Feeding canola meal or soy expeller at two dietary net energy levels to growing-finishing barrows and gilts

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Gowans FEED CONSULTING

>$10 profit difference per hog

	Constant NE, Mcal/kg					*P* value
	2.4	2.3	2.2	2.1	SEM	Linear
Feed cost per tonne, $	**249.51**a	233.13b	216.22c	**198.81**d	0.354	<0.001
Feed cost per kg BW gain, $	**0.67**a	0.63b	0.60c	**0.57**d	0.006	<0.001
Feed cost per hog, $	**62.50**a	59.58b	56.72c	**54.66**d	0.530	<0.001
IOFC per hog, $	**61.02d**	63.50c	65.93b	**71.43a**	0.853	<0.001

Beltranena and Smit, 2015 BPS

Background

CANADA: GRAINS AND OILSEEDS SUPPLY AND DISPOSITION — December 21, 2016

Grain and Crop Year (a)	Area Seeded	Area Harvested	Yield	Production	Imports (b)	Total Supply	Exports (c)	Food & Industrial Use (d)	Feed, Waste & Dockage	Total Domestic Use (e)	Carry-out Stocks	Average Price (g)
	thousand ha		t/ha	thousand metric tonnes								$/t
Canola												
2014-2015	8,407	8,344	1.97	16,410	77	19,495	9,163	7,360	368	7,790	2,542	489
2015-2016	8,363	8,322	2.21	18,377	101	21,020	10,245	8,315	385	8,759	2,016	509
2016-2017f	8,242	7,769	2.37	18,424	100	20,539	9,500	8,900	88	9,039	2,000	510-550
Soybeans												
2014-2015	2,251	2,235	2.71	6,049	331	6,625	3,804	1,787	337	2,350	471	418
2015-2016	2,190	2,185	2.92	6,371	316	7,158	4,100	1,923	515	2,666	393	440
2016-2017f	2,213	2,179	2.97	6,463	250	7,105	4,400	1,850	370	2,420	285	440-480

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- Solvent-extracted canola meal (CM) has relatively low energy value due to high dietary fibre content.
- Soy expeller (SE) is now locally produced in Canada and has greater energy value than imported soybean meal.
- These feedstuffs offer opportunities to reduce or increase dietary net energy (NE) level at low cost.

Objective

- To compare growth performance and carcass traits of growing-finishing barrows and gilts fed low or high NE levels including either CM or SE to market weight.

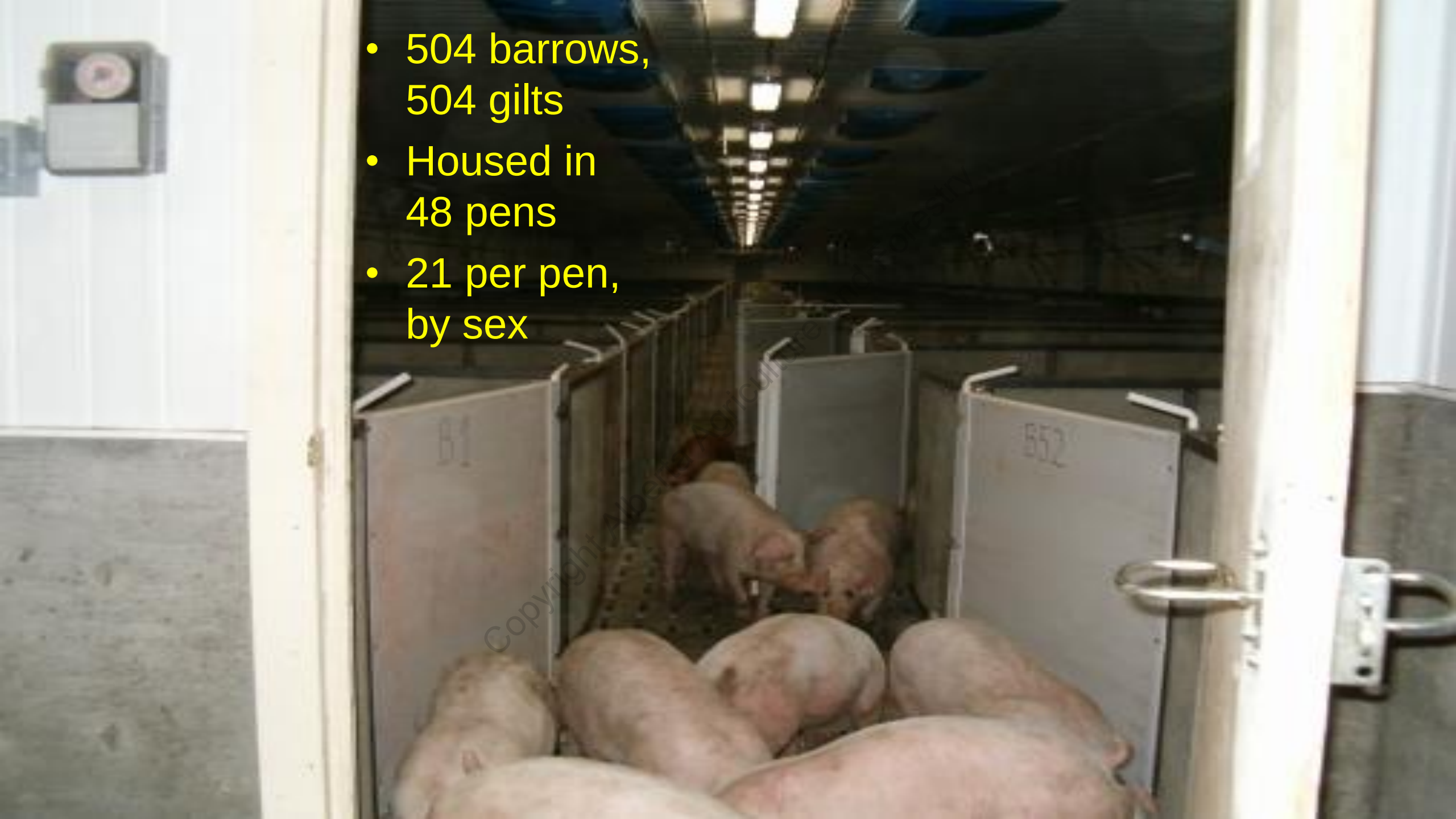
manitoba.ca

canolacouncil.org

Drumloche Barn at Lougheed, AB

2 x 2 x 2 factorial

- Low 2.17 - 2.20 Mcal NE/kg
- High 2.32 - 2.35 Mcal NE/kg
- CM 25 or 20%
- SE 15 or 12.5%
- Barrows
- Gilts



- 504 barrows, 504 gilts
- Housed in 48 pens
- 21 per pen, by sex

Pen BW and feed disappearance (ADFI) were measured at day 0, 12, 24, 33, 53, 74, weekly thereafter, and at slaughter weight (130 kg).


• Pigs were slaughtered at Maple Leaf (Brandon, MB). Individual carcasses were weighed and graded (Destron).
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		Grower 1 diets - 25 to 45 kg				**Grower 2** diets - 45 to 65 kg				**Grower 3** diets - 65 to 85 kg			
		Low NE diets		High NE diets		Low NE diets		High NE diets		Low NE diets		High NE diets	
	$/tonne	**0% CM**	**25% CM**	**0% CM**	**25% CM**	**0% CM**	**25% CM**	**0% CM**	**25% CM**	**0% CM**	**25% CM**	**0% CM**	**25% CM**
Barley 12% CP	$ 148	653.82	543.82	0.00	0.00	727.36	614.59	0.00	0.00	729.00	615.62	0.00	0.00
Wheat HR 14% CP	$ 171	0.00	0.00	646.30	527.18	0.00	0.00	723.30	601.99	0.00	0.00	727.36	603.14
Canola Meal 38% CP	$ 238	0.00	250.00	0.00	250.00	0.00	250.00	0.00	250.00	0.00	250.00	0.00	250.00
Soy expeller 42% CP	$ 388	150.00	0.00	150.00	0.00	150.00	0.00	150.00	0.00	150.00	0.00	150.00	0.00
Wheat DDGS 38% CP	$ 162	90.00	90.00	90.00	90.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Fababean 25% CP	$ 184	80.00	80.00	80.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Canola oil	$ 720	0.00	19.04	9.06	33.93	0.00	19.40	6.20	31.51	0.00	19.70	5.52	31.81
Limestone 38% Ca	$ 86	13.33	9.83	11.29	9.40	13.12	9.83	9.99	9.23	13.07	9.84	9.14	9.24
Mono/dical 21% P	$ 686	2.96	0.00	3.15	1.00	2.26	0.00	2.15	0.00	2.05	0.00	1.05	0.00
Salt (NaCl)	$ 69	4.18	3.53	4.22	3.99	3.47	3.32	4.06	3.84	3.47	3.32	4.05	3.83
L-Lysine·HCl 99.0%	$ 1,490	3.13	2.18	3.77	2.92	2.22	1.29	2.71	1.87	0.89	0.00	1.28	0.45
L-Threonine 98.5%	$ 2,790	0.44	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DL-Methionine 99%	$ 5,044	0.36	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-Tryptophan 98.0%	$ 16,000	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder micro	$ 4,800	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Copper sulfate 25%	$ 2,744	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Ronozyme P-(M) 200	$ 2,328	0.20	0.20	0.20	0.18	0.18	0.17	0.20	0.17	0.14	0.12	0.20	0.14
NE GFL	Mcal/kg	2.17	2.17	2.32	2.32	2.17	2.17	2.32	2.32	2.17	2.17	2.32	2.32
SD LYS:NE	**g/Mcal**	**4.25**	**4.25**	**4.25**	**4.25**	**3.58**	**3.58**	**3.58**	**3.58**	**3.10**	**3.11**	**3.10**	**3.10**
TOTAL CA	%	0.73	0.69	0.66	0.68	0.70	0.67	0.59	0.65	0.67	0.64	0.54	0.63
STTD P	%	0.30	0.30	0.30	0.30	0.28	0.28	0.28	0.28	0.26	0.26	0.26	0.26

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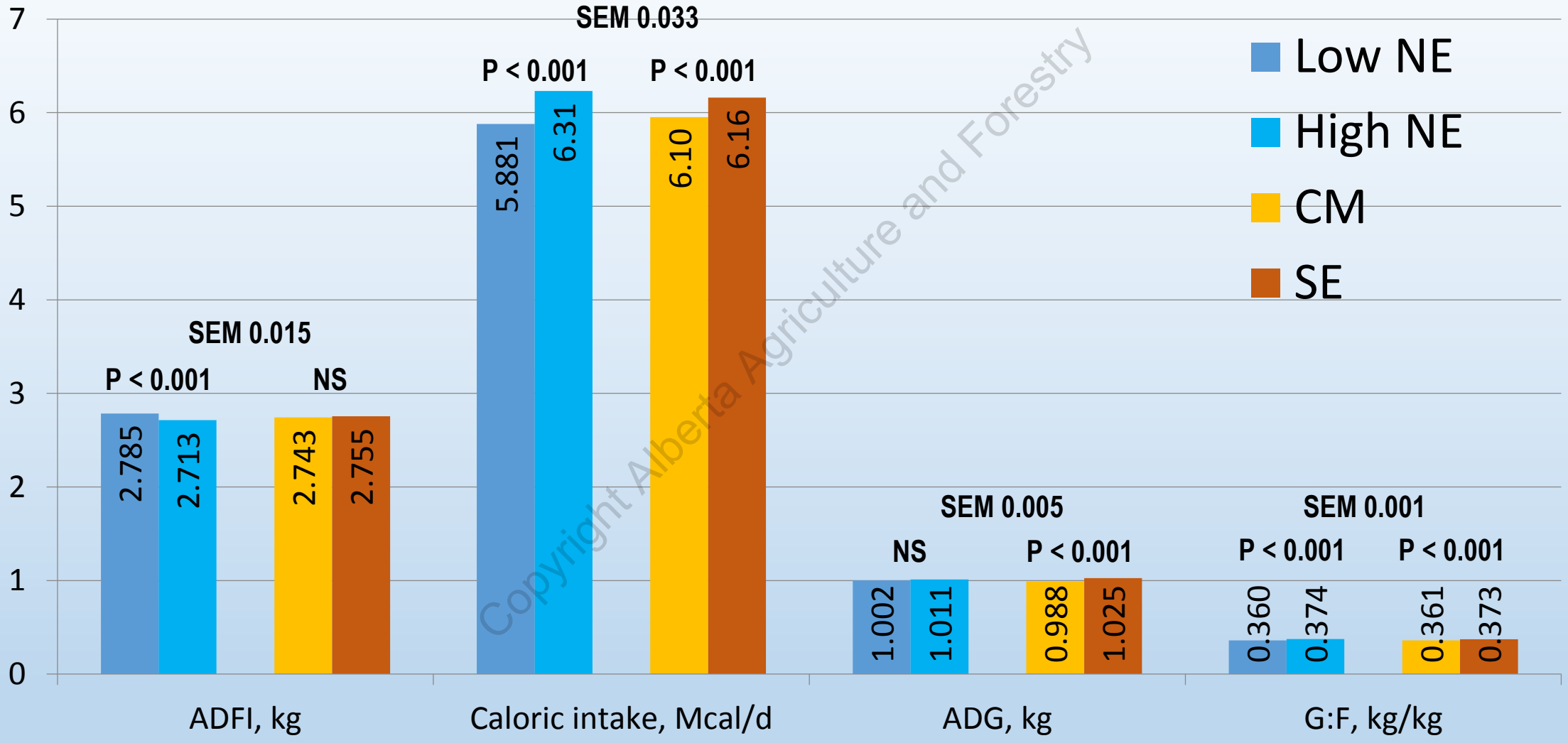
		Finisher 1 diets - 85 to 105 kg				Finisher 2 diets - 105 to 125 kg			
		Low NE diets		High NE diets		Low NE diets		High NE diets	
	$/tonne	0% CM	20% CM	0% CM	20% CM	0% CM	20% CM	0% CM	20% CM
Barley 12% CP	$ 148	789.62	697.52	0.00	0.00	857.23	773.09	0.00	0.00
Wheat HR 14% CP	$ 171	0.00	0.00	781.74	687.67	0.00	0.00	858.80	765.71
Canola Meal 38% CP	**$ 238**	0.00	200.00	0.00	200.00	0.00	200.00	0.00	200.00
Soy expeller 42% CP	**$ 388**	125.00	0.00	125.00	0.00	125.00	0.00	125.00	0.00
Wheat DDGS 38% CP	$ 162	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00
Fababean 25% CP	$ 184	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Canola oil	$ 720	0.00	18.64	7.41	28.16	0.00	13.79	0.00	20.91
Limestone 38% Ca	$ 86	9.16	9.33	8.38	8.68	10.86	8.58	7.89	7.88
Mono/dical 21% P	$ 686	1.00	0.00	1.22	0.00	1.57	0.00	2.07	0.00
Salt (NaCl)	$ 69	3.58	3.47	4.23	4.04	4.00	3.87	4.69	4.50
L-Lysine·HCl 99.0%	$ 1,490	0.76	0.19	1.12	0.58	0.64	0.00	0.86	0.32
L-Threonine 98.5%	$ 2,790	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DL-Methionine 99%	$ 5,044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-Tryptophan 98.0%	$ 16,000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder micro	$ 4,800	0.70	0.70	0.70	0.70	0.50	0.50	0.50	0.50
Copper sulfate 25%	$ 2,744	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ronozyme P-(M) 200	$ 2,328	0.19	0.14	0.20	0.17	0.20	0.18	0.20	0.18
NE GFL	Mcal/kg	2.20	2.20	2.35	2.35	2.21	2.20	2.35	2.35
SD LYS:NE	**g/Mcal**	**2.76**	**2.76**	**2.76**	**2.76**	**2.60**	**2.60**	**2.60**	**2.60**
TOTAL CA	%	0.53	0.60	0.51	0.59	0.60	0.59	0.50	0.56
STTD P	%	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.23

Analyzed nutrients

Nutrient, %	Canola meal	Soy expeller
Moisture	9.7	4.6
Starch	0.1	n/a
Crude protein	38.5	42.9
NDF	24.0	13.0
ADF	18.7	12.5
Ether extract	**3.8**	**8.4**
Amino acids		
Lysine	2.3	2.8
Methionine	0.8	0.6
Threonine	1.6	1.7
Tryptophan	0.5	0.6
Glucosinolates, µmol/g	6.07	n/a
Trypsin, IU/mg	n/a	6.14

CM -ADM, Lloydminster, AB.
SE -Jordan Mills, Roland, MB.

Overall trial (d0 – 74)



12 pens of 21 barrows or 21 gilts per diet

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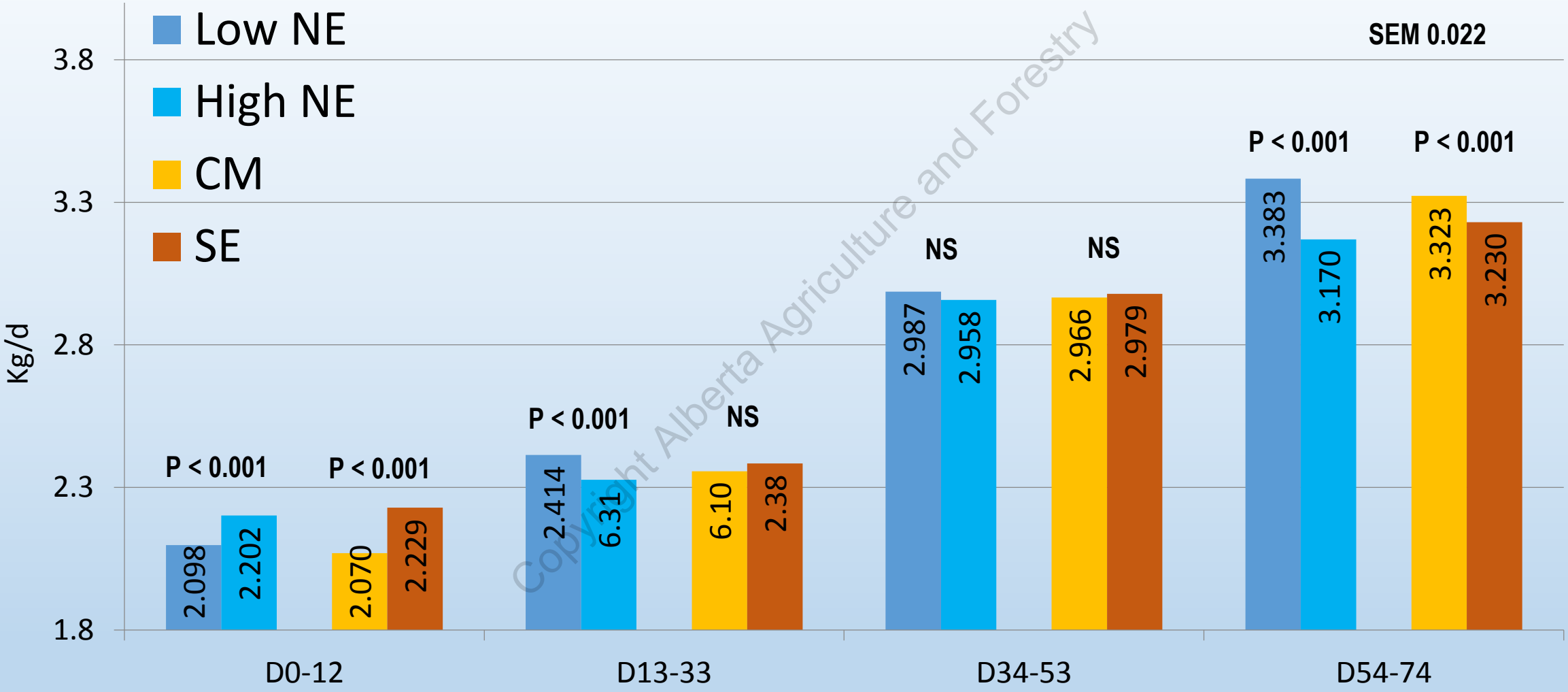
Feed disappearance by growth phase



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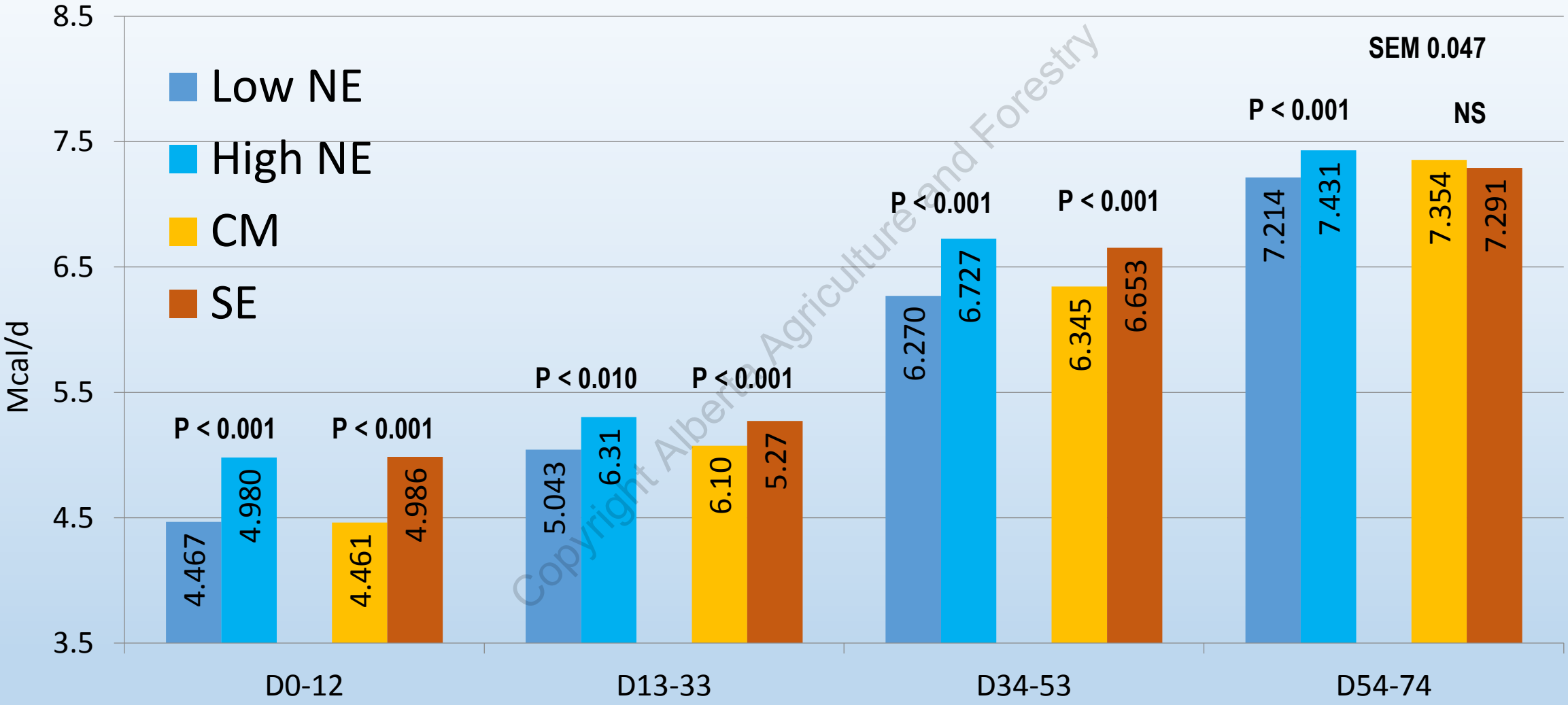
Caloric intake by growth phase



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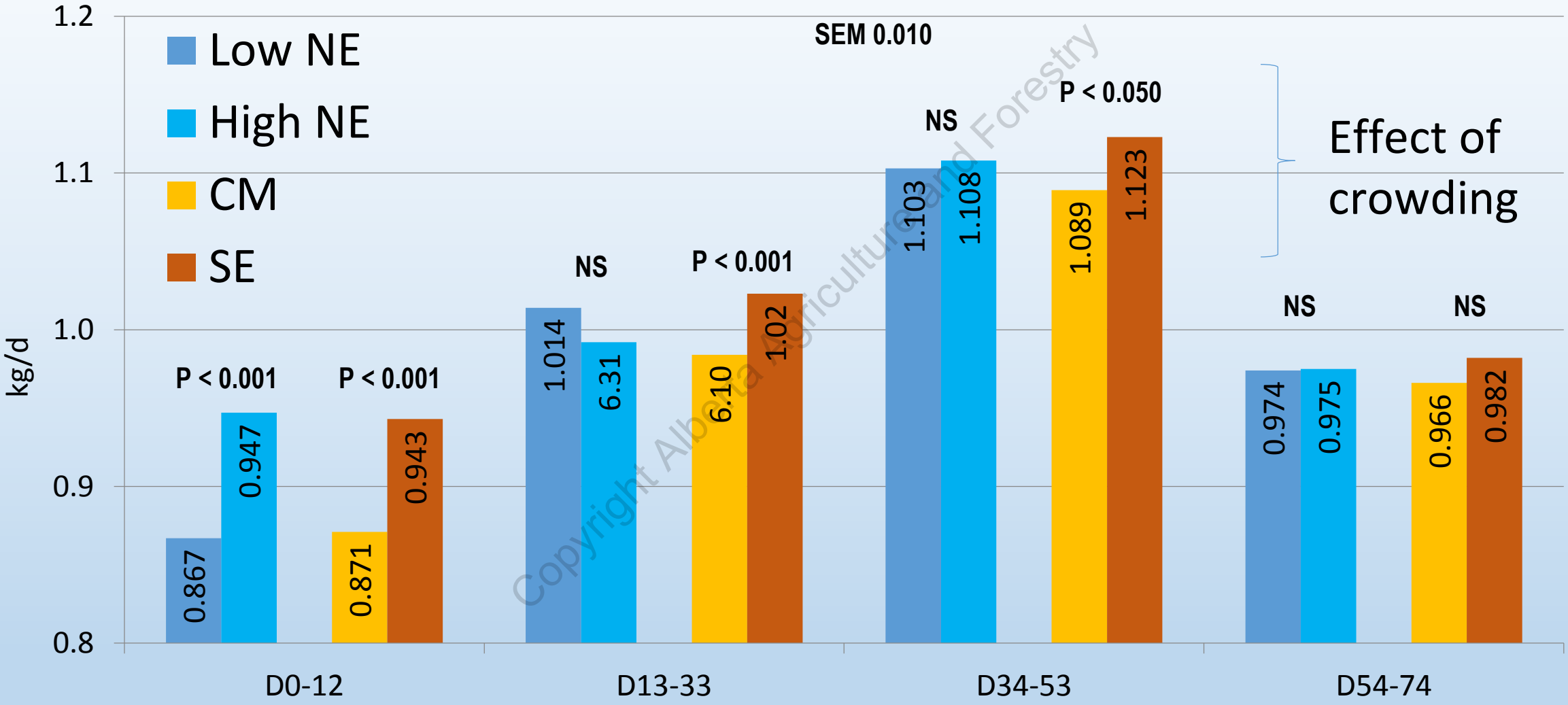
Weight gain by growth phase



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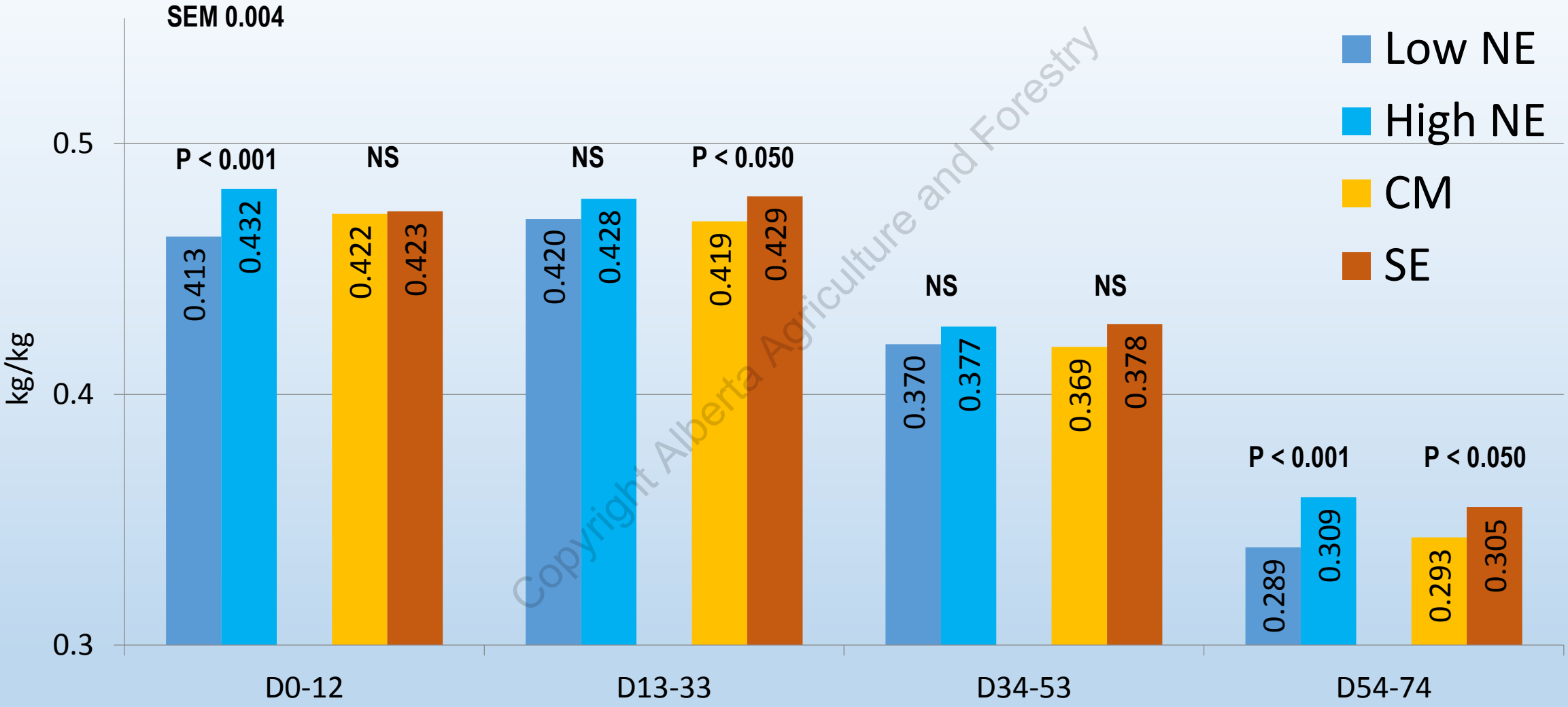
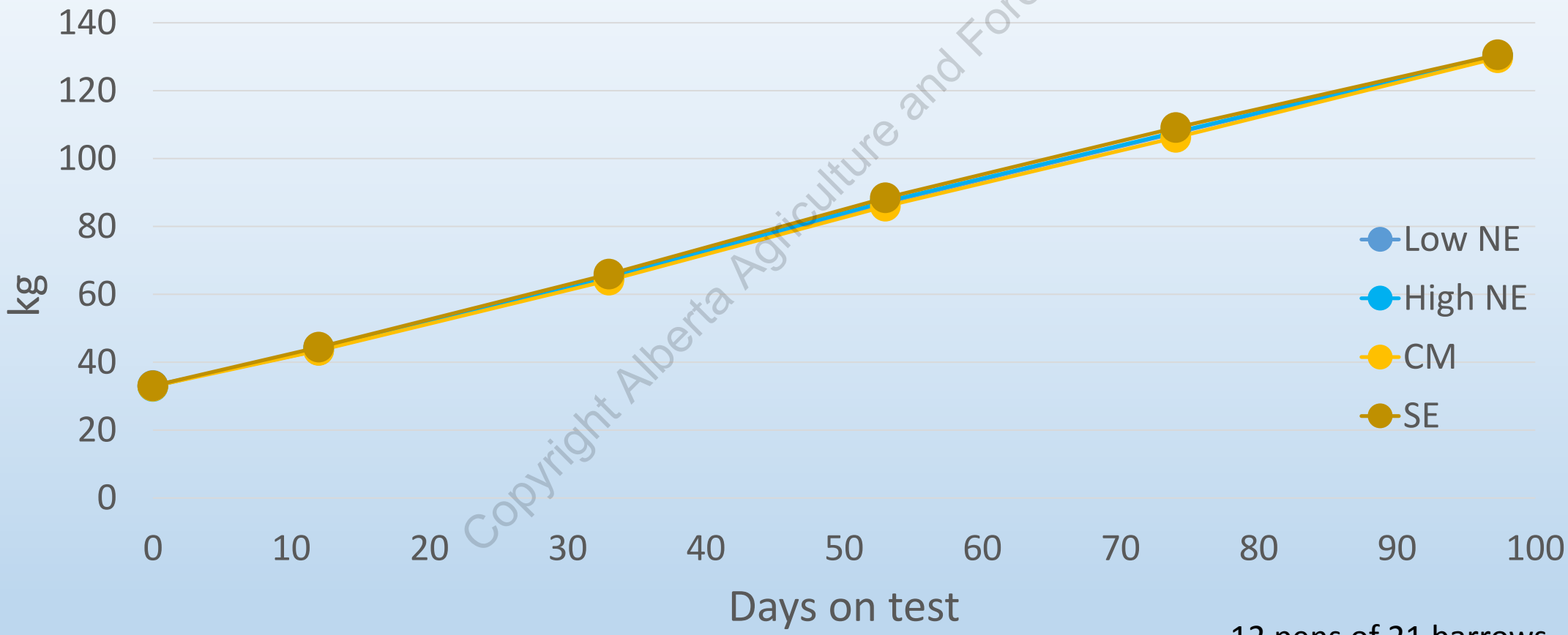
Feed efficiency by growth phase



12 pens of 21 barrows or 21 gilts per diet

Body weight by day on test

2.6d longer to 130kg
CM vs. SE
P < 0.001



12 pens of 21 barrows
or 21 gilts per diet

Carcass traits

	Low NE	High NE		CM	SE		SEM	NE level	Protein
Ship weight, kg	130.1	130.2		129.7	130.6		0.3	0.925	0.081
Carcass wt, kg[c]	101.9	102.7		101.6	103.0		0.3	**<0.050**	**<0.001**
Dressing, %	78.3	78.9		78.3	78.9		0.1	**<0.010**	**<0.010**
Backfat, mm	18.4	19.0		18.5	18.9		0.2	0.064	0.172
Loin depth, mm	61.7	61.8		60.6	62.9		0.4	0.793	**<0.001**
Lean yield, %	60.8	60.5		60.7	60.6		0.1	0.061	0.755
Index	115.0	115.3		115.3	115.0		0.2	0.269	0.269
Carcass, $	208.47	210.85		208.61	210.71		0.75	**<0.050**	0.052

12 pens of 21 barrows or 21 gilts per diet

Feed cost, profit margin

d0-103 , $	Low NE	High NE		CM	SE		SEM	NE level	Protein
Feed cost	265.86	294.24		276.17	283.93		0.07	**<0.001**	**<0.001**
Feed cost per kg BW gain	0.80	0.84		0.82	0.81		0.003	**<0.001**	0.070
Feed cost per pig	77.22	81.85		79.57	79.50		0.39	**<0.001**	0.892
Feed cost per pig shipped	78.54	82.87		79.96	81.46		0.75	**<0.001**	0.061
ISFC per pig	75.13	72.14		72.50	74.77		0.46	**<0.001**	**0.001**
ISFC per pig shipped	**68.84**	**66.09**		**67.46**	**67.78**		0.68	**<0.010**	0.480

$2.75 more profit per hog feeding low NE

$0.32 more profit per hog feeding SE ($388/tonne) vs. CM ($238/tonne)

12 pens of 21 barrows or 21 gilts per diet

Conclusions

- Feeding low (2.17-2.20) vs. high (2.32-2.35 Mcal/kg) net energy (NE) diets to hogs resulted in greater profitability ($2.75).

- Abruptly introducing 25% canola meal in the grower phase diets was a challenge to pigs, which never caught up to those fed more palatable, lower fibre, soy expeller diets.