Canola Meal Energy Research Update

(recent results from yellow seeded canola feeding studies)

Canola Industry Meeting

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Canola meal components

Component, as is	Canola Meal	Soybean Meal	Canola meal % soybean meal
Swine DE, kcal/kg	3100	3650	85
Poultry ME, kcal/kg	2000	2500	80
Crude Fibre, %	11.5	3	380
ADF, %	19	5	380
NDF, %	27	7	380
Lignin	8	1	800
Cellulose	5	5	100
Starch + Sugars	14	16	88
Oligosaccharides	3	3	100
Other polysaccharides	15	12	125

Relative economic value of canola meal to high protein soybean meal in least cost animal feeds

Animal type	Relative value
Layer chicken	65% - 75%
Broiler chicken	55% - 70%
Pig starter	60% - 65%
Hog grower/finisher	65% - 75%
Gestating sow	65% - 75%
Lactating sow	60% - 70%
Dairy	70% - 85%

Canadian canola industry goals for 2015

Element	2006	2015 Target
Meal	2000 kcal/kg energy content (poultry)	10% increase (2200 kcal/kg) (90% of soybean meal)

Increasing the energy content of canola meal for swine and poultry by 10% can increase its value by a similar amount.

Factorial study to increase the energy content of canola meal

It was agreed that we need to look at the potential cumulative effects of making changes in breeding, processing and enzymes to determine if existing technology could help us achieve the 10% metabolizable energy increase objective. Therefore it was determined that a factorial experiment was indicated as a first step:

- 3 types of canola classes (black napus, yellow napus, canola quality juncea)
- 2 processing conditions (conventional and light toasting desolventization)
- 2 enzyme treatments (with and without a multi-substrate enzyme combination).

Canola meal from different canola types and processing

Canola Meal Research – Projects related to increasing metabolizable energy levels

- Preparation of high digestibility canola meals from regular canola and yellow seeded canola (POS Pilot Plant)
- Estimation of the net energy content of six samples of canola meal in growing pigs (Prairie Swine Centre)
- A new, high energy canola meal for poultry and swine: The effect of yellow seed coat, processing and enzyme supplementation (University of Manitoba)
- Evaluation of yellow seeded canola products for poultry (Nova Scotia Agricultural College)

Nutrient composition of different canola meals.

Nutrient (dry matter basis)	Black Napus	Canola Juncea	Yellow Napus
Crude protein, %	43.9	47.5	49.8
Oil, %	1.8	1.7	1.7
Crude fibre, %	9.6	6.9	6.1
Neutral detergent fibre, %	21.8	16.2	14.7
Acid detergent fibre, %	16.6	11.8	9.9
Sucrose, %	8.9	9.2	10.2
NSP's, %	17.6	18.9	16.0
- NSP Arabinose, %	5.2	5.6	5.2
- NSP Glucose, %	3.6	4.7	2.7
Lignin, %	7.1	3.9	3.7

Nutrient composition of different canola meals for swine (Prairie Swine Centre)

Meal type	DE, kcal/kg dm	NE, kcal/kg dm	Protein digest, %
Black napus – regular toasted	3620	2480	82.2
Black napus – light toasted	3650	2500	84.0
Canola juncea – regular toasted	3810	2620	86.7
Canola juncea – light toasted	3710	2550	85.5
Yellow napus – regular toasted	3950	2720	87.4
Yellow napus – light toasted	4000	2740	87.4

Nutrient composition of different canola meals for swine (Prairie Swine Centre)

Meal type	NE, kcal/kg dm	% Increase over Black
Black napus	2490	
Canola juncea	2585	3.8
Yellow napus	2730	9.6
Regular toasted	2607	
Light toasted	2590	-0.7

Broiler chicken performance and AMEn for different canola meals (Nova Scotia Agricultural College)

Black Napus	35 day BW, g	Feed /Gain	AMEn, kcal/kg dm
Regular toasted, no enzyme	1279	2.27	2474
Regular toasted, plus enzyme	1440	1.98	2494
Light toasted, no enzyme	1194	2.29	2179 ?
Light toasted, plus enzyme	1301	2.24	2414

Broiler chicken performance and AMEn for different canola meals (Nova Scotia Agricultural College)

Canola Juncea	35 day BW, g	Feed /Gain	AMEn, kcal/kg dm
Regular toasted, no enzyme	1247	2.19	2347
Regular toasted, plus enzyme	1465	1.92	2638
Light toasted, no enzyme	1354	2.02	2384
Light toasted, plus enzyme	1440	2.10	2401

Broiler chicken performance and AMEn for different canola meals (Nova Scotia Agricultural College)

Yellow Napus	35 day BW, g	Feed /Gain	AMEn, kcal/kg dm
Regular toasted, no enzyme	1475	1.90	2707
Regular toasted, plus enzyme	1589	1.93	2655
Light toasted, no enzyme	1280	2.08	2782
Light toasted, plus enzyme	1445	2.12	2757

AMEn of different canola meals for poultry (Nova Scotia Agricultural College)

Meal type	AMEn, kcal/kg dm	% Increase
Black napus	2391	
Canola juncea	2443	2.2
Yellow napus	2725	14.0
Regular toasted	2553	
Light toasted	2486	-2.6
No enzyme	2479	
Plus enzyme	2560	3.3

Broiler chicken performance for different canola meals (University of Manitoba)

Meal type	BW gain day 4-18, g	Feed/Gain
Black napus – regular toasted	428	1.33
Black napus – light toasted	372	1.40
Canola juncea – regular toasted	416	1.38
Canola juncea – light toasted	393	1.42
Yellow napus – regular toasted	432	1.33
Yellow napus – light toasted	361	1.43

Broiler chicken performance for different canola meals (University of Manitoba)

Meal type	BW gain day 4-18, g	Feed/Gain
Black napus	400	1.36
Canola juncea	405	1.40
Yellow napus	396	1.38
Regular toasted	425	1.35
Light toasted	375	1.42

Glucosinolate content and myrosinase activity in different canola meals

Meal type	Glucosinolates, umole/g	Myrosinase activity, U/g
Black napus – regular toasted	24.8	0.1
Black napus – light toasted	32.2	0.8
Canola juncea – regular toasted	13.6	0
Canola juncea – light toasted	21.2	0.3
Yellow napus – regular toasted	15.8	0.1
Yellow napus – light toasted	20.2	1.1

Glucosinolate content and myrosinase activity in different canola meals

Meal type	Glucosinolates, umole/g	Myrosinase activity, U/g
Black napus	30.7	0.5
Canola juncea	18.8	0.2
Yellow napus	20.0	0.6
Regular toasted	21.0	0.1
Light toasted	25.3	0.7

Conclusions

- Canola type has the largest influence on energy content. Yellow hull canola types have lower fibre contents. The higher energy in yellow hull canola is likely due to a combination of higher protein and higher levels of digestible sugars (higher sucrose).

- Vacuum desolventization followed by light toasting showed no advantage over regular toasting. This may in part be due to small differences in processing temperatures and ineffective deactivation of myrosinase enzyme resulting in higher levels of glucosinolates.

- The use of carbohydrase enzymes was somewhat effective, especially for canola juncea. This may be due to higher levels of soluble non-starch polysaccharides in canola juncea (to be verified).

Next Steps

Follow-up studies: part of Canola Council application for AAFC Agri-Science Cluster

Canola Meal Research

High inclusion Levels of Regular and High Energy Canola Meal in Animal Feeds

- Objective is to address the issues associated with high canola meal feed inclusion levels such as: anti-nutrients, inefficient nitrogen utilization and effects on carcass composition, and to demonstrate that high energy canola meal can effectively be used at very high inclusion levels in swine and poultry feeds.

- Multi-institution co-ordinated series of studies to fully investigate very high dietary inclusion levels of both regular and high energy meal. The work will take place at the University of Alberta, University of Manitoba, Nova Scotia Agricultural College and AAFC Lethbridge.

Total cost of the project is $1,932,000.

Canola Meal Research

Improving Carbohydrate Composition of Canola Meal to Increase Energy Content.

- Objective is to determine what the important energy yielding and energy detracting carbohydrate components of canola meal are with the objective of providing information to canola breeders to develop high energy canola varieties.

- Some aspects: fully characterize the carbohydrate content of different types of canola and their inter-relationships, set targets for carbohydrate alteration, produce and evaluate (with and without enzymes) small quantities of promising high energy canola meals.

- Research will take place at AAFC Saskatoon and the University of Manitoba.

Total cost of the project is $609,000.

Thank you

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