Field Peas for Feed

- Forage

- Grain

Table 2. Field pea grain, pea co-products and pea forage nutrient analysis.

Item	Pea Grain	Pea Hulls	Pea Screenings	Pea Hay	Pea Straw	Pea Silage
Dry matter, %	88	92	90	88	89	35
			% Dry Matter			
Crude protein, %	25.5	9.0	23.6	13.6	8.5	15.4
Total digestible nutrients, %	87.0	60.0	80.0	58.0	46.0	58.0
NEm, Mcal/lb	1.02	0.59	0.88	0.56	0.38	0.57
NEg, Macl/lb	0.67	0.33	0.59	0.27	0.13	0.31
Calcium, %	0.15	0.48	0.14	1.39	1.62	1.32
Phosphorus, %	0.44	0.09	0.48	0.28	0.11	0.22

Adapted from Lardy et al., 2009. Alternative Feeds for Ruminants. AS-1182 p. 21.

Field Peas

- Very nutrient dense grain
  - High protein
  - High rumen protein degradability
  - Highly digestible
  - Slower rate of digestion than barley
  - Energy similar to corn
  - Palatable
  - Feed value for ruminants 140% bushel of corn
  - Low calcium, high phosphorus

Table 1. Comparison of nutrient value of livestock feed grain with field peas

Item	Field peas	Corn	Barley
Dry matter, %	89	88	88
		% Dry Matter	
Crude protein, %	25.5	9.8	13.2
Total digestible nutrients, %	87.0	90.0	85.0
NEg, Mcal/lb	0.67	0.68	0.63
Rumen undegradable protein, %	30.0	60.0	27.0
Calcium, %	0.15	0.03	0.05
Phosphorus, %	0.44	0.31	0.35
Fat,%	1.40	4.30	2.20

Adapted from Anderson et al., 2007. AS-1301 and NRC, 1996.

Varietal Variation

Item	Cultivar				
	Profi	Arvika	Carneval	Trapper	SEM[a]
CP, % DM	22.6	26.1	22.6	19.4	-
0 h N disappearance, %	54.3[c]	53.0[c]	47.4[c]	32.0[b]	5.65
Slowly degradable, %	45.7[b]	47.0[b]	52.6[b]	68.0[c]	6.00
Rate of CP digestion, %/h	14.6[d]	8.6[c]	10.5[d]	7.3[b]	0.26
Estimated RDP, % of CP					
$k^f = 0.02$	93.4[c]	91.5[c]	92.7[c]	87.4[b]	2.05
k = 0.04	88.2[c]	85.4[c]	86.6[c]	77.7[b]	3.29
k = 0.06	84.3[c]	81.0[c]	82.0[c]	71.0[b]	4.02

[a]n = 4.[b, c, d, e]Row means with different superscripts are different ($P < 0.02$).
[f]k = ruminal outflow rate (h^{-1}). Adapted from Encinias et al. (2004).

Feeding Trials
NDSU
Carrington
Research
Extension Center

Creep Feed

Receiving Rations

Growing Finishing

Carcass Characteristics

Cow Supplementation

Heifer Supplementation

Processing - pelleting

Dr. Anderson

Creep Feed

- Best combination for adg and feed conversion at 33-67 % inclusion with wheat midds (3.1 vs 2.8)
- Gains greater with rolled versus ground or whole peas (3.31 vs 3.13)

Receiving Rations

- Rolled pulse grains at 17% of 60 percent concentrate receiving rations compared to canola as protein source increased intake from 15 lbs to 16.3 and adg from 3.6 to 4.0.
- Greater gains persisted on common corn based finishing diet fed to market weight.

Backgrounding

- Include in high forage diets as an energy and protein supplement
- 2-6 lbs per head per day depending on other feeds
- For higher gain targets feed with corn or oats

Animal Desc.	Feeders and Replacements - 650lbs, Steer, ADG:2.7lbs		
Predicted ADG:	2.70 Lbs	**BCS Days**	
Hair Condition:	dry and clean	**Current Temperature (F)**	
Mud in Lot:	< 10 cm. (4 inches)	**Previous Month Temperature**	
On Pasture:	No	**Wind Speed (mi/hr)**	

Feed Name	**As Fed Lbs/Head/Day**	**% of Ration**	**$/Head/Day**
GRASS HAY	8.000	27.1	$0.20
SILG CORN	16.000	54.1	$0.24
PEA GRAIN	5.000	16.9	$0.50
32-0 BEEF SUPP	0.500	1.7	$0.10
FORT TM SALT	0.071	0.2	$0.01
Total	29.571*		$1.05*

* waste factor not included

Finishing

- 15-20% of ration typically will meet protein needs
- Depending on costs could be the only grain
- Peas and corn combination is complimentary
- Tendency for higher intake and performance or better conversion with pea inclusion

Table 1. Equivalent price of field peas based on nutritional content compared to corn and canola meal

		Corn, $/bushel					
		2.00	2.25	2.50	3.00	3.50	4.00
Canola	125	3.53	3.64	3.75	3.86	3.96	4.07
Meal	150	4.03	4.13	4.24	4.34	4.43	4.55
$/ton	175	4.52	4.63	4.73	4.83	4.94	5.04
	200	5.02	5.12	5.23	5.33	5.44	5.54

Carcass Traits “Pea Fed Beef”

- Peas in finishing ration at over 10% for over 76 days has resulted in increased tenderness and juiciness
- Warner-Bratzler shear test values reduced 1.5 lbs
- Taste Panel evaluation of juiciness and flavor
- Potential for specialty beef brand

Cow Supplementation

- Excellent protein and energy supplement for breeding herd
- Replacement for oilseed-grain mixes
- Source of rumen degraded protein for enhancing intake and digestibility of low quality forage
- Can be combined with ddg and other ingredients in cubes

Processing

- Not always a benefit
- Roll for calves in creep and in receiving rations
- Generally a benefit for cracking for feedlot cattle
- Do not need to be processed for cows
- Work well as an ingredient for binding pellets
- Heating or extruding not cost beneficial for cattle

Pea Forage

- High quality hay and silage
- Low fiber
- High protein
- High RFV
- High animal performance
- Difficulty in curing
- Less yield than grasses
- Often grown in combination with cereal
- Long vined forage varieties

Harvested Pea Forage

Table 1.
Forage production and nutritional value of field pea and/or cereal grains* (3yr avg).

	DM Yield Tons/acre	Hay Yield 15% Moist	Silage Yield 40% DM	Protein %	TDN %	RFV
Field Peas	1.95	2.29	4.88	16.95	67.37	145.57
Barley	1.78	2.09	4.45	9.74	64.08	126.76
Field Peas/Barley	2.18	2.56	5.45	13.65	65.12	132.75
Oats	1.78	2.1	4.45	9.44	60.58	116.09
Field Peas/Oats	2.17	2.55	5.42	12.48	62.94	118.74

*adapted from S. Zwinger, Carrington Res Ext Center Annual Report, 2011.

Pea Byproducts

- Hulls
  - By product of splitting
  - Very light and difficult to handle and store
  - Hull itself low in digestibility but often pea fragments
  - Feed values vary
    - Crude protein 9
    - TDN 60
- Starch
  - By product of fractionating for pea protein, fiber and flour
  - Fine powder
  - Poor flowability
  - Useful in binding pellets
  - Feed Values
    - Crude protein 13
    - TDN 87

Pea Screenings

- Highly variable in feed value depending on foreign matter and weed seeds
- Likely to include stones and dirt
- Splits equal feed value to peas
- For calves typically blend with other grain
- Good forage extender and supplement for cows

- Analysis:
  - Crude protein 23
  - TDN 80
  - Ca .14
  - Phos .48

Pea Residue

- Palatability best if baled or grazed shortly after harvest
- Generally preferred and higher quality than cereal straw
- Seeding fall cover crop into residue or light tillage to initiate volunteer growth can provide late season grazing

- Analysis:

• Crude protein	5-8
• TDN	46
• Ca	1.6
• Phos	.11

FEED AND FORAGE REPORT

DAIRYLAND LABORATORIES, INC.
Arcadia, WI 54612
Telephone 608-323-2123

Report date: 2/ 3/2017
Sample number: 001-1702-010847

ACCOUNT # 3681 (0)
SAMPLED BY: John Dhuyvetter

TO: John Dhuyvetter
5400 s Highway 83

Minot , ND 58701

SAMPLED FOR: VEGAS VARTY

PRODUCT: field pea straw (1B - D)

Moisture	%	24.04%
Dry Matter	%	75.96%

		Dry Basis	Average	Normal Range
Crude Protein	%DM	8.58%	9.91	2.91 - 16.91
aNDF	%DM	65.84%	63.31	46.37 - 80.25
aNDFom	%DM	64.11%	61.92	45.91 - 78.30
ND-ICP est w/ SS	%DM	1.37%	2.53	0.56 - 6.42
Fat (EE)	%DM	1.30%	2.43	1.25 - 3.61
Ash	%DM	9.61%	9.76	5.44 - 14.08

NFC	%	17.77%

OARDC

Other Livestock

- Swine
  - Limit use in starter diets due to anti nutritional factors
  - For growing and finishing can replace all SBOM by supplementing synthetic methionine or in combination with canola meal
  - Must be ground or pelleted
  - Up to 30% of lactating sow ration
- Poultry
  - 10-40 % of laying hen ration
  - 20-30% broiler and turkey
- Sheep
- Dairy

OTHER PULSES

LENTIL
CHICKPEA
FABA BEAN

- high protein 25-33%
- some anti nutritional factors
- starch 35-45%
- fiber 5-10%, low fats
- high lysine
- low methionine and threonine
- limit 20-30% diet

Summary

- Pulse crops are widely grown in western ND as part of diverse rotation
- In addition to being an important cash crop can also be homegrown feed/supplement to support livestock operation
- Good feed qualities as forage, grain, low grade grain, or grain processing byproducts