Inclusion of Dietary Co-products: Impact on Performance & Bottom Line

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The Big Problem: Feed Costs

Feedstuffs

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THE WEEKLY NEWSPAPER FOR AGRIBUSINESS

SPECIAL REPORT

Ethanol, exports and livestock:
Will there be enough corn to supply future needs?

USDA projections for the year ahead indicate that the U.S. corn supply-demand balance is changing from one of chronic surplus production capacity to an extended period of tight supplies. If so, relatively high corn prices will be needed to allocate limited supplies among the growing alternative users. This article provides a more up-to-date look at trends in U.S. corn production and utilization during the next five years and implications for related industries.

By ROBERT N. WISNER and C. PHILLIP BAUMEL

Emerging picture

American farmers harvested a record corn crop in 2003 that was insufficient to fill market requirements.

FIGURE

Production projection with trend yield

Feed and residual use adjusted for DGS

Total processing plus seed

Available for export

1. U.S. corn production, domestic use, availability for exports, projections to 2008.

Vision: Co-products will become (more) important feed ingredients

Simple economics

Vision

- **Maximize opportunities to include (human) non-edible feedstuffs into swine diets**
  - **Pig is an omnivorous species**

A person who never made a mistake never tried anything new.

Albert Einstein

Is Feeding Co-products Really New?

Feedstuffs in Swine Feed

Feedstuff	N. Am.	EU-25	NL
		(%)	
Cereals	65	48	19
Co-products 'oil seed crushing'	15	25	32
Co-products 'food industry'	5	14	32
Fats & oils	3	2	4
Miscellaneous	12	11	13

(FEFAC; 2005)

- **Since 2005, N. Am. has moved rapidly toward EU scenario**

Some Items to Solve

➢ Develop and use of new feedstuffs

- Evaluate new feedstuffs / co-products
- End goal: Maximize co-products utilization

Characterize feedstuffs for Net Energy & Standardized Ileal Digestible Amino Acids:

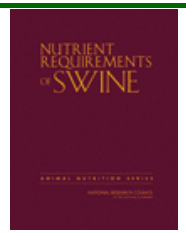
- Fill gaps in data bases: SIP project
- Formulate feeds accordingly: Validate

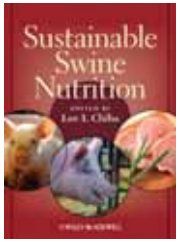

➢ Linking the crop and livestock industry

- Rapid feed quality evaluation for main feedstuffs

Technology Transfer







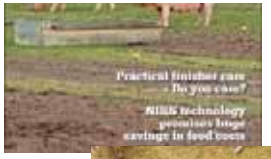
For this topic, we know much more now than in 2005

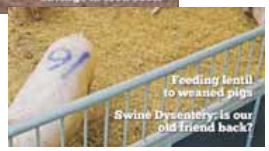
Technology Transfer

Technology Transfer

Generally, tough to get economic analyses included in such papers

Technology Transfer





- Caution: Simple economics

Recent Review

JAS7169

Controlling feed cost by including alternative ingredients into pig diets: A review[1,2]

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ABSTRACT: Sustained price increases for traditional cereal grain and protein meal feed commodities have forced the pork industry to consider the dietary inclusion of alternative feedstuffs. Crop seed may serve as feedstuffs but their demand as feedstock for human

factors (ANF): fiber, tannins, glucosinolates, and heat-labile trypsin inhibitors. Several methods can optimize nutrient use of pigs fed alternative feedstuffs by reducing effects of their ANF. These methods include: 1) particle size reduction to increase nutrient digestibility, 2)

Importance of Feed Quality Evaluation

Input
- Feedstuffs
- Intake

Output
- Carcass Wt & Q
  - Pork Q
  - Nutrient Mngt

Pig
- Growth (predictable)
  - Animal Health
  - Welfare

Co-products – Risk Management

- Feedstuffs high in fiber and crude protein
  - Feed Quality Evaluation
    - Energy: NE versus DE/ME

Feedstuff	N. Am.	EU-25	NL
		(%)	
Cereals	65	48	19
Co-products 'oil seed crushing'	15	25	32
Co-products 'food industry'	5	14	32
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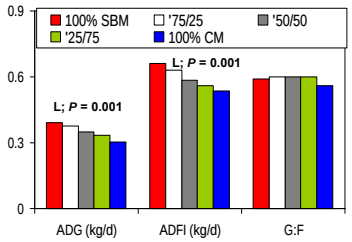
Miscellaneous	12	11	13

How come the European feed industry can manage?
Diets with lower starch and higher fiber and protein content

Weaned Pigs
Solvent-Extracted Canola Meal



Performance was reduced when CM was included

Diets formulated to equal DE, CP, and total Lys

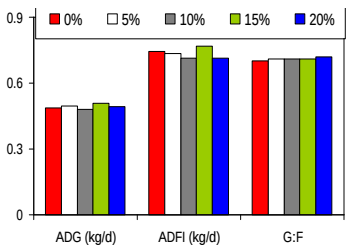
Wheat	20	20	20	20	20
Barley	49.6	45.6	41.4	37.2	33
SBM	25.4	19	12.7	6.3	-
CM	-	8.8	17.6	26.5	35.3
Tallow	-	1.5	3.3	5.0	6.7
L-Lys.	.10	.12	.13	.14	.15

- Glucosinolates (ANF)
- Palatability
- Fiber
- Lower AA digestibility

SE Canola meal: 3.84 µmol total glucosinolates/g
One diet; steam pelleted

(Baidoo et al., 1987)

Weaned Pigs
Solvent-Extracted Canola Meal



Performance was not reduced when solvent-extract CM was included

Diets formulated to equal NE and SID AA

Wheat	57.9	57.8	56.7	56.1	55.5
L/PC/F	15	15	15	15	15
SBM	20	15	10	5	-
CM	-	5	10	15	20
Oil	3	3.5	4.0	4.5	5.0
L-Lys.	-	.08	.15	.23	.30

- Other feedstuffs?
  - Palatability
  - "Buffer"
- Feedstuffs change
  - Glucosinolate

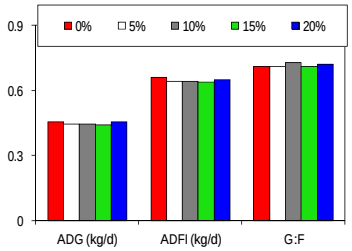
- L, lactose
- PC, soy protein concentrate
- F, fish meal

SE Canola meal: 3.84 µmol total glucosinolates/g
One diet; steam pelleted

(Landero et al., 2011)

20% canola meal reduced feed price by $11.9 per MT and feed cost per unit of body weight gain by 2 cents/kg.

Weaned Pigs
Expeller-Pressed Canola Meal



Performance was not reduced when expeller-pressed CM was included

Diets formulated to equal NE and SID AA

Wheat	55.9	56.2	56.6	57.0	57.4
L/PC/F	15	15	15	15	15
SBM	20	15	10	5	-
EPCM	-	5	10	15	20
Oil	5.0	4.5	4.0	3.5	3.0
L-Lys.	.02	.09	.16	.22	.29

- Other feedstuffs?
  - Palatability
  - "Buffer"

EP Canola meal: 10.87 µmol total glucosinolates/g
One diet; steam pelleted

(Landero et al., 2012)

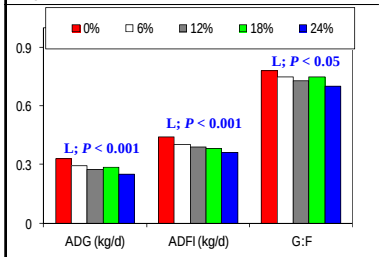
20% expeller-pressed canola meal reduced feed price by $29.8 per MT and feed cost per unit of body weight gain by 4.2 cents/kg.

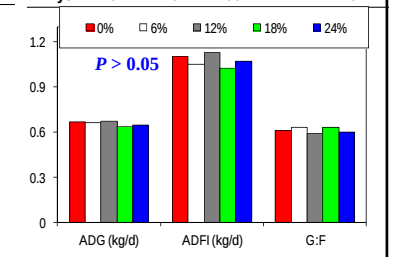
Weaned Pigs
Solvent-Extracted Juncea Canola Meal

Phase-2 and -3 diets formulated to equal NE and SID AA

Wheat	58.7	58.0	57.4	56.8	56.2
L/PC/F	10	10	10	10	10
SBM	24	18	12	6	-
JCM	-	6	12	18	24
Oil	2.6	3.2	3.8	4.4	5.0
L-Lys.	.09	.17	.25	.32	.40

Wheat	69.2	68.6	68.0	67.3	66.7
L/PC/F	-	-	-	-	-
SBM	24	18	12	6	-
JCM	-	6	12	18	24
Oil	2.0	2.6	3.2	3.8	4.4
L-Lys.	.20	.28	.36	.44	.52





SE Juncea meal: 10.84 µmol total glucosinolates/g [gluconapin]
Two diets; diet 1, cold pelleted; diet 2 steam-pelleted

(Landero et al., 2013)

Preference trials

For performance trial
Each pen of pigs receives one diet (or diet regime) throughout the entire experiment

For preference trial
Each pen of pigs receive a choice to pick one or another diet

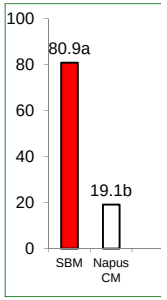
Diets

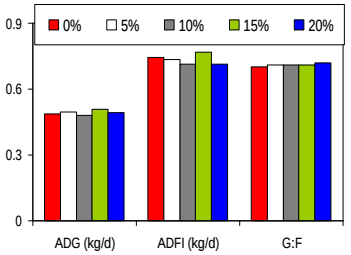
	SBM	CM	JCM
Wheat	67.67	65.51	65.51
PC/FM	5	5	5
SBM	20	-	-
CM	-	20	-
JM	-	-	20
Oil	3.0	4.9	4.9
L-Lys.	.10	.40	.40

Diets formulated to equal NE and SID AA

Preference vs. Performance

Solvent-Extracted Canola Meal



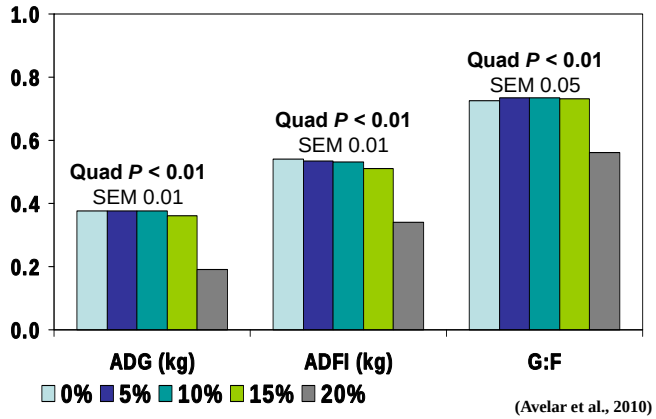


Bottom-line: when provided a choice, pigs will pick what they like best; however, without choice, pigs' drive to grow will drive energy intake

(Landero et al., 2013)

Weaned Pigs

Wheat Distillers Dried Grain with Solubles (DDGS)

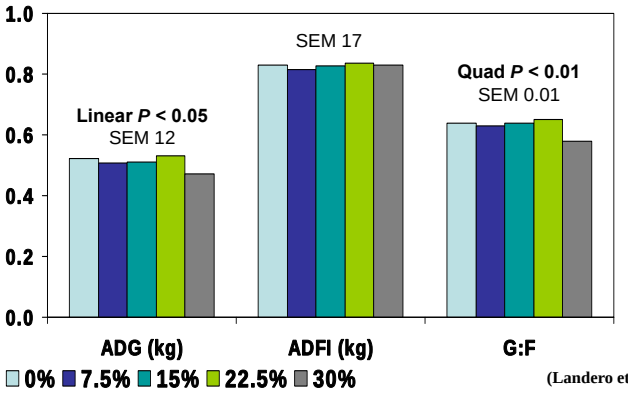


(Avelar et al., 2010)

15% wheat DDGS reduced feed price by $14.60 per MT and feed cost per unit of body weight gain by 2.07 cents/kg.

Weaned Pigs

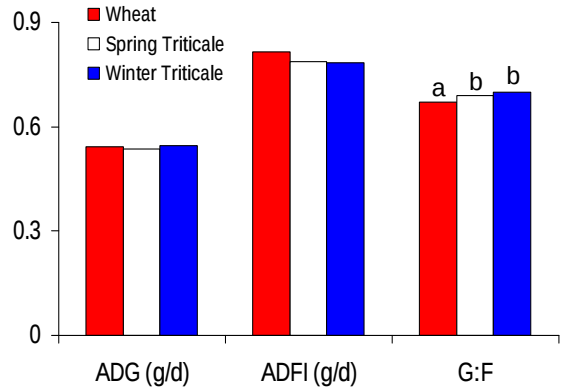
Lentil



(Landero et al., 2012)

22.5% lentil reduced feed price by $4.13 per MT and feed cost per unit of body weight gain by 0.64 cents/kg.

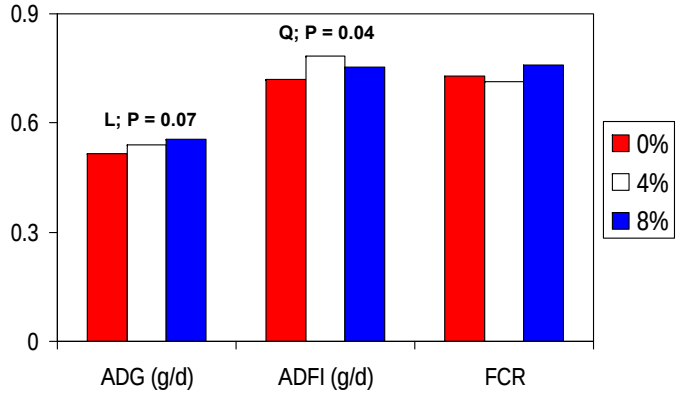
Weaned Pigs
Triticale



Triticale entirely replaced 66% wheat (Beltranena et al. 2008)

Price difference between triticale and wheat determines feed cost advantage

Weaned Pigs
Crude Glycerol

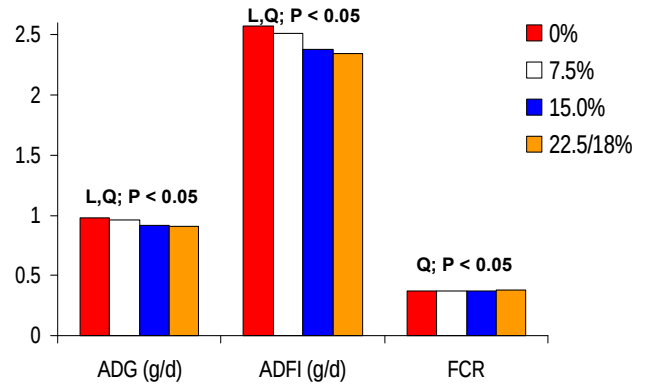


Crude glycerol replaced wheat
CFIA approval required (Zijlstra et al. 2009)

Weaned Pigs
Other such trials

- **Completed**
  - B. juncea expeller
  - Field pea
  - Barley, wheat, and energy
  - Wheat millrun
- **Ongoing**
  - Cold-pressed canola cake

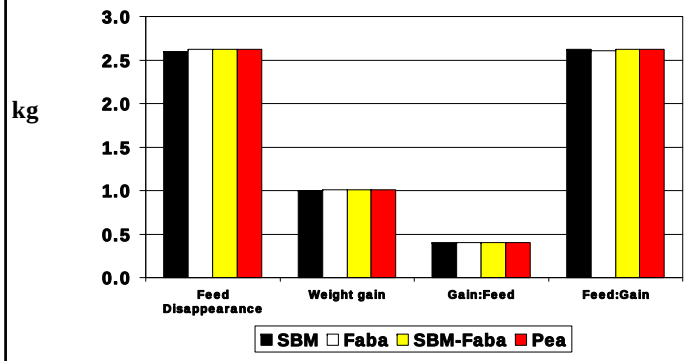
Grower-Finisher Pigs
Expeller-Pressed Canola Meal



(Seneviratne et al. 2009)

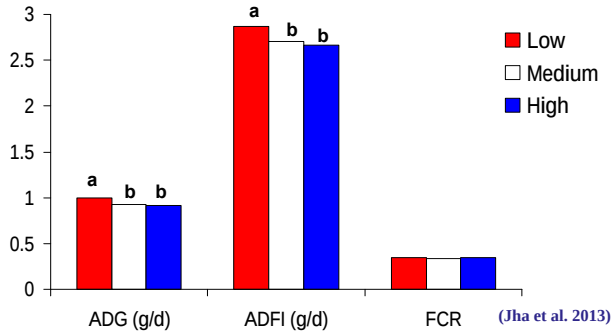
15% expeller-pressed canola meal reduced feed cost by $2.00 per pig.

Grower-Finisher Pigs
Zero-Tannin Faba Bean and Field Pea



(Beltranena et al. 2007)

Grower-Finisher Pigs
Co-Product Inclusion 1

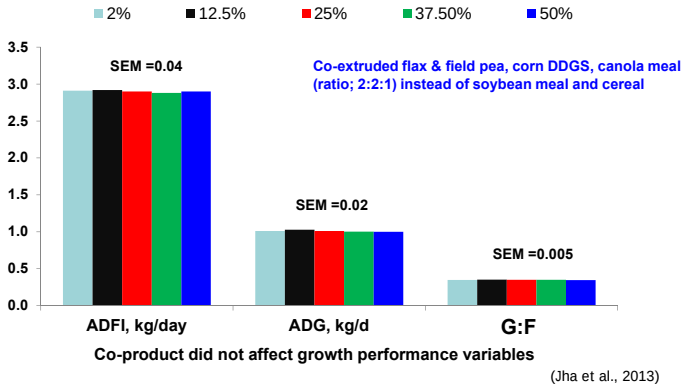


(Jha et al. 2013)

Variable	Low	Medium	High
Feed costs, CDN$/kg gain	0.842 a	0.788 b	0.747 b
Income over feed, CDN$/pig	39.5 a	39.9 a	42.4 b

Grower-Finisher Pigs
Co-Product Inclusion 2

% = co-product inclusion



Co-product did not affect growth performance variables

(Jha et al., 2013)

Changes in carcass and pork quality [later in presentation]

Take Home Message

- Pigs can successfully convert a wide array of feedstuffs into pork
- Use modern feed evaluation
- Let performance targets and economics drive your feed formulation

Summary and Conclusions

- **Co-Products**
  - Are important feedstuffs
  - Manage risk with proper FQE
- **Variability in Quality**
  - Is large; will be important to manage
- **Specific Risks**
  - Mycotoxins & residues, occasionally important
  - Pork quality, is affected but payment might not be
- **Conclusion**
  - Co-products reduce feed costs/pork, but also provide challenges to achieve cost-effective, predict-able growth, carcass characteristics and pork quality

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Canada

canolacouncil

ALBERTA PORK

ACIDF

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  - ALMA
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  - Canadian International Grains Institute
  - Danisco Animal Nutrition
  - Provimi
  - DSM Nutritional Products

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Swine nutrition research

- Basic carbohydrate nutrition
- Feedstuff development
- Rapid feed quality evaluation

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