Alternative and Co-Product Feeds for Supplementation

NRCS Little Beaver Conservation District
2015 Soil Health Workshop

Doug Landblom, Beef Cattle Specialist
Dickinson Research Extension Center

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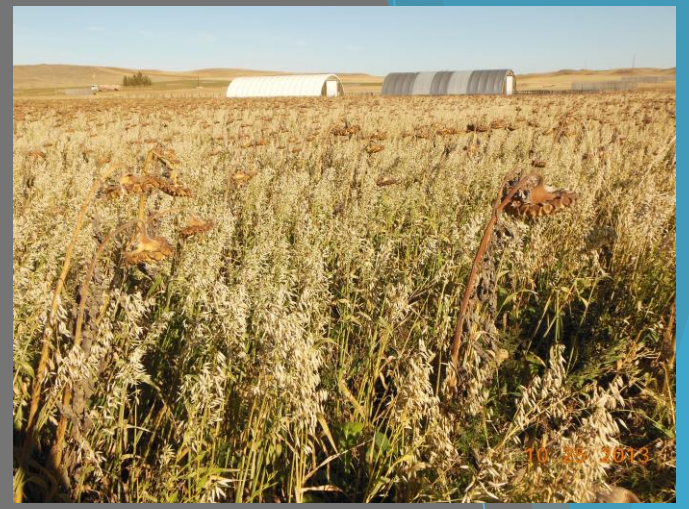
Alternatives – Reducing the Carbon Footprint

- Grazing is the easiest way to harvest feed, increase animal performance, and reduce carbon emissions into the atmosphere.
- There are dual purpose crops can be grazed or harvested mechanically that fit well into cropping systems . . . Feeding the soil and producing above ground biomass.
- Co-products of the milling and processing industry provide the cattle industry with a plethora of high quality feeds that are ideal for supplementing forages.



Co-Products – Types

- Staws and fibrous co-products
- Roots and Tubers
- Grains, grain co-products and screenings
- Oilseeds and oilseed co-products
- Liquid co-products

	CP	UIP	TDN	NEm	NEg	ADF	Ca	P	S
BARLEY GRAIN	13.5	27.0	84.0	0.94	0.64	7.0	0.05	0.47	
BARLEY MALT SPROUT PEL*	14.0	-	74.0	0.77	0.52	15.0	0.14	0.56	
BEET PULP *	9.1	30.0	72.0	0.77	0.49	31.0	0.72	0.20	
DRY EDIBLE BEAN CULLS	24.4	20.0	78.0	0.81	0.56	16.0	0.15	0.59	
CANOLA MEAL	43.6	28.0	69.0	0.73	0.45	18.0	0.67	1.00	
CORN GRAIN	10.0	60.0	90.0	1.02	0.70	3.0	0.02	0.31	
CORN (DDGS) *	29.5	60.0	86.0	0.96	0.66	17.0	0.10	0.40	0.37 – 1.12
DRY CORN GLUTEN FEED *	21.5	20.0	78.0	0.92	0.62	8.4	0.02	0.31	
FIELD PEA*	23.6	30.0	90.0	1.02	0.70	8.0	0.15	0.44	
FIELD PEA SCREENINGS	23.6	-	80.0	0.88	0.59	8.0	0.14	0.48	
FLAX	22.8	-	110.0	1.28	0.89	8.0	0.26	0.56	
HULL-LESS OAT	17.8	30.0	93.0	0.97	0.67	4.0	0.11	0.44	
OAT GRAIN	13.6	30.0	77.0	0.84	.055	-	0.07	0.36	
SAFFLOWER MEAL	25.4	20.0	57.0	0.55	0.29	41.0	0.37	0.81	
SUNFLOWER MEAL *	38.9	20.0	64.0	0.65	0.35	28.0	0.39	1.06	
SOYBEAN HULLS*	12.4	30.0	80.0	0.83	0.57	45.0	.059	0.17	
WHEAT MIDDLINGS*	18.7	20.0	80.0	0.87	0.59	11.0	0.16	1.01	

Characteristics – Highly Digestible Fiber Co-products

- Barley Malt Sprouts – Consist of barley malt sprouts and some thin barley. BMS are moderately high in crude protein (16%) and energy (74%). Valuable in creep feeds and backgrounding supplements.

- Beet Pulp – Low protein (9.1% CP) high energy supplement (72 % TDN). Energy content is similar to oats. Best use is in backgrounding diets and specialty feeds. In finishing diets, BP can be used as a roughage source with an energy value greater than corn silage. Price and availability may limit its use. Mostly rumen degradable (30% UIP). Good source of calcium and phosphorus.

- Corn Gluten Feed (Dry) – Corn gluten feed is moderately high in protein (20-25% CP), low in starch, and is high in digestible fiber. Low calcium and moderately high phosphorus content. Can be used in many types of beef cattle rations.

- Corn DDGS – Co-product of the corn ethanol industry. Corn DDGS is very palatable protein (29% CP) and energy (86% TDN) feed. A relatively high proportion of the protein escapes rumen degradation making it an ideal supplement to feed in combination with high rumen degradable ingredients. The optimum level of inclusion in rations is 30.0%, but up to 40% has been fed without problems. Contains high sulfur levels (0.37-1.12%) due to sulfuric acid addition during fermentation. Water sulfur levels need to be checked. Total dietary sulfur intake from feed and water should be less than 0.40%.

Characteristics – Highly Digestible Fiber Co-products

- Sunflower Meal – A high protein (35-39% CP) lower energy supplement that works well in beef cattle rations. The protein is highly rumen degradable and the protein and energy levels are affected by the amount hull that is added back to the meal after oil extraction. Contains a moderately high level of calcium (0.39%)and very high phosphorus content (1.06%)

- Soybean Hulls – Crude protein (12.1%) is somewhat low and largely rumen digestible, but due to the high digestible fiber content from hemicellulose, the energy level (80% TDN) is high.

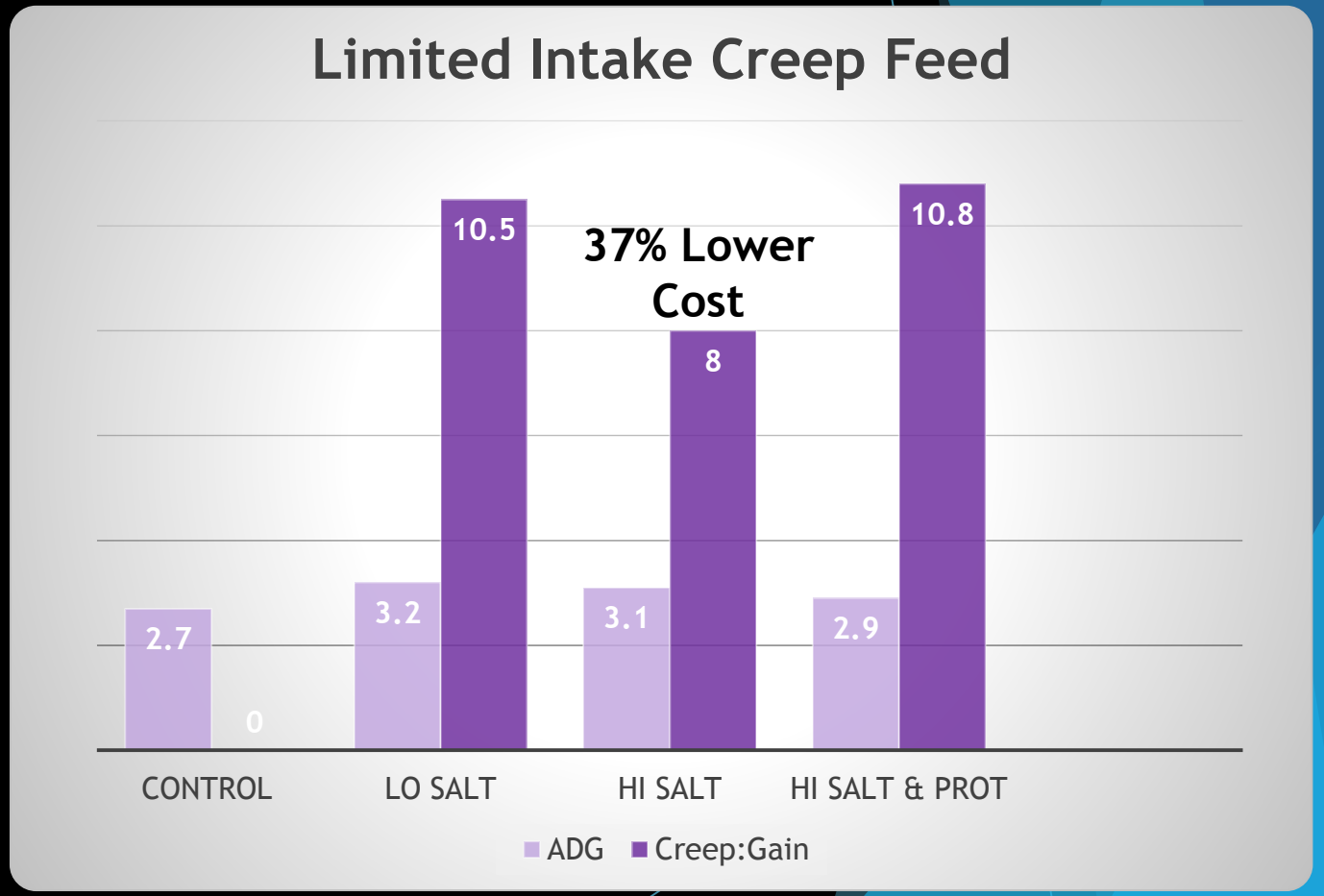
- Wheat Middlings – A moderately high protein (18.7% CP) that is largely rumen degradable. The fiber content is highly digested by ruminants and is a good source of phosphorus and potassium, but a typically low source of calcium.

Pasture Supplementation – Creep Feed –

- Unrestricted creep intake can result in costly over consumption.
- Salt is a cheap and effective way to limit intake in self-fed supplements.
- Creep Feed:
  - Peas, Wheat Midds & SBOM
  - 2 Levels of crude protein - 19 and 33.5%
  - 3 Levels of salt - 0, 8, and 16%
- 3 – 35 day creep periods
  - Period 1 – No Salt
  - Period 2 – 8% Salt
  - Period 3 – 16% Salt

Intake Limited Creep Feed

	Low Salt	Hi Salt	Hi Protein
Salt Level	8	16	16
Protein Level	19.0	19.0	33.5
Peas	56.3	51.0	18.3
Wheat Midds	24.3	24.3	0.0
Soybean Meal	4.9	4.9	59.0
Molasses	5.9	5.9	5.9
(Landblom et al. 2003)			

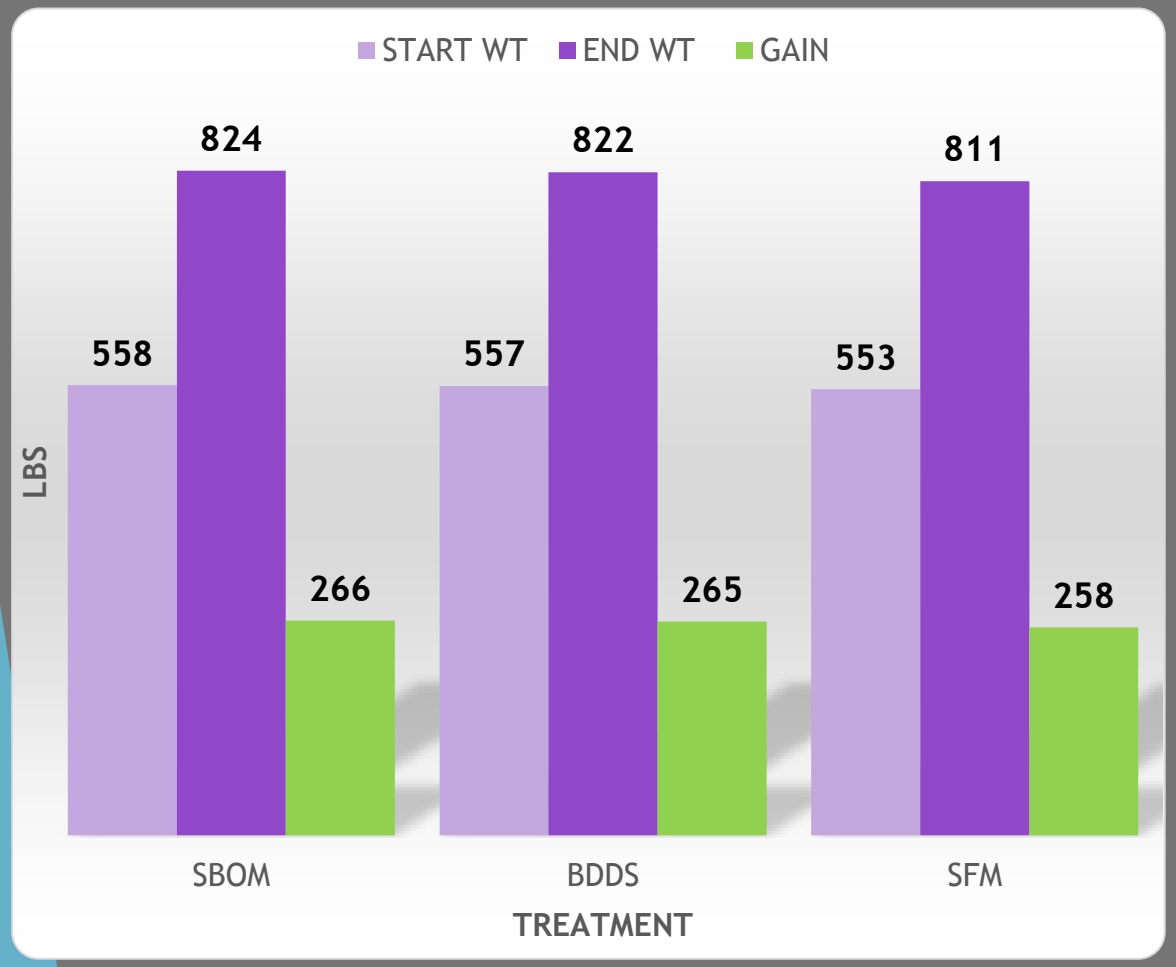


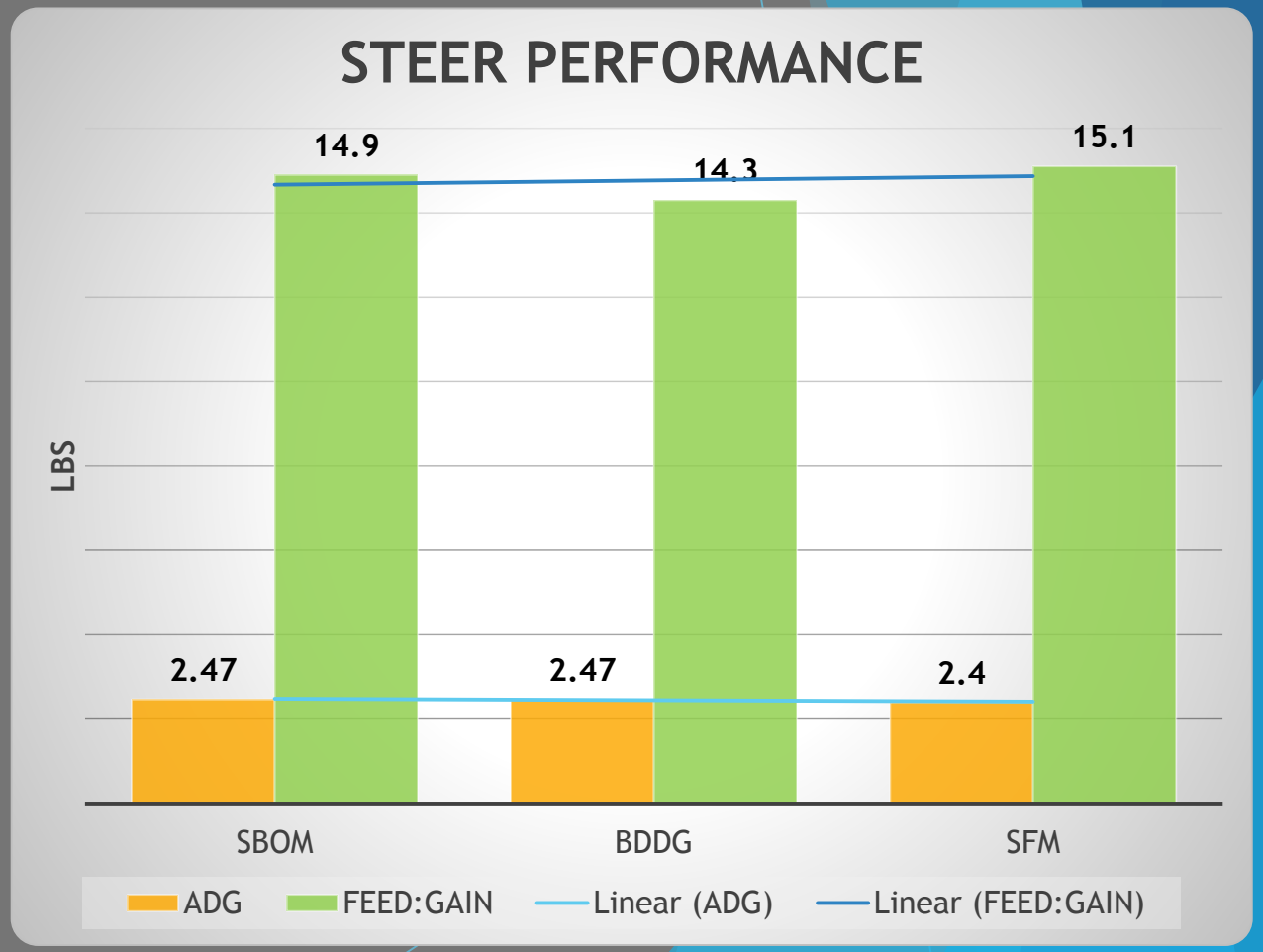
Backgrounding Supplement – Sunflower Meal (Landblom et al. 1987)

- Nutrients in sunflower meal (SFM) can be variable due to:
  - Oil content of the seed
  - Extent of hull removal
  - Efficiency of oil extraction
- Crude Protein can range from 26 to 40%; most common is 34-38%
- Dry SFM can be stored for extended periods of time.
- SFM protein is highly rumen digestible (74-80% RDP).
  - SBOM protein is 66% rumen degradable
  - Canola Meal protein is 68% rumen degradable
- In a 110 day study, C x A x H steers averaging 556# were used to compare SFM, SBOM, and barley distillers dried grain (BDDG)

Comparison of SFM, SBOM, & BDDG

	SBOM	BDDG	SFM
SBOM	6.9	-	-
SFM	-	-	11.0
BDDG	-	19.0	-
BARLEY	21.5	19.7	22.0
WHEAT STRAW	13.8	14.3	15.1
CORN SILAGE	34.8	25.0	27.9
MIXED HAY	23.5	19.9	21.7


START WT
END WT
GAIN
824
822
811
558
557
553
266
265
258
LBS
SBOM
BDDS
SFM
TREATMENT

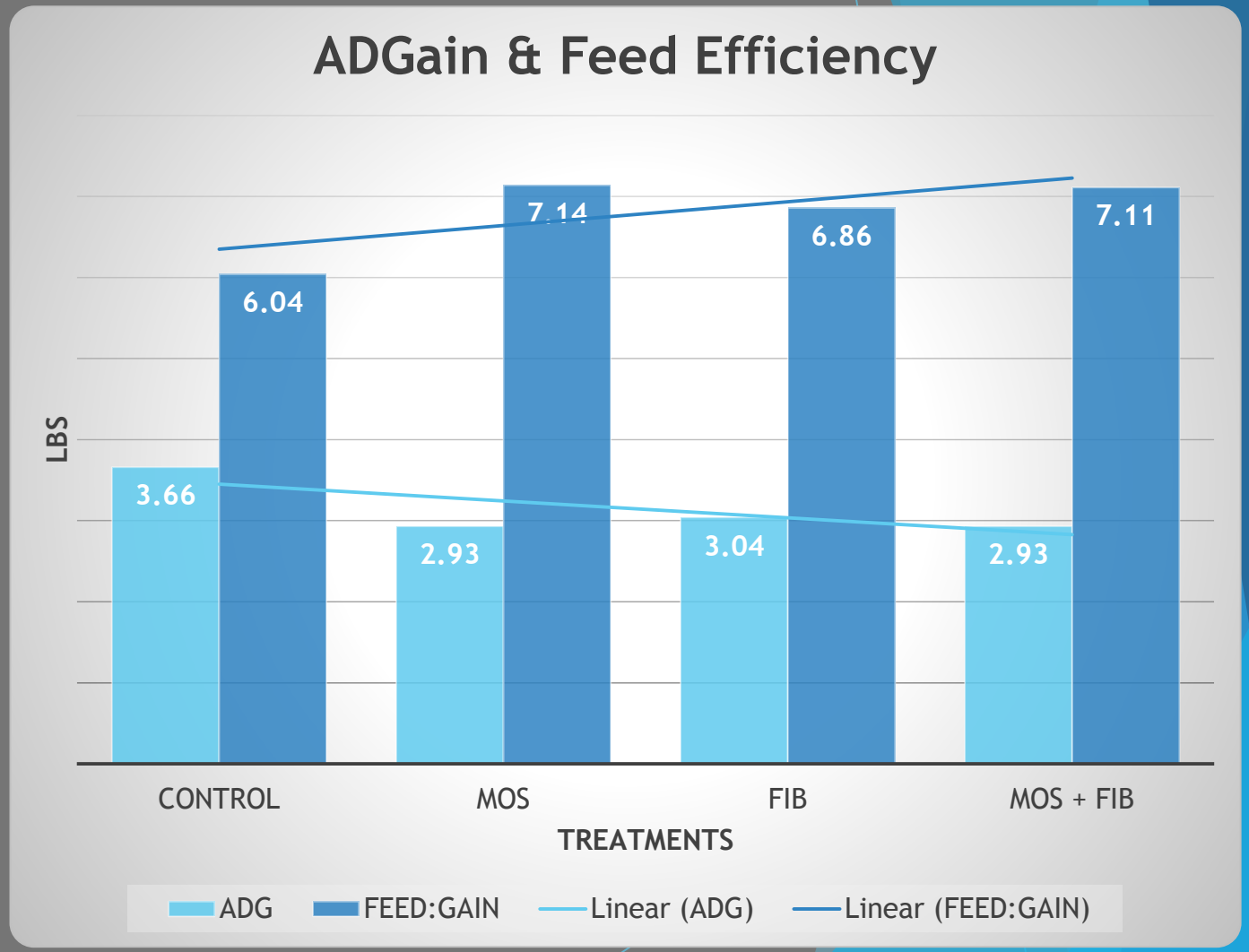

STEER PERFORMANCE
14.9
14.3
15.1
2.47
2.47
2.4
LBS
SBOM
BDDG
SFM
ADG
FEED:GAIN
Linear (ADG)
Linear (FEED:GAIN)

Backgrounding Supplement – Peas, Fiber Co-products, and Natural Cultures

- Peas and highly digestible fiber ingredients were fed to 80 Steer calves averaging 616# were weaned in November and fed 84 days. (Senturklu et al. 2014)
- Alfalfa-brome-crested wheatgrass mixed hay was fed (10.0% CP)
- Steers were fed a control diet with Rumensin plus Revelor-IS implant or a diet with natural feed cultures (Alltech, Inc.):
  - Control – Rumensin + Revelor-IS Implant
  - Fibrozyme (FIB)
  - Mannan Oligosaccharide (MOS)
  - MOS and FIB
  - Pelleted supplements were top dressed over chopped hay. The natural cultures were fed in carrier feed consisting of corn, beet pulp, corn oil, and molasses. Fed at 1#/head/day.
- Highly digestible fiber sources:
  - Soybean Hulls
  - Barley Malt Sprouts
  - Corn Distillers Dried Grain with Solubles
  - Wheat Midds

Supplement Composition & Performance

	Ctrl	MOS,FIB & MOS + FIB
Soybean Hulls, %	30.7	30.8
Field Pea, %	20.0	20.0
Corn, %	15.0	15.0
Barley Malt Sprts, %	10.0	10.0
Wheat Middlings, %	10.0	10.0
Corn DDGS, %	8.0	8.0
Decox (6.0%), %	0.027	-
Rumensin (36.3gm/kg), %	0.02	-
Other, %	6.2	6.2
CP, %	15.1	15.1
TDN, %	70.2	70.25
Fat, %	2.65	2.65
ADF, %	18.03	18.03
NEg Mcal/kg	1.16	1.16

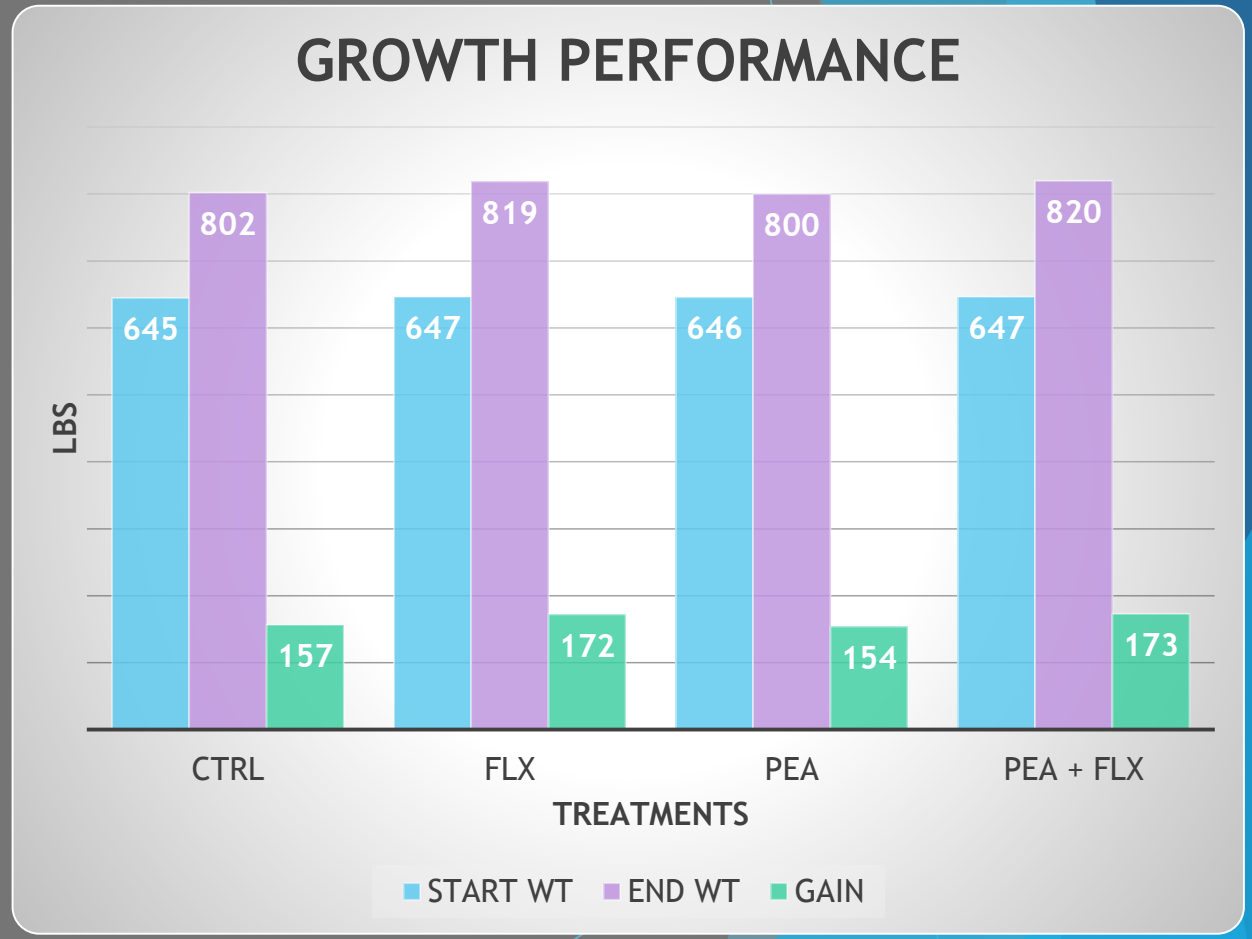


Backgrounding Supplement – Peas, Flaxseed & Highly Digestible Fiber Co-products

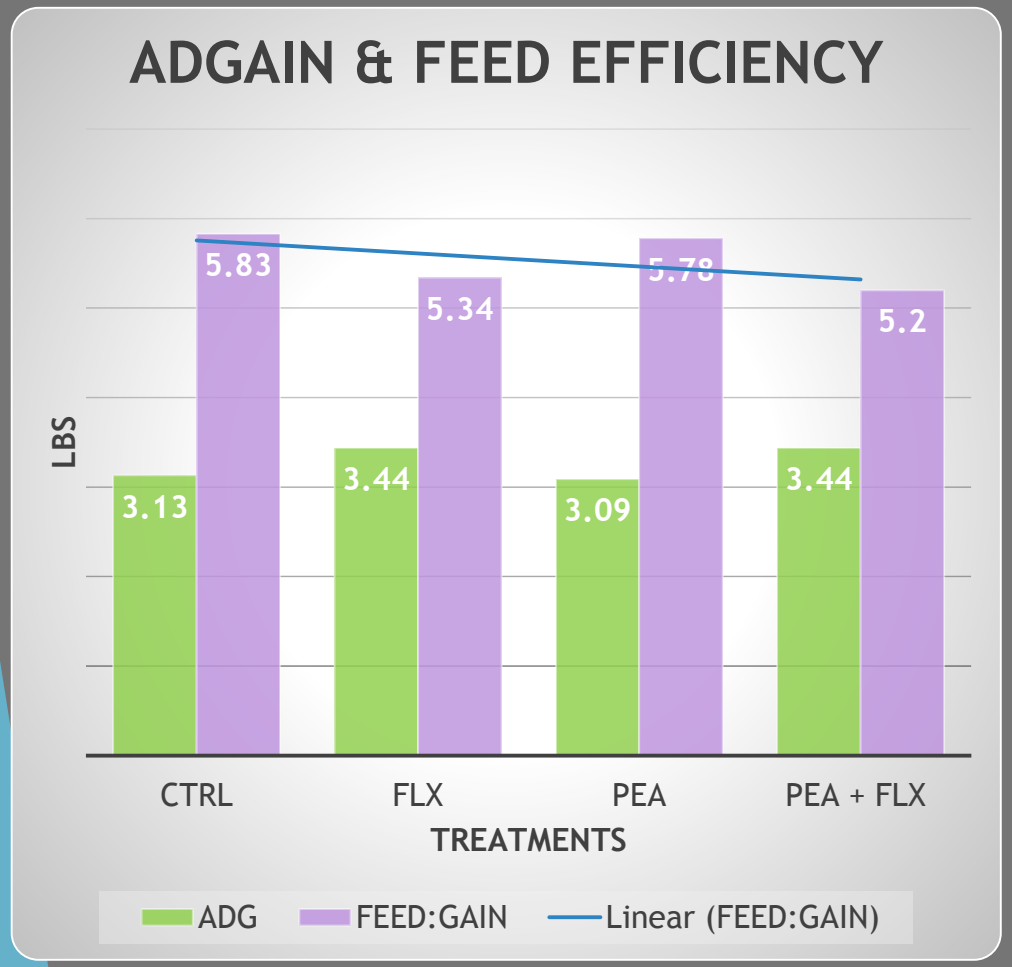
- Peas and flaxseed were combined with highly digestible fiber ingredients?
  - Flaxseed has been shown to enhance immune resistance due to anti-inflammatory properties associated with the seed. (Drouillard et al., 2000; Quill et al., 2008)
  - Feeding 10-15% flaxseed during the first 5-6 weeks after weaning has been associated with:
    - Increased feed intake, growth, and feed efficiency
    - Reduced bovine respiratory disease (BRD)
- DREC conducted a research project to evaluate the effect of feeding peas, flaxseed, and a pea-flaxseed combination to determine post weaning performance, and immune response (PWP) during the first 50 days after weaning. (Senturklu and Landblom, 2014)
- We also studied steer performance and immune response carryover effect into the finishing period.
- Supplements were top dressed over 10% CP alfalfa-bromegrass hay

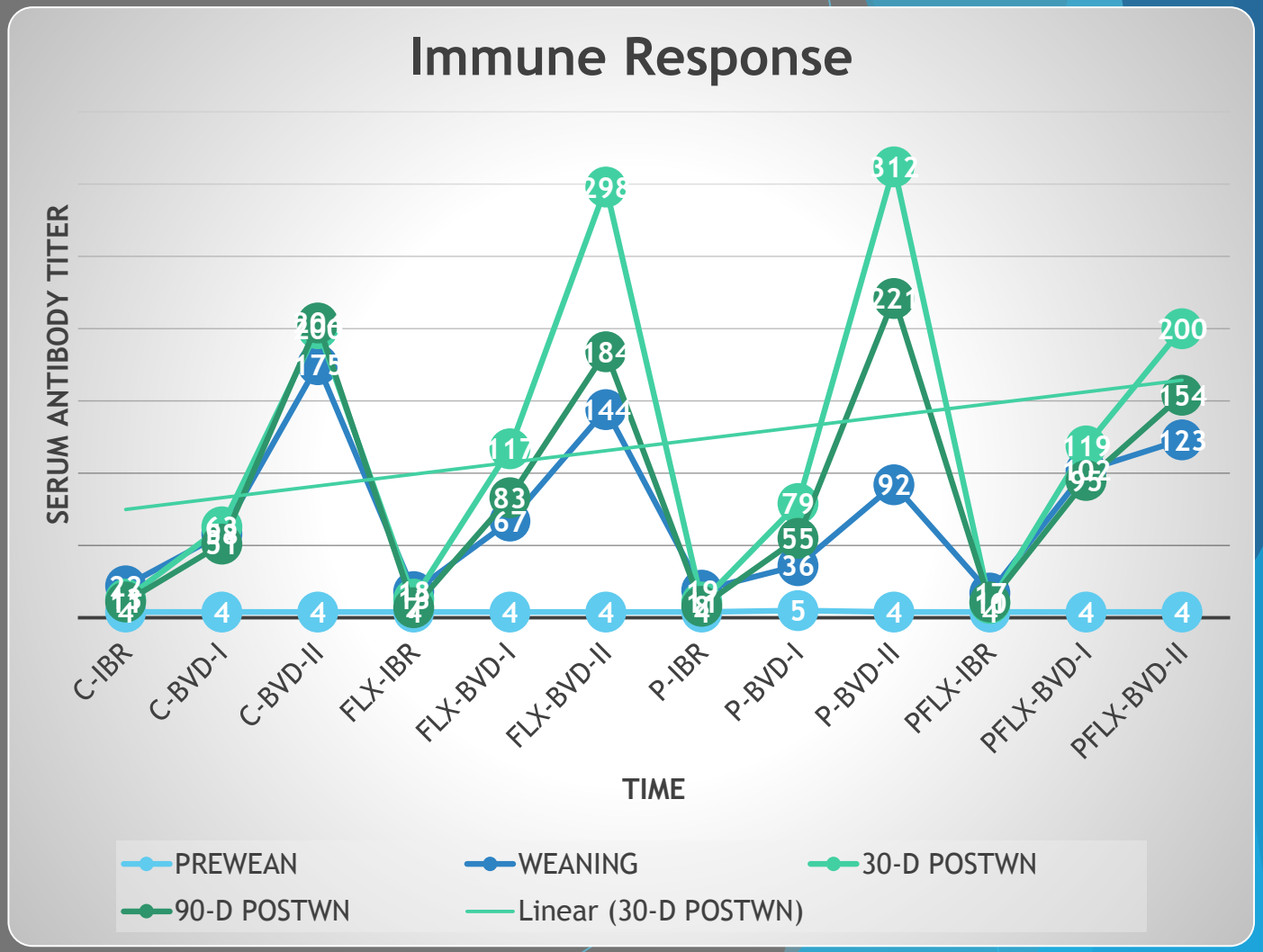
Supplement Composition & Performance

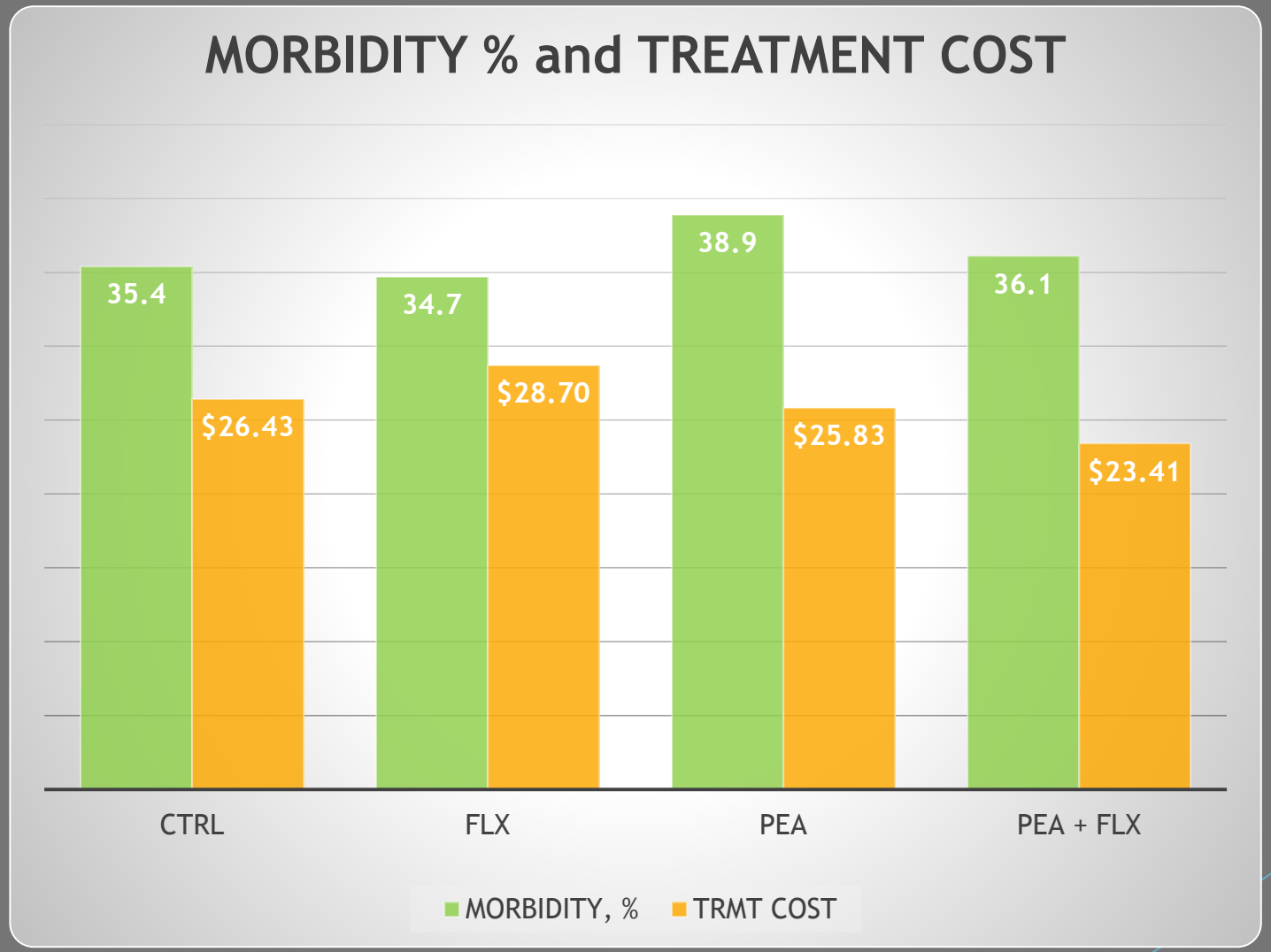
	CTRL	FLX	PEA	PFLX
FLAXSEED, %	-	12.5	-	12.5
PEA, %	-	-	20.0	20.0
CORN, %	15.0	15.0	15.0	10.0
SOYBEAN HULLS, %	21.5	28.7	30.7	34.2
WHEAT MIDDS, %	24.9	11.7	10.0	12.0
BLY MALT SPTS, %	20.0	15.0	10.0	5.0
CORN DDGS, %	12.3	10.8	8.0	-
OTHER, %	6.3	6.3	6.3	6.3
CP, %	15.5	15.5	15.5	15.5
ADF, %	16.0	17.7	18.0	18.8
NEg, Mcal/kg	1.13	1.27	1.16	1.27



Flaxseed Efficiency & Immune Response






MORBIDITY % and TREATMENT COST
35.4
$26.43
34.7
$28.70
38.9
$25.83
36.1
$23.41
CTRL
FLX
PEA
PEA + FLX
MORBIDITY, %
TRMT COST

Cow Wintering Supplement –

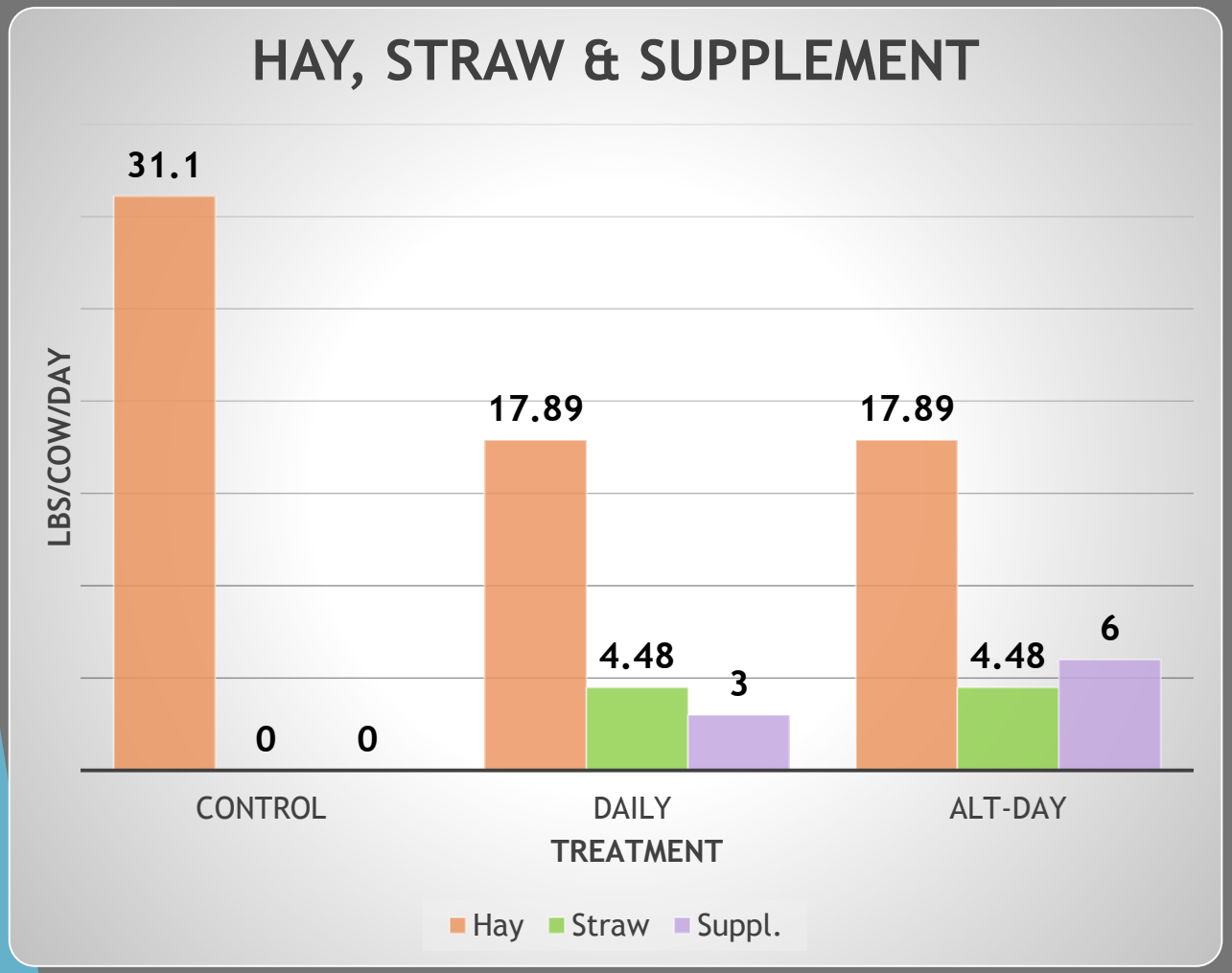
- Cows can be wintered several ways:
  - Hay daily
  - Winter grass with lick tub protein supplement
  - Low quality hay with lick tub protein supplement
  - Lower quality forage supplemented on alternate days
- Question? Under drought conditions in which hay is limited, is there an alternative to selling cows?
- Lick tubs formulated with DDGS and feather meal can be used to reduce some forage, but not when a large amount of forage needs to be replaced. Cows cannot lick enough supplement to meet nutrient requirements. (Senturklu and Landblom, 2014)
- One option is to replace a large quantity of forage with a nutrient dense supplement containing a balance of rumen degradable (RDP) and rumen undegradable protein (RUP). (Senturklu et al., 2014)
- Experiment Comparisons:
  - Hay diet
  - Reduced hay and straw diet plus protein/energy supplement formulated with peas, barley malt sprouts, and corn DDGS fed daily or on alternate days.

Cow Supplement Composition

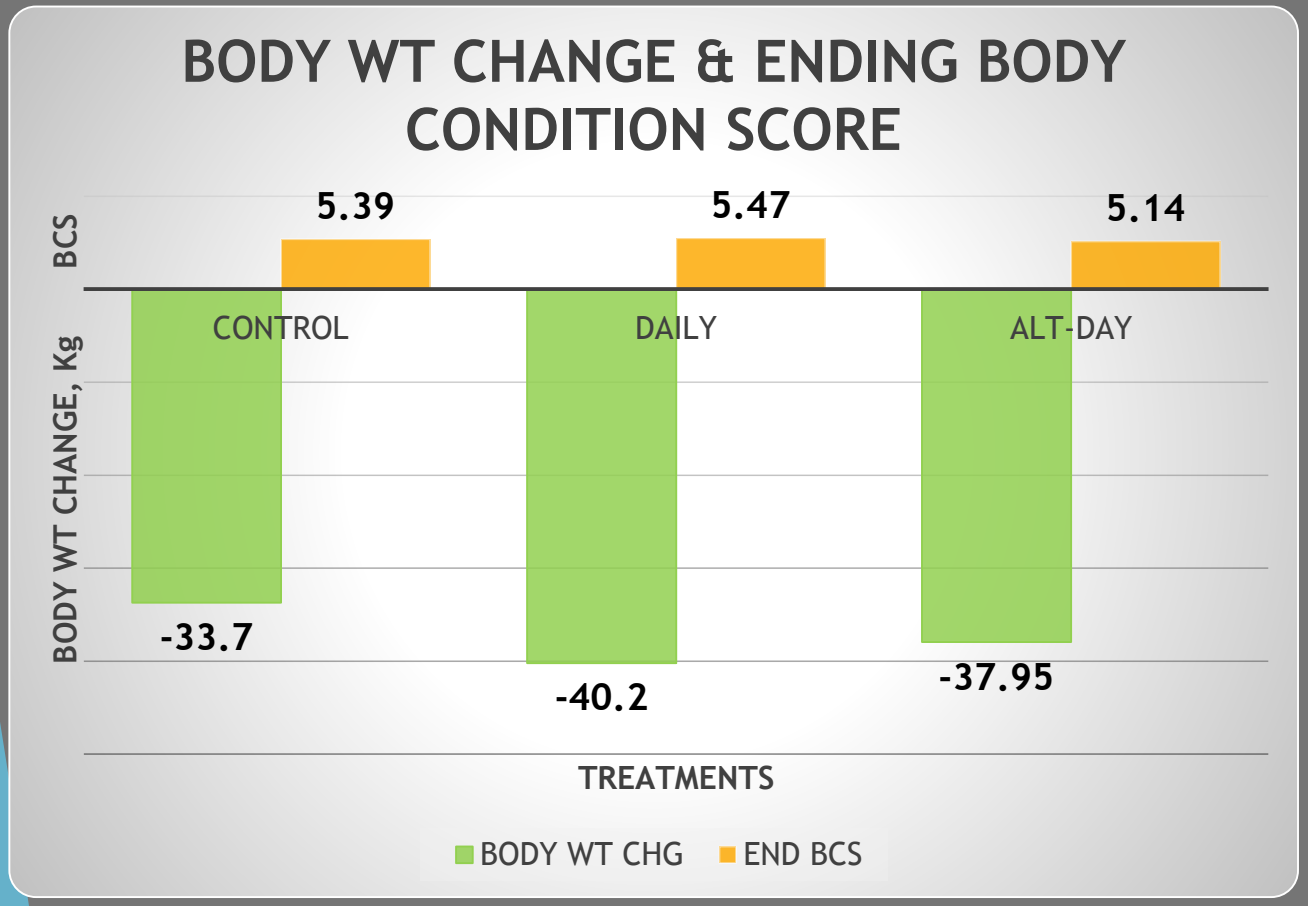
	DM %
FIELD PEA	49.87
BLY MALT SPROUT	22.0
CORN DDGS	20.0
BEET MOLASSES	5.0
DICAL PHOS	2.45
SALT	0.50
TM PRE-MIX	0.15
VIT. PRE-MIX	0.025

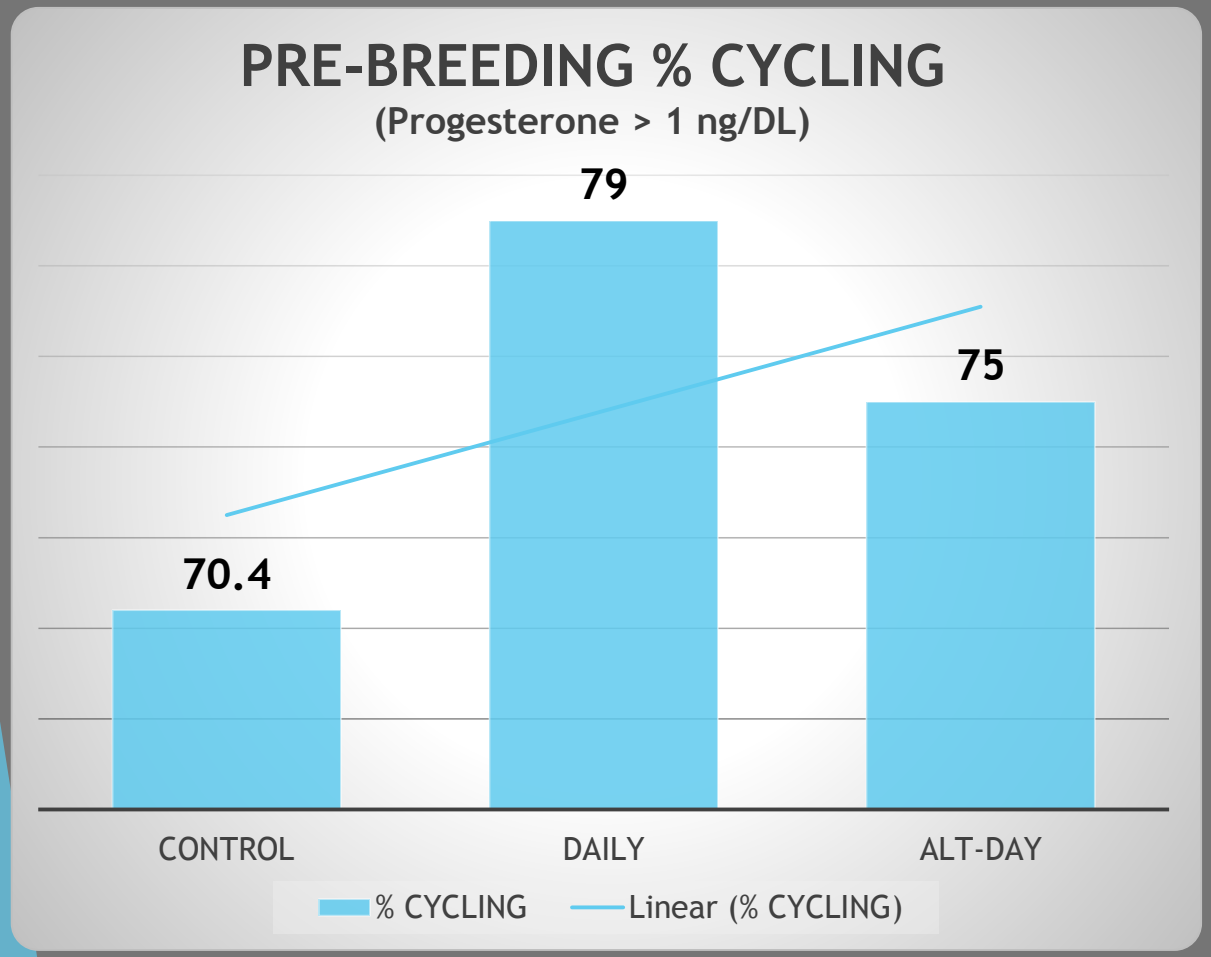
Feed Nutrient Analysis, DM%

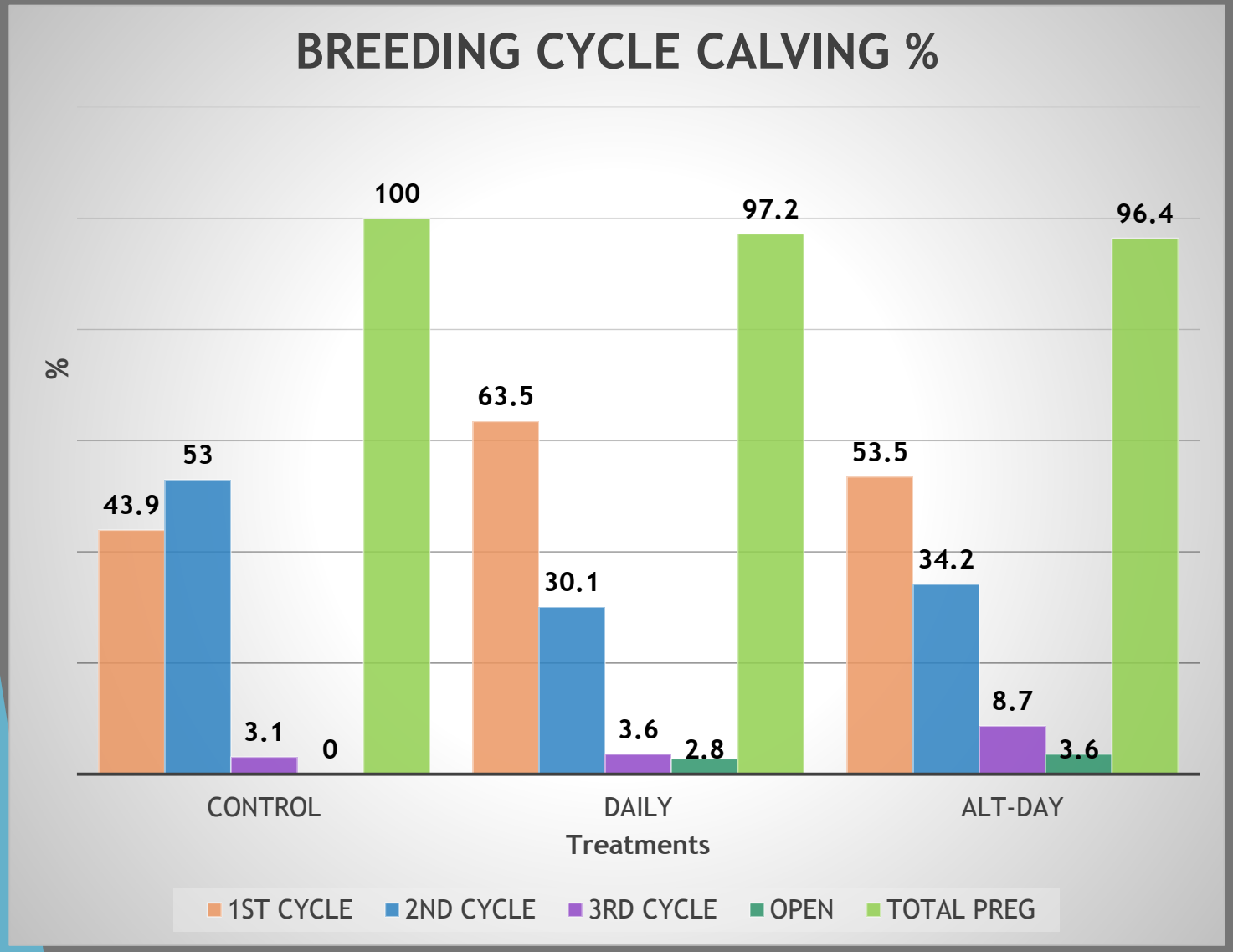
	Hay	Straw	Suppl.
CP	10.2	4.7	22.8
ADF	39.0	49.2	10.52
NDF	57.6	77.06	27.74
TDN	52.5	35.0	79.08
CRUDE FAT	1.65	2.0	3.35
FIBER	32.0	41.7	8.36
STARCH	8.0	-	29.62
CAL	0.93	0.27	0.63
PHOS	0.17	0.04	0.11
NEm Mcal/kg	1.14	0.64	1.94
NEg Mcal/kg	0.57	0.16	1.3
RDP%	80.0	30.0	61.0
RUP%	19.5	69.0	36.0


HAY, STRAW & SUPPLEMENT
LBS/COW/DAY
31.1
0
0
17.89
4.48
3
17.89
4.48
6
CONTROL
DAILY
ALT-DAY
TREATMENT
Hay
Straw
Suppl.

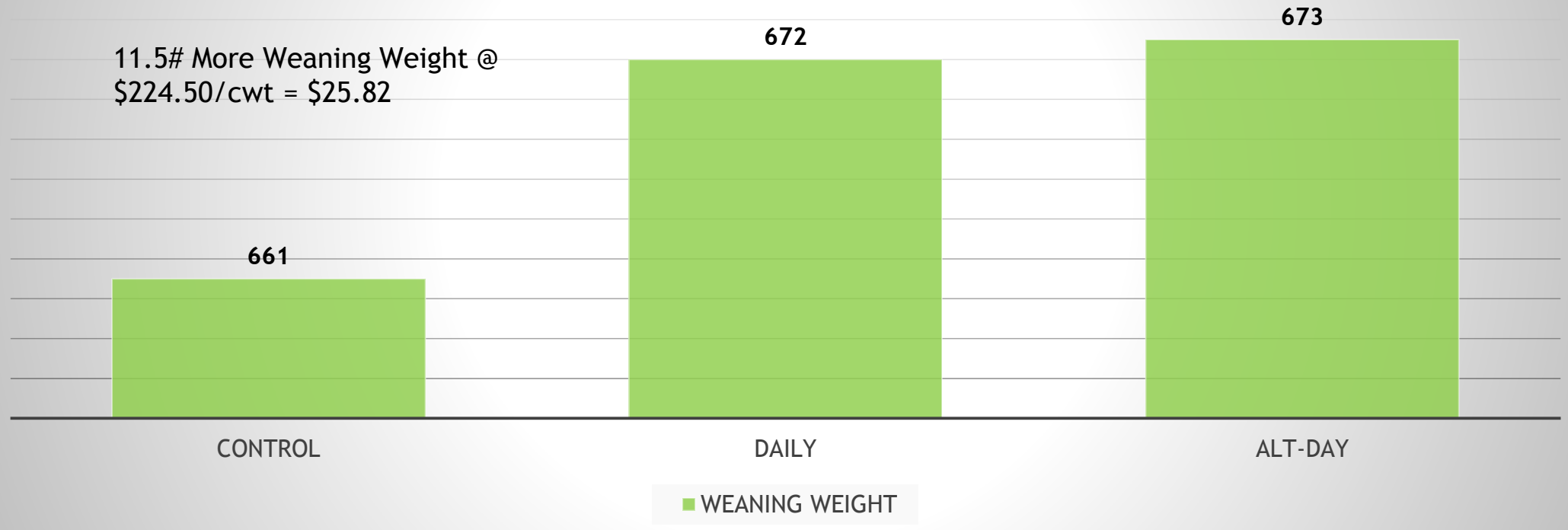

CASE
210


BODY WT CHANGE & ENDING BODY CONDITION SCORE
BCS
5.39
5.47
5.14
CONTROL
DAILY
ALT-DAY
BODY WT CHANGE, Kg
-33.7
-40.2
-37.95
TREATMENTS
BODY WT CHG
END BCS


PRE-BREEDING % CYCLING
(Progesterone > 1 ng/DL)
79
75
70.4
CONTROL
DAILY
ALT-DAY
% CYCLING
Linear (% CYCLING)


BREEDING CYCLE CALVING %
%
43.9
53
3.1
0
100
63.5
30.1
3.6
2.8
97.2
53.5
34.2
8.7
3.6
96.4
CONTROL
DAILY
ALT-DAY
Treatments
1ST CYCLE
2ND CYCLE
3RD CYCLE
OPEN
TOTAL PREG

WEANING WEIGHT
(214 Days Of Age)



Summary

- 1# of supplement (22.8% CP, 79% TDN, 61% RDP/36% RUP) replaced 2.9 # of hay and straw.
- Feeding a ration of hay, straw, and supplement cost 6.0% more than hay.
- Hay replacement with supplement maintained cow body condition, improved 1st service reproductive performance, and supported 11.5 # heavier weaning weights.
- There was no difference between feeding supplement daily or every other day.


Questions