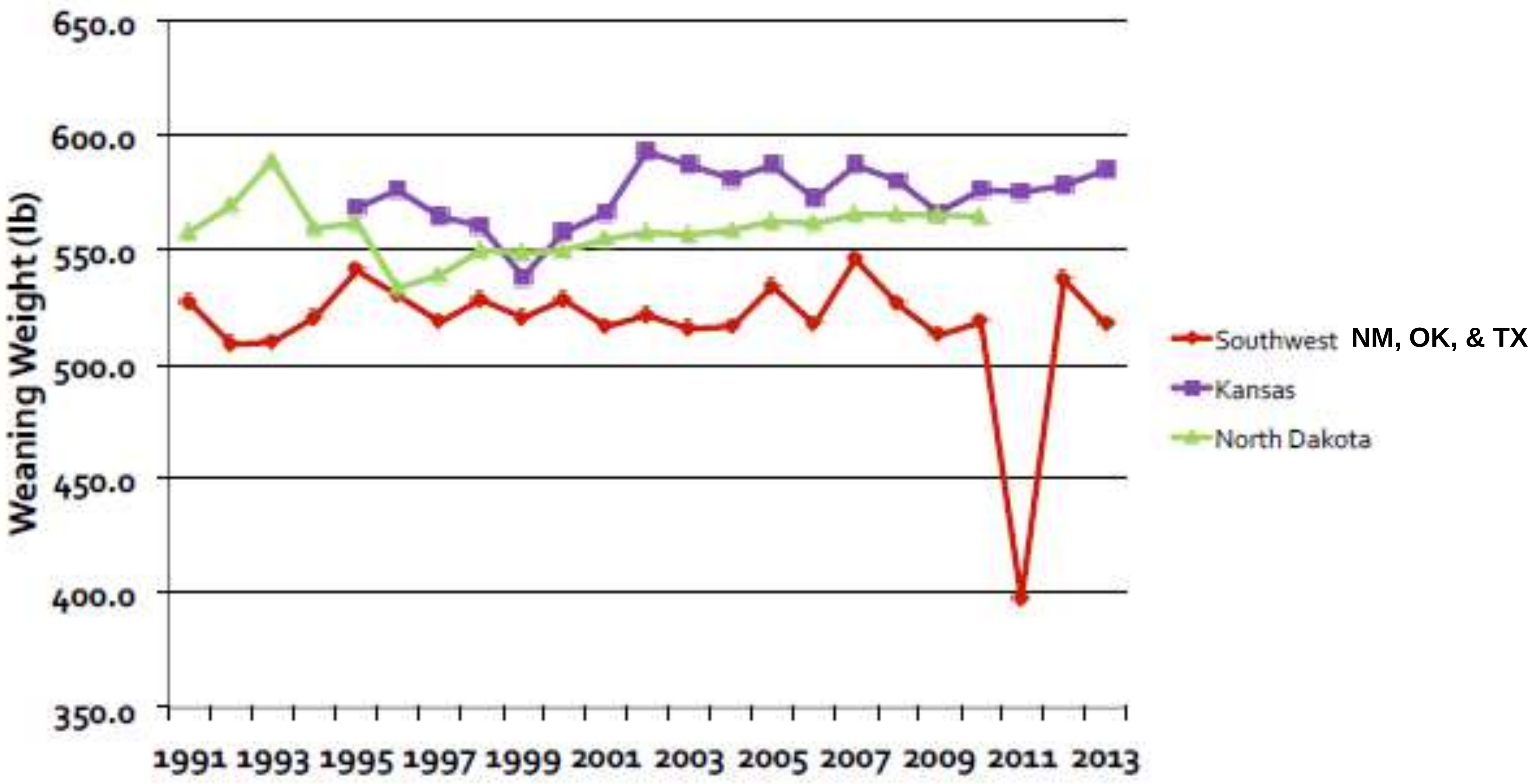
- **Larger cows have greater requirements.**
  - NEm requirements increase ~5.9% for each 100 lb increase in cow weight.
  - Feed intake increases ~6.2% for each 100 lb increase in cow weight (~620 lb more forage/year, as fed basis).
- **More milk = higher year-long maintenance requirements (NEm)**
  - Cows that produce more milk have larger internal organs (relative to live weight: rumen, small and large intestines, liver, heart, kidney).
  - Size of internal organs has major effect on maintenance energy requirements.
  - GI tract and liver make up less than 10% of cow's body mass. But combine to use 40 to 50%of total energy expenditures in a beef cow.

Industry Trends

- Selection for increased growth through weaning has led to bigger, heavier cows.
- Available data suggest that the average cows weighs around 1400 lbs.
  - Increase of 200 to 250 lbs in last 20 to 25 years
- Have stocking rates been adjusted appropriately?
- Increased growth and increased milk should lead to **increased weaning weights** provided that genetic expression for milk and growth is **not** limited by the environment.

Have weaning weights increased over time?

Weaning Weight in Commercial Cow/Calf Operations



Effect of Cow Size on Calf Weaning Weight

- 2013 Auburn University: data on 373 calves weaned during 2006-2012 and BW of their respective dams.
  - Increase in cow BW of 100 lb only increased calf weaning BW by **4.9 lb**
- 2010 OSU Study: data was collected on 737 cow/calf pairs over 6 years from a commercial Angus and Angus x Hereford commercial cowherd calving in spring or fall seasons and grazing native tallgrass prairie or bermudagrass pasture.
  - Increase in cow BW of 100 lb increased calf weaning BW by **10 lb**
- 2011 OSU study: data was collected on 1,111 calves in a Brangus cow/calf operation at the USDA Grazinglands Research Laboratory in El Reno, OK. Cows grazed abundant native rangeland over an 8 year period.
  - Increase in cow BW of 100 lb increased calf weaning BW by **2.34 lb**
- **Average increase across studies: 5.75 lb**

Does this pay?

- Recent value of added gain ranges from about $0.80 to $1.20 per lb
- Apparent maximum value = $1.20 x 10 = $12.00
- Apparent minimum value = $.80 x 2.3 = $1.84

Annual cost/100 lb of additional cow weight = $42
(Doye and Lalman, 2011)

Cow Size: Conclusions

- Beef industry has been selecting for faster growth rates (larger weaning and yearling weight EPDs).
- As a result, cows are getting **BIGGER**.
- Cows are **NOT** getting taller.
- Data clearly suggest that heavier cows are less efficient than smaller cows.
- Beef industry has been selecting for greater milk production
- Higher milking cows are less efficient than low milking cows

Conclusions (Continued)

- No strong evidence that commercial cow efficiency has improved ("sell at weaning" context)
- The result: feed inputs/costs per cow/calf unit are increasing while limited data suggests that production is not.
- During the drought, did we make a bad situation worse by failing to account for **Heavier Cows** in determining optimum stocking rates???

USDA-NRCS Suggested Stocking Rates for Beaver County (1 AU = 1000 lb cow)

Section of County	Normal Precipitation	Drought
Eastern half	20 acres/AU	30 to 40 acres/AU
Western half	25 to 30 acres/AU	40 to 50 acres/UA

How does cow size affect AU?

Cow		Calf				Yearly
BW	AU	Birth	Weaning	Average	AU	AU*
1000	1.0	70	550	310	0.41	1.24
1200	1.2	80	590	335	0.44	1.45
1400	1.4	90	630	360	0.46	1.67

***Assume calves weaned at 7 months: use cow AU for 5 months and cow + calf AU for 7 months.**

Eastern Beaver County

Assume 1,000 acres

Cow BW	# Pairs	Avg WW	Total WW	$/hd*	Total $
Normal Spring (20 acres/AU)					
1200	34.4	590	20,296	$1,563.50	$53,784.40
1400	30.0	630	18,900	$1,606.50	$48,195.00
Diff			-1,396		-$5,589.40
Drought (35 acres/AU)					
1200	19.7	590	11,623	$1,563.50	$30,800.95
1400	17.1	630	10,773	$1,606.50	$27,471.15
Diff			- 850		-$3,329.80

*590 lb calf sells @ $2.65/lb
630 lb calf sells @ $2.55/lb

Western Beaver County

Assume 1,000 acres

Cow BW	# Pairs	Avg WW	Total WW	$/hd*	Total $
Normal Spring (27.5 acres/AU)					
1200	25.0	590	14,750	$1,563.50	$39,087.50
1400	21.8	630	13,734	$1,606.50	$35,021.70
Diff			-1,016		-$4,065.80
Drought (45 acres/AU)					
1200	15.3	590	9,027	$1,563.50	$23,921.55
1400	13.3	630	8,379	$1,606.50	$21,366.45
Diff			-648		-$2,555.10

*590 lb calf sells @ $2.65/lb
630 lb calf sells @ $2.55/lb

Managing Cattle with Limited Forage

Managing Cattle with Limited Forage

- Strategies
  - Culling
  - Early Weaning
  - Limit feeding concentrate instead of hay
  - Limit feeding hay instead of free-choice
  - Using better hay feeders
  - Use an ionophore (monensin)
  - Ammoniating low quality roughage

Cull Poor Producing Cows

1. Open (non-pregnant) old cows
2. Open replacement heifers
3. Old cows with unsound mouth, eyes, feet and legs
4. Open cows of any age
5. Thin cows over 7 years of age (BCS < 4)
6. Very late bred 2 year olds

Early Weaning

- Wean calves sooner rather than later (150 vs. 210 days of age)
- Market calves now or feed for a short period then sell

Why early wean?

- Nutrient requirement of a dry cow are ~50 to 65% of that of a cow nursing a calf
- Cows consume 15-20% less forage when no longer lactating
- Cows will maintain body condition and re-breed easier
- Maintains 12 month calving interval

Limit Feeding Concentrate

- Viable option due to feed costs?
- Reduce forage intake by 70- 80% by limit feeding higher levels of grain
    - 0.5% BW hay/day (1400 lb cow: 7 lb hay)
- **Long term, you can't feed your way out of a drought!**

Limit Feeding Hay

- Reduce hay intake = reduce waste and increase digestibility
  - Roll out: feed predetermined amount
  - Limit access to bales
- Need to consider hay quality, cow stage of production, cow condition, etc.
- Strategic supplementation

Restricting Time of Access to Hay

Item	6 hrs	24 hrs	Difference, %
Exp. 1: 17.6% CP hay*			
Hay DM Intake, lb/day	24.5	34.2	28.4
Hay DM waste, %	23.2	39.5	41.3
Cow BW change	161	207	22.2
Exp. 2: 15.4% CP hay*			
Hay DM Intake, lb/day	23.6	28.4	16.9
Hay DM waste, %	16.1	16.4	1.8
Cow BW change	141	168	16.1
Exp. 3: 9.6% hay**			
Hay DM Intake, lb/day	21.2	27.4	22.6
Hay DM waste, %	0.8	7.7	89.6
Cow BW change	27.3	51.2	46.7

*Miller et al., 2007: Illinois research

**Jaderborg et al., 2011: Minnesota research

Using Better Hay Feeders

Modified Cone (MCONE)

Open bottom steel ring (OBSR)

Polyethylene Pipe (POLY)

Sheeted bottom steel ring (RING)

Sexten et al., 2011

Effect of Feeder Design on Waste

Item	Feeder			
	MCONE	OBSR	POLY	RING
Total waste, lb	71[a]	283[b]	294[b]	170[c]
Waste, % of bale wt	5.3[a]	20.5[b]	21.0[b]	13.0[c]

Sexten et al., 2011

Hay Wastage

How much does wasted hay really cost?

Savings		$ Wasted/feeding period*			
	Cost/ton, $	**MCONE**	**OBSR**	**POLY**	**RING**
$195	**50**	68.14	263.57	270.0	167.14
	75	102.21	395.36	405.00	250.71
$391	**100**	136.29	527.14	540.00	334.29
	125	170.36	658.93	675.00	417.86
$586	**150**	204.43	790.71	810.00	501.43
	175	238.50	922.50	945.00	585.00
	200	272.57	1054.29	1080.00	668.57

***Assumptions: 120 day feeding period**
1500 lb average bale weight
Feeding 2 bales/week

Hay Feeder vs. Bale Rolled Out

- 2006 3-year North Dakota study
- Cows fed 59 days during late gestation
- Fed enough hay to maintain or improve body condition prior to calving
- Three treatments:

Bale rolled out

Bale Processor

Tapered Cone Feeder

Landblom et al., 2006

Performance Results

Item	Bale Roll Out	Bale Processor	Cone Feeder
Cow wt change, lb	50[a]	66[b]	79[b]
ADG, lb	0.85[a]	1.12[b]	1.34[b]
BCS Change	-0.04	0.029	0.07
Hay Disappearance, lb	34.4[b]	35.9[c]	31.2[a]

- Cone feeder vs. bale roll out:
  - Gain: +58%
  - Hay disappearance: -9.3%
  - Wintering cost for 100 cows for 135 days (hay + equipment + fuel + labor): -9%

Hay Wastage

Cone feeder vs. bale roll out:

- **Year 2: dense, tightly tied alfalfa-grass bales**
  - ➢ **Waste reduced by 80%**
- **Year 3: loose, poorly tied oat bales**
  - ➢ **Waste increased by 87%**

Alfalfa-Grass Bales

Oat Bales

Use an Ionophore (Monensin)

Effect of Ionophore on Cow Performance

Sexten et al., 2011: Fed 3 lb/day of 33% CP CSM based pellet with either 0 or 200 mg of monensin (58 day trial)

	Supplement		
Item	Con	Rum	P-value
Initial wt, lb	1083	1091	0.79
Initial BCS	5.15	5.21	0.70
DMI, % of BW	1.69	1.75	0.45
Change in wt	35	65	0.04
Change in BCS	0.13	0.57	0.01
ADG, lb/d	0.62	1.12	0.04

Ionophore cost: ~2 to 2.5¢/day

Managing Cattle with Limited Forage: Conclusions

- Combining 2 or more feeding strategies (limit feed hay, hay feeder, feed monensin) could:
  - Reduce hay use by 30 to 40%!
  - Reduce winter feed costs by 15 to 30%!
- It will require more skilled management and planning.

“Standard” vs. “Technology” Management on Cow Performance and Hay Disappearance

- 72 gestating Angus and Angus X Hereford cows fed 84 days
- All cows fed prairie hay (6.2% CP) free choice + 1 lb/day of 38% CP supplement (CSM based)
- Two treatments:
  - “Standard”
    - 24 hour access to hay
    - Open bottom steel ring feeder
    - No feed additive
  - “Technology”
    - 7 hour access to hay
    - Modified cone feeder
    - 200 mg Rumensin per cow per day in supplement

Sparks et al., 2013

"Standard" vs "Technology" Management on Cow Performance and Hay Disappearance

	Management		
Item	**Standard**	**Technology**	**P-value**
Weight change (84 days), lb	10	23	0.33
BCS change	+0.47	+0.29	0.28
Hay disappearance, lb/day	26.6	22.0	0.03
Bale weight wasted, %	24.9	11.9	0.01

- Performance did not differ between treatments.
- Yet, with technology, hay disappearance was reduced by 17.3%.
- Hay wastage was reduced by 52% with technology.
- Cost per cow over 84 days was $11.80 less with technology.

Thank You!

Questions?

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Anhydrous Ammonia Treatment

- Anhydrous ammonia treatment of cereal grain straws
  - Can serve as source of NPN
  - Must be treated in air-tight structure to prevent ammonia loss
- Research has shown ammoniation to increase both digestibility and intake
- Increases crude protein content of straw

Ammoniation Procedure

- Stack bales in a 3,2 or 3,2,1 arrangement, leaving 2-3 inches between bales
- Cover stack with 6 mil thick black plastic
- Seal edges with approximately 12 inches of soil
- Apply approximately 3% ammonia of the total dry stack weight (60 lbs/dry ton) and leave covered for specified amount time depending on temperature

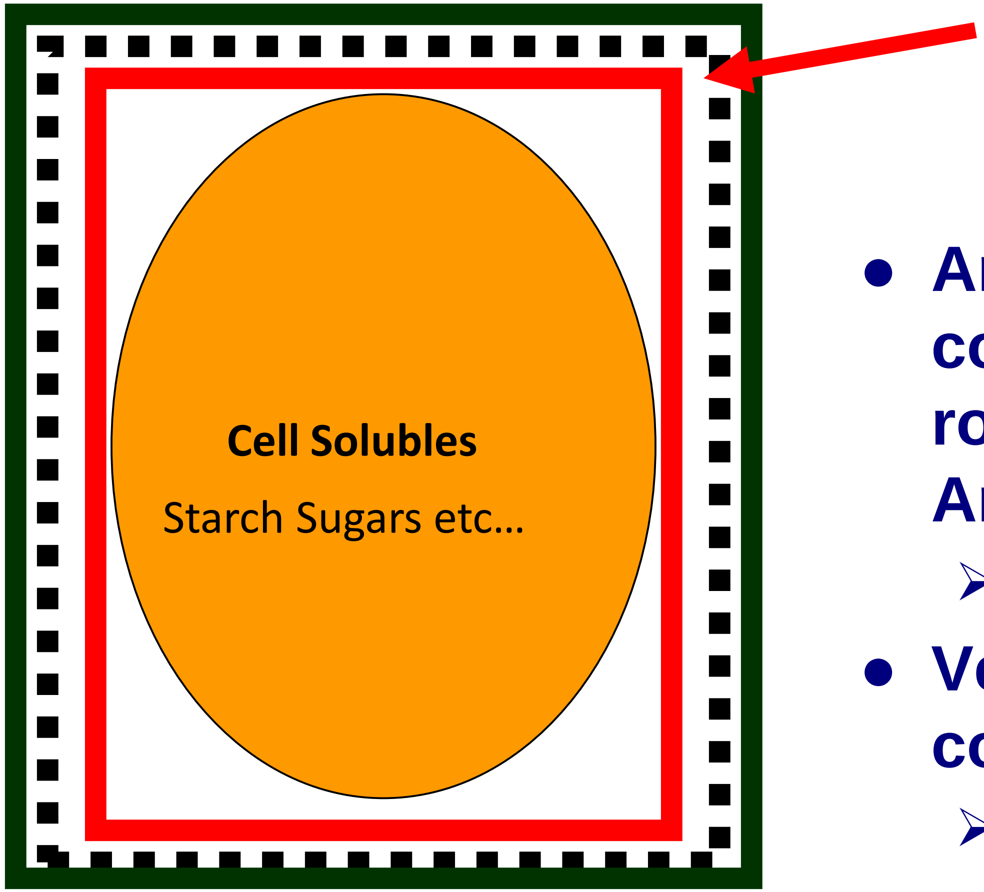

DEERE

Length of time stack needs to remained covered

Temperature, ºF	Weeks of Treatment
Below 40	8 plus
40-60	4 to 8
60-80	2 to 4
Above 80	2

Keeping the plastic in one piece is the greatest challenge of ammoniating hay…treating during warmer temperatures is best

How does ammoniation work?



Cell Wall

Hemicellulose, Cellulose, Lignin

- **Anhydrous ammonia combines with moisture in roughage to form: Ammonium Hydroxide**
  - $NH_3 + H_20 = NH_4OH$
- **Very strong alkaline compound**
  - **Solubilizes hemicellulose by breaking chemical bonds holding lignin & hemicellulose together**
  - **Partially breaks down structure**

Ammoniation of Low Quality Forages

- SAFETY

- Only clean low quality forages are good candidates for ammoniation
  - Very few weeds
  - Less than 5% crude protein

- Toxic compounds may be created if moderate quality forages are ammoniated
  - 4-methylimidazole is formed when ammonia reacts with soluble sugars

1981 OSU Research
(Dry Beef Cows)

		Drylot	
	Native Range	Untreated Straw	Ammoniated Straw
Straw CP, % of DM		4.2	8.7
Straw, DM digestibility		47.0	56.6
Straw Intake, % of BW		1.50	1.81
ADG, lb	0.52	0.09	0.40