

Canola Oil and Meal Applications

Australian Oilseeds Federation Forum

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Canola Strengths and Challenges

- + Canola is a high oil content seed (42%) – excellent source of edible oil (*and biodiesel!*)
- + Canola oil is a premium value oil for health and functionality
- Canola oil faces intense global competition from “commodity oils”; e.g. soybean oil, palm oil

Need to de-commoditize canola



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Place of Canola Oil in World Vegetable Oil Markets (2005/06)

- Canola is the third most widely used vegetable oil (MT=million tonnes)
 - Palm oil 35 MT
 - Soybean oil: 33 MT
 - Canola/rapeseed oil: 17 MT
 - Sunflower oil: 10 MT
 - Peanut oil: 5 MT
 - Cottonseed oil: 5 MT
 - Olive oil: 3 MT
 - Coconut oil: 3 MT



Canola Oil Market Development

Promote canola oil's strengths:

Health

- Lowest in saturated fat (7 %) of any common vegetable oil
- Good combinations of mono- and poly- unsaturated fats

Versatility

- Stable
- Neutral taste
- Light color and texture

Canola Brand

- Perceived to be among the healthiest of all oils



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Canola Oil Market Development

Strategy

- Increase brand recognition of canola as healthiest oil
- Promote canola oil in our highest value markets, especially the U.S.
- Obtain credible third party endorsement
- Provide accurate and current technical information



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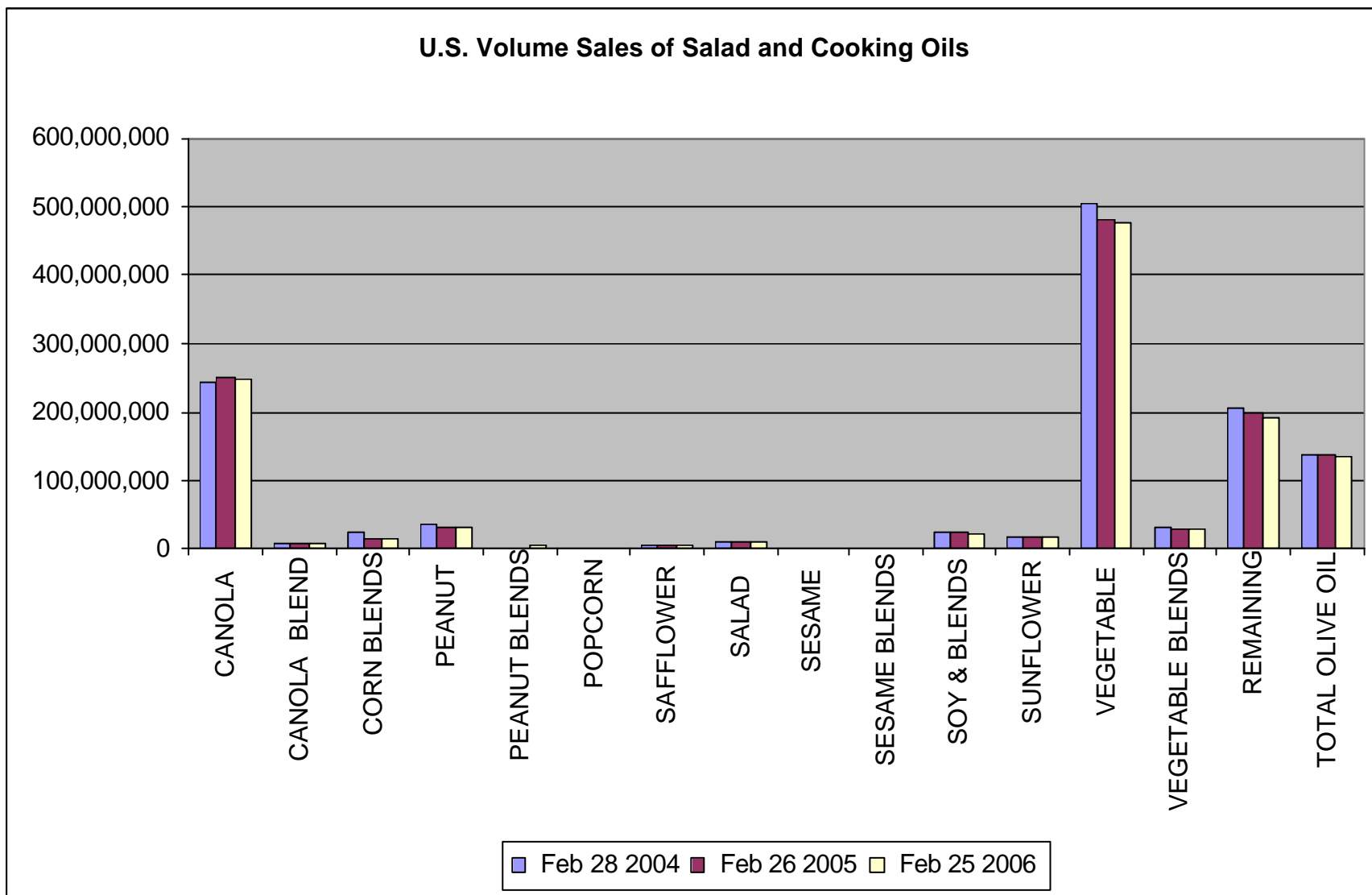
Place of Canola Oil in U.S. Vegetable Oil Market (2005)

Oil type	000 T/yr	%
– Soybean oil	8,165	69.1
– Corn oil:	785	6.6
– Canola oil:	770	6.5
– Palm oil:	616	5.2
– Coconut oil:	467	4.0
– Cottonseed oil:	427	3.6
– Olive oil:	249	2.1
– Sunflower oil:	181	1.5
– Peanut oil	109	0.9
– Other	<u>45</u>	<u>0.5</u>
Total	11,814	100.0



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U.S. Volume Sales of Salad and Cooking Oils



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Promoting Canola Oil in the U.S.

- Joint project of U.S. and Canadian canola industries
- Support original clinical research on canola oil health benefits
- Targeted information on canola oil's health and versatility benefits to consumers, health professionals, culinary professionals, food service and food manufacturing customers: "Low in saturated fats" is key message
- Work with U.S. government regulators (via U.S. Canola Association) on canola oil recognition in food recommendations and regulations, eg. food labelling, health claims, food pyramid
- Promote both conventional and high-stability canola oils
- Priority: increased emphasis on food service and food manufacturing industries
 - Trans fats, "obesity crisis", providing opportunities for canola oil blending and replacement of partially hydrogenated fats
- Promotion and research budget: > \$ 2.0 million in 2006



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Health and Nutrition Issues

- Healthy oils
 - US Nutrition Guidelines
 - Reduce intake of saturated fats
 - Increase intake of mono- and poly-unsaturated fatty acids (omega-3's)
 - ? Good for liquid vegetable oils, especially canola oil (mentioned as a “healthy oil”)



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FDA Health Claim

Approved October 6, 2006

“Limited and not conclusive scientific evidence suggests that eating about 1 1/2 tablespoons (19 grams) of canola oil daily may reduce the risk of coronary heart disease due to the unsaturated fat content in canola oil. To achieve this possible benefit, canola oil is to replace a similar amount of saturated fat and not increase the total number of calories you eat in a day. One serving of this product contains [x] grams of canola oil.”



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FDA Health Claim

Approved October 6, 2006

Criteria for foods eligible to bear the claim include containing at least 4.75 grams of canola oil per reference amount customarily consumed, no more than one gram of trans fat and low levels of saturated fat and cholesterol.



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Strategy to leverage FDA Health Claim

- Publicize health claim to consumers
- Encourage food industry to use health claim and to develop products using canola oil as replacement for unhealthy oils



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Canola meal value

Canola meal is the second most popular protein meal in world. Value is related to soybean meal

- Canola meal has 75% the protein of 47% protein soybean meal
- Canola meal has 80% - 90% the energy value of dehulled soybean meal
- The price of canola meal usually ranges between 60% and 70% the price of soybean meal



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Canola meal value

Strengths:

- High levels of methionine, cystine and histidine – good for dairy cattle and laying chickens
- High ADF/NDF ratio – good for dairy cattle
- High phosphorus levels
- Not antigenic

Weaknesses:

- Low lysine levels – penalty for meat producing animals
- Low biological energy values for monogastrics – penalty for poultry



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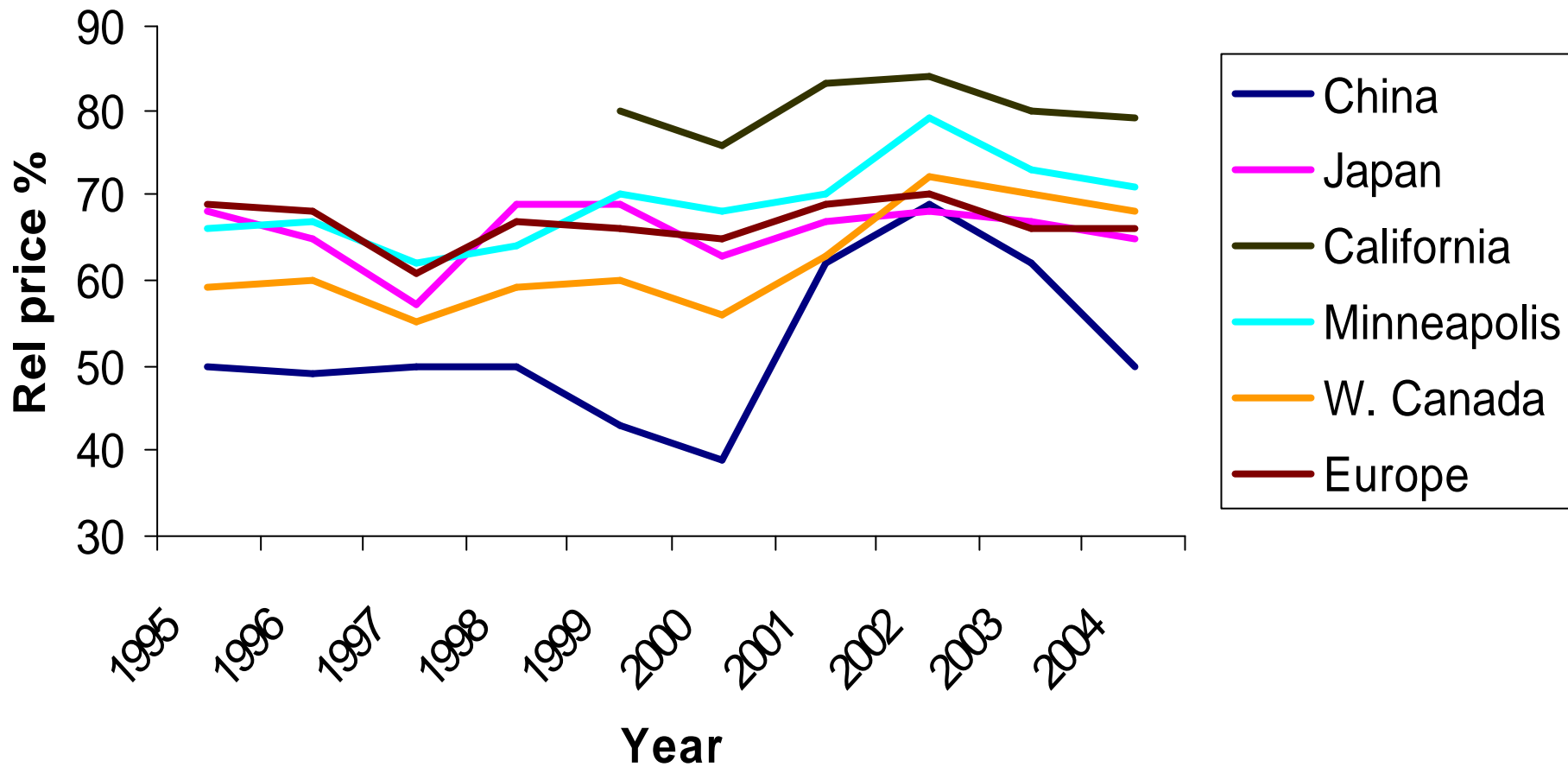
Canola meal relative value to soybean meal

Animal type	Relative value (% soybean meal)
Broiler chicken	55% - 65%
Layer chicken	60% - 70%
Hog grower	65% - 75%
Dairy Cattle	70% - 85%



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Canola meal / Soy meal relative price



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Canola/rapeseed meal use, 2004

Country	Use (000,000 t)
Australia	0.3
Bangladesh	0.2
Canada	0.7
China	6.7
EU	6.0
India	2.8
Japan	0.8
Mexico	0.7
Pakistan	0.4
U.S.	<u>1.9</u>
Total	20.5



Misconceptions about canola meal

It is unpalatable. Not true - it has a neutral taste to most animals

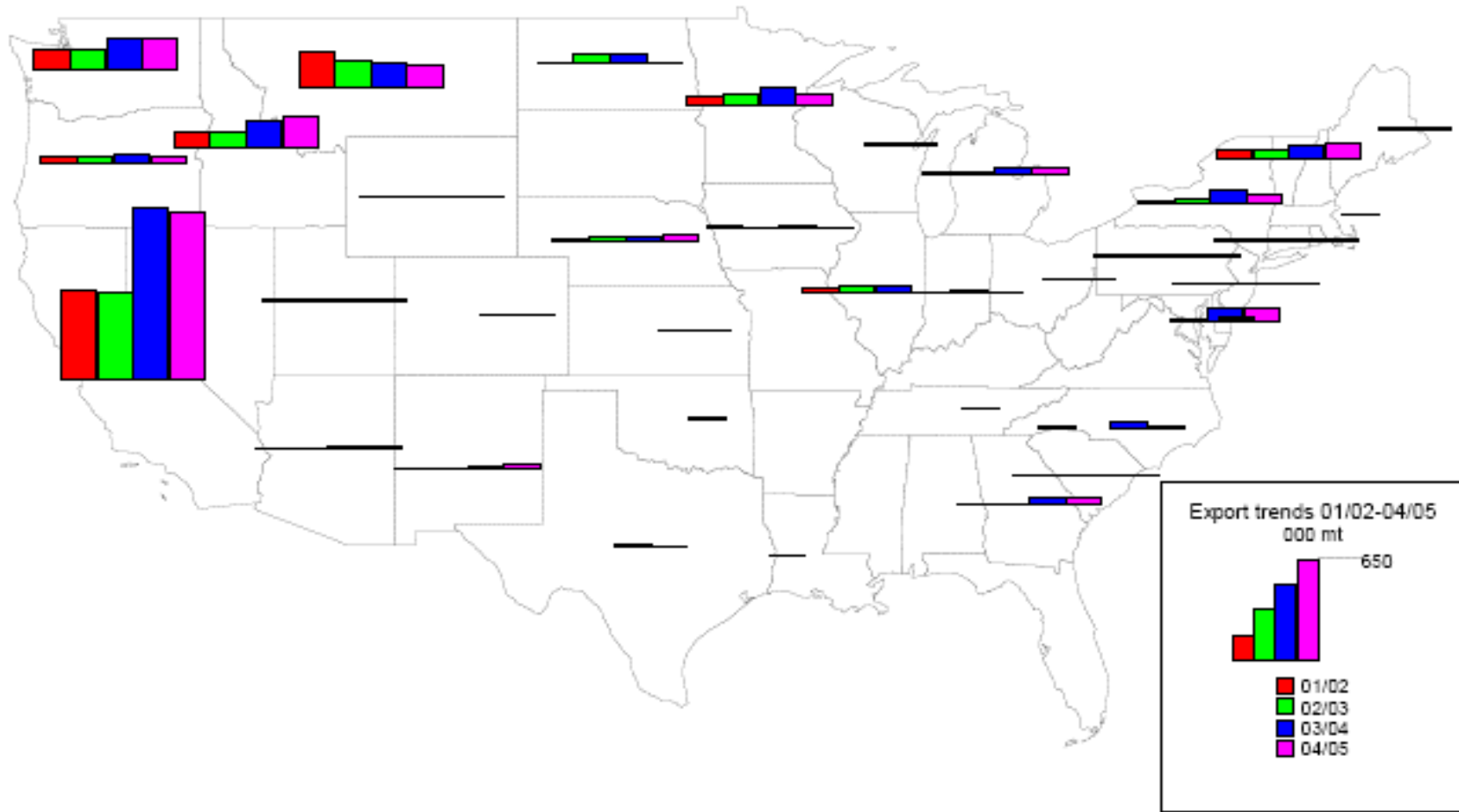
It will result in lower animal performance. Not true - when diets are balanced properly, performance is excellent.

It must be priced at a discount. Not true - it is a premium ingredient for some animals, e.g. dairy cattle



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Canadian Canola Meal Exports to U.S. Ag Commodity Research, Nov 28, 2005



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Feeding canola meal to dairy cattle

Feeding canola meal to dairy cows will increase milk production by 1.0 litre per cow per day

Feeding canola meal to dairy cows will increase milk production by 1.0 litre per cow per day!!



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TABLE 2 Milk production of cows fed canola meal compared to soybean meal or cottonseed meal

	Milk yield (kg/day)	
	Control	Canola
Ingalls and Sharma (1975)	23.0	23.7
Fisher and Walsh (1976)	24.4	23.0
Laarveld and Christensen (1976)	24.9	26.4
Sharma et al. (1977)	20.7	20.9
Sharma et al. (1977)	21.5	21.8
Papas et al. (1978)	24.3	25.2
Papas et al. (1978)	23.9	24.6
Papas et al. (1979)	21.8	22.2
Laarveld et al. (1981)	26.4	27.7
Sanchez and Claypool (1983)	33.4	37.7
DePeters and Bath (1986)	39.8	41.4
Vincent and Hill (1988)	28.5	28.6
Vincent et al. (1990)	25.1	26.7
McLean and Laarveld (1991)	28.9	30.7
McLeod (1991)	17.2	16.9
Emmanuelson et al. (1993)	21.0	21.9
Dewhurst et al. (1999)	24.0	24.5
Dewhurst et al. (1999)	23.7	25.5
Average Milk Yield	25.1	26.1



TABLE 3 Ingredient and rumen microbe amino acid composition compared to milk protein (NRC, 2001)
(The first limiting amino acid in each protein source is highlighted.)

	Amino acid as percent of milk protein						
	Milk % EAA	Rumen microbe*	Cassia meal**	Soybean meal	Corn gluten meal	Cottonseed meal	Sunflower meal
Arginine	7.2	139	197	225	99	361	288
Histidine	5.5	73	138	111	83	120	113
Isoleucine	11.4	107	83	89	80	64	87
Leucine	19.5	81	82	88	190	71	133
Lysine	16.0	119	84	87	23	61	50
Methionine	5.5	84	95	58	95	67	102
Phenylalanine	10.0	104	103	116	141	125	110
Threonine	8.9	121	113	98	84	85	98
Tryptophan	3.0	90	115	93	60	93	97
Valine	13.0	85	88	78	70	77	90

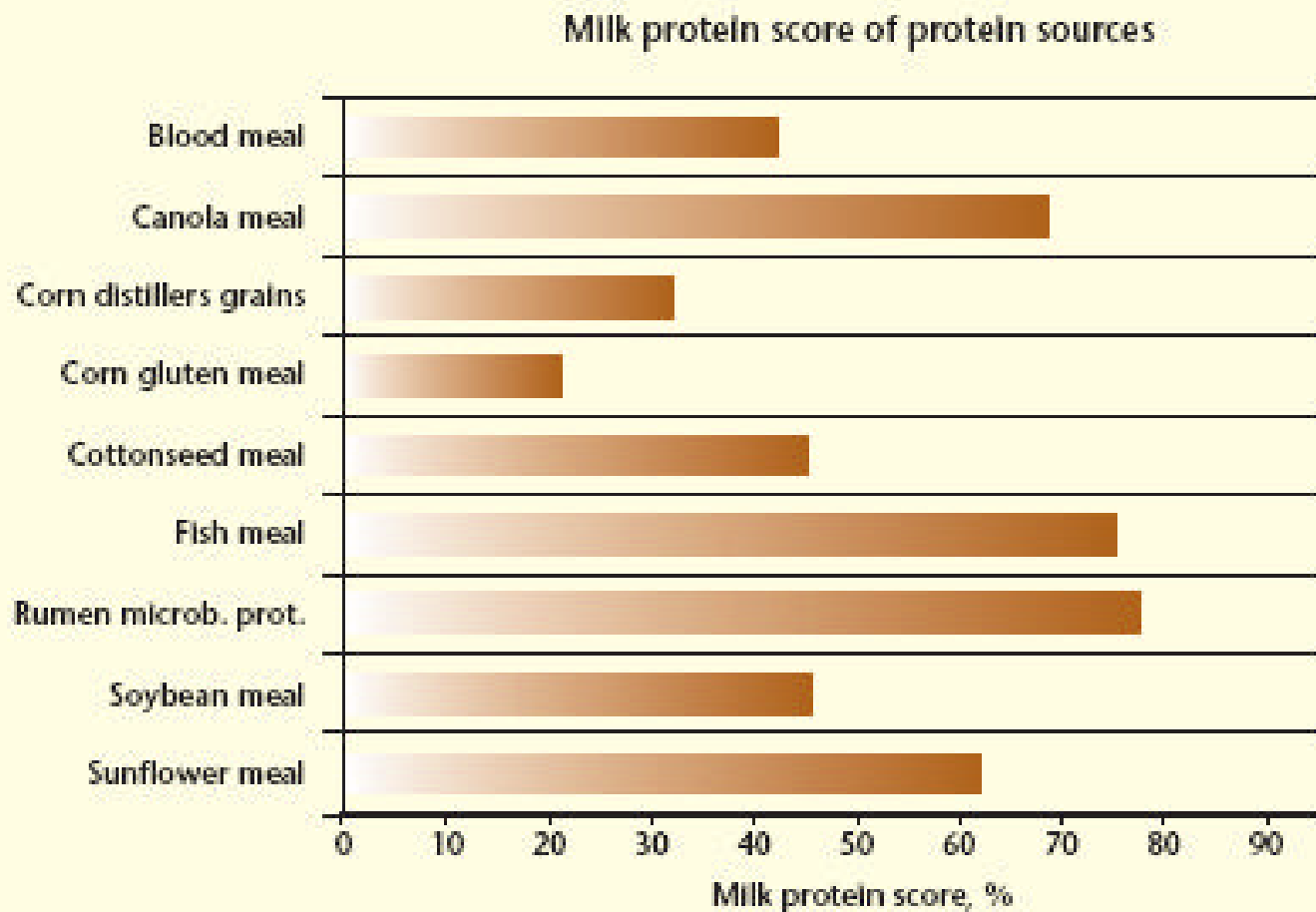
*Assume 50/50 ratio of rumen bacteria and protozoa.

** Canada meal amino acid values from this publication, all others from NRC, 2001, p.72



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Figure 1 Milk protein score of common feed ingredients for dairy cattle (Schingoethe, 1991)



Increasing value for dairy cattle

Increase rumen bypass protein - by thermal and chemical treatment

Increase rumen bypass protein from 35% to approximately 60% - capitalize on good amino acid balance of canola meal for milk production purposes

Maintain high amino acid digestibility in small intestine



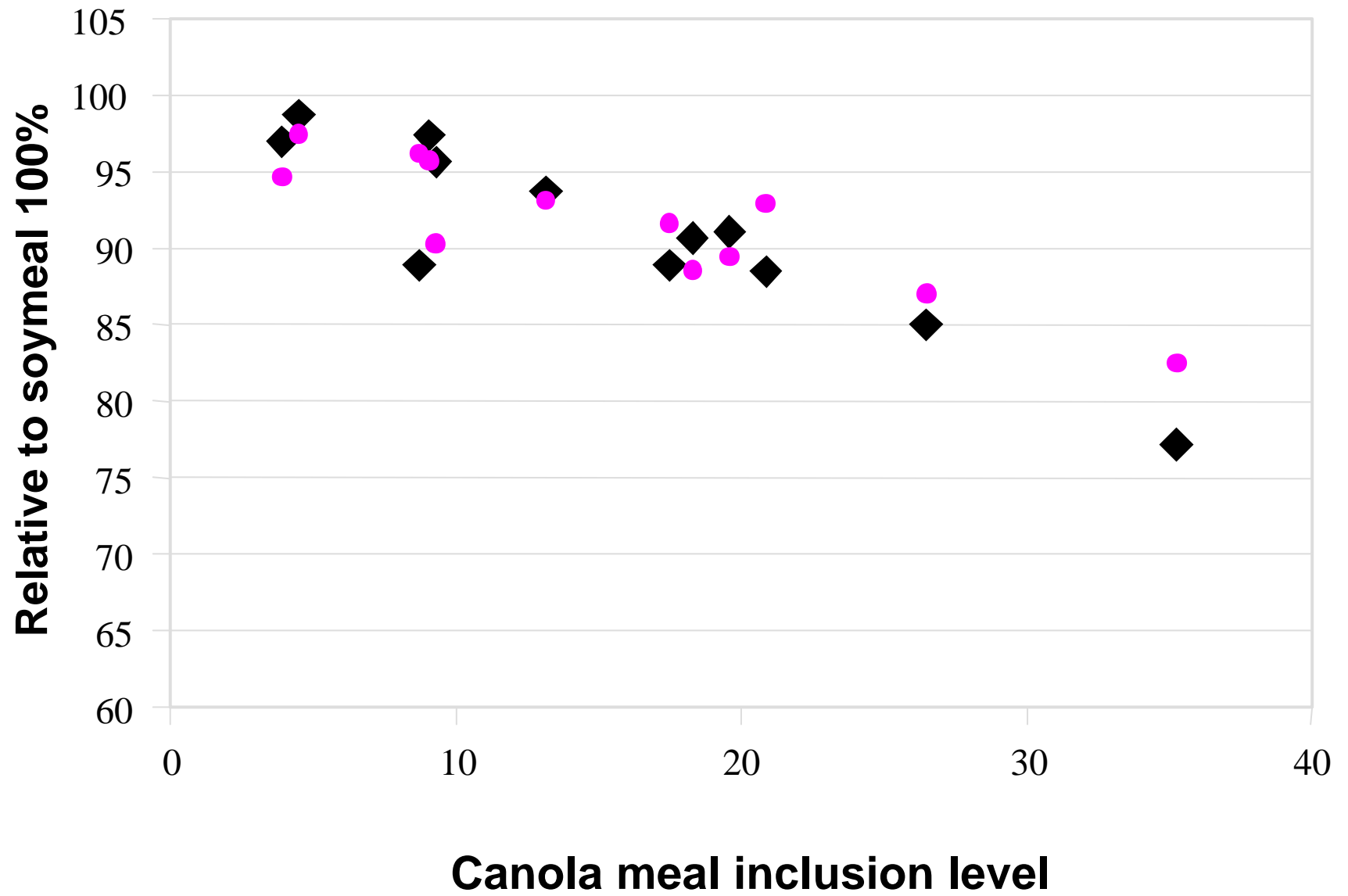
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Amino acid digestibility

- Hog and poultry performance is affected by lower amino acid digestibility in canola meal compared to soybean meal

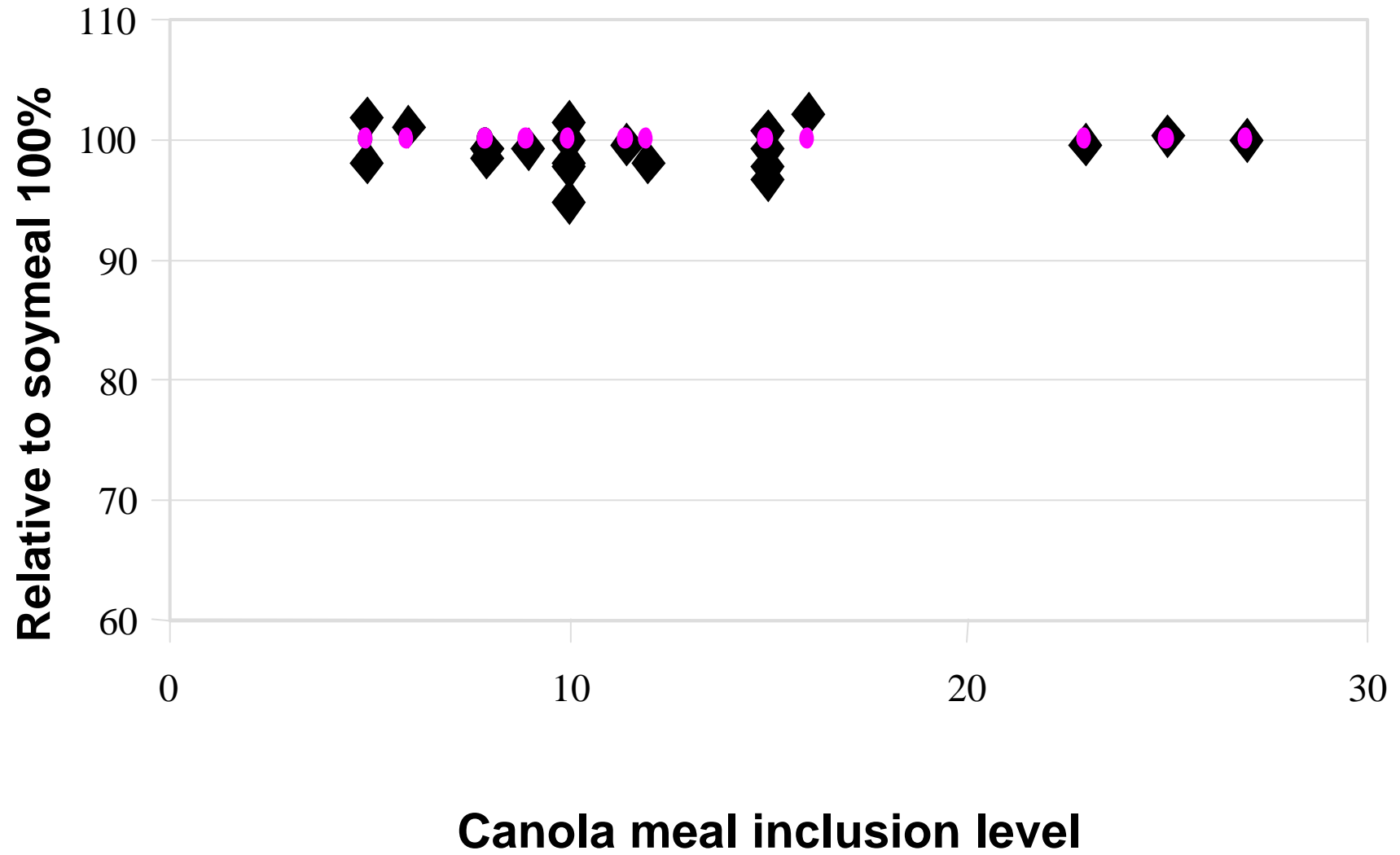


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◆ ADG, % soy control

● Dig. Lysine, % soy control



◆ ADG, % soy control ● Dig. Lysine, % soy control

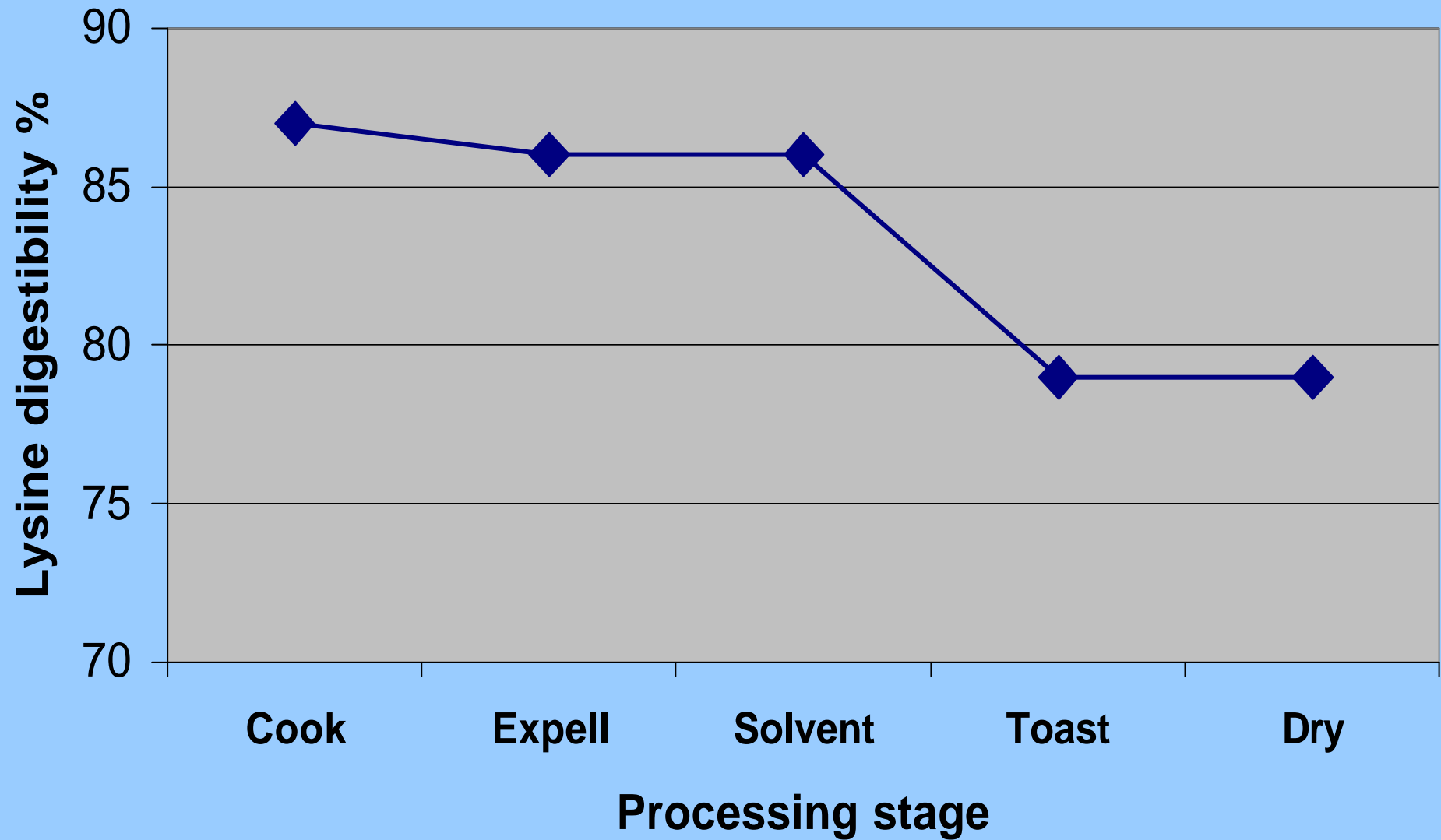
Amino acid digestibility

- Affected by processing conditions - especially desolventizer-toaster temperatures
- University of Saskatchewan research
 - **Reduce DT temperatures from 105 degrees C to between 90 and 95 degrees C**
 - **Alternative solvent removal methods**

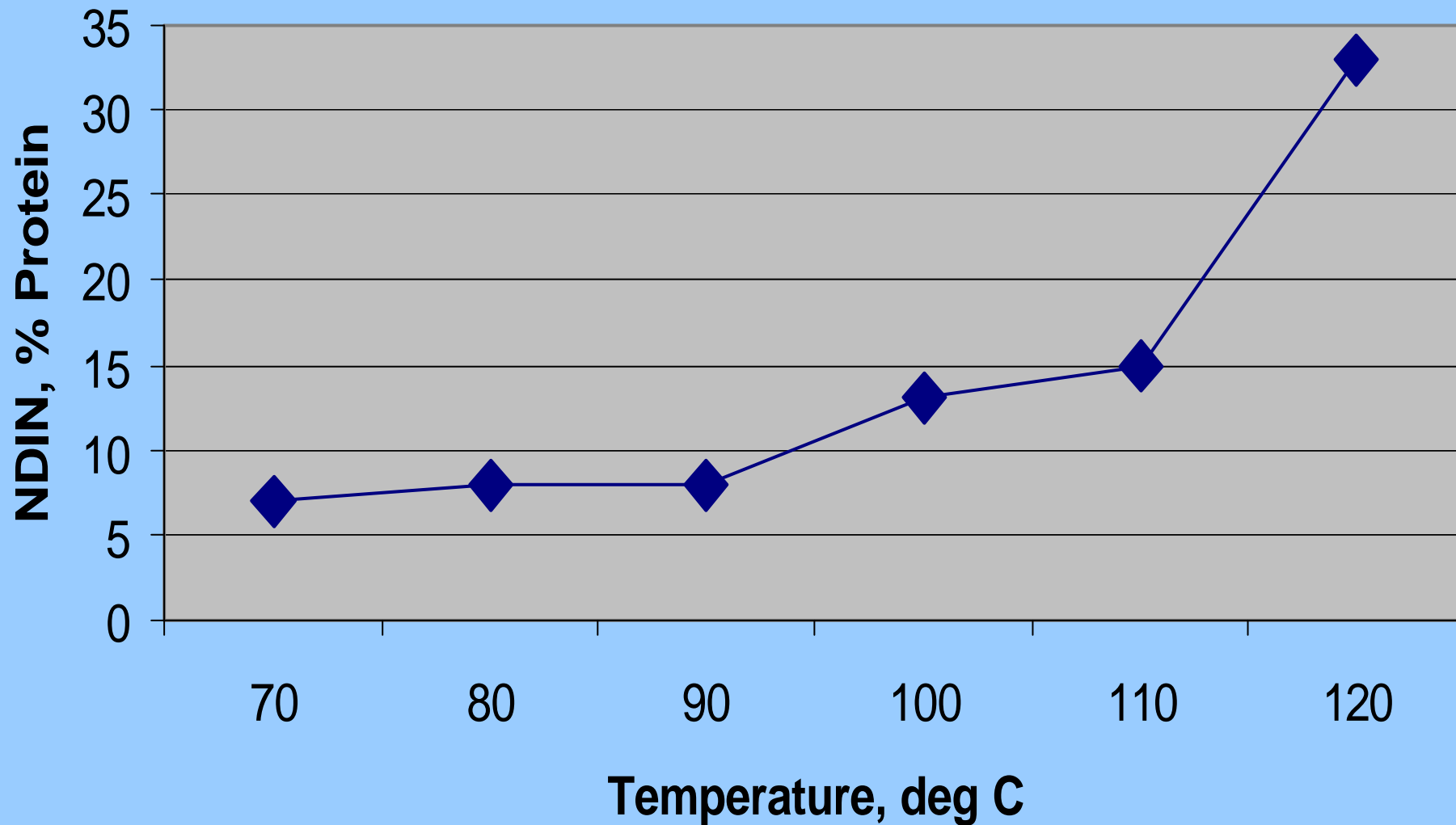


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Canola processing stage and lysine digestibility (Newkirk, 2000)



Canola Meal processing temperature and NDIN (Newkirk, 2000)





Other great things about canola meal

The high methionine, low lysine levels in canola meal complements the high lysine, low methionine levels in feed peas – a perfect western Canadian combination substitute for soybean meal, especially in swine diets.

Canola meal, unlike soybean meal, does not contain any antigenic proteins. This makes canola meal a valuable protein in antigen sensitive diets for pigs, calves, fish and pets.



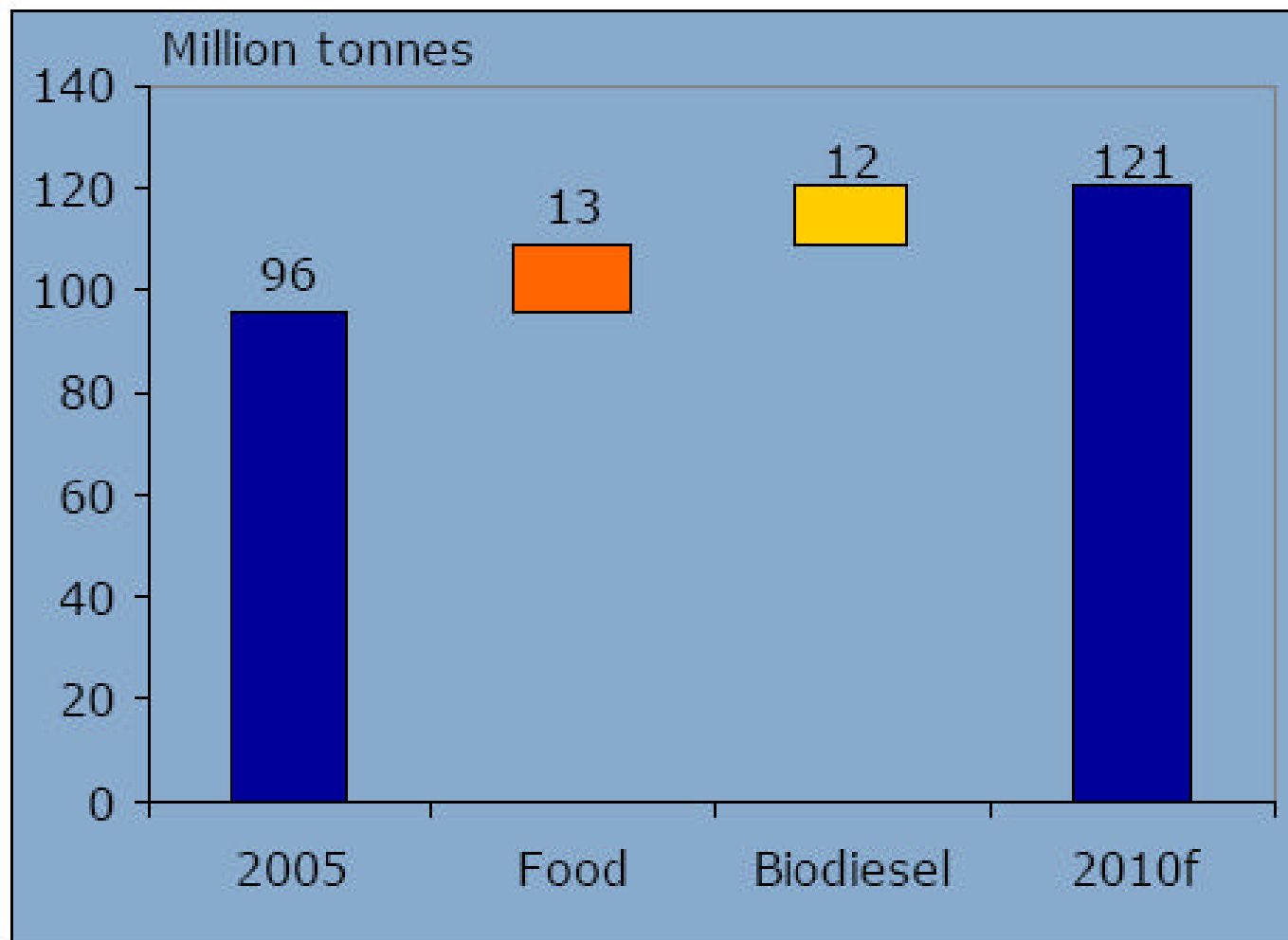
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Bio-diesel



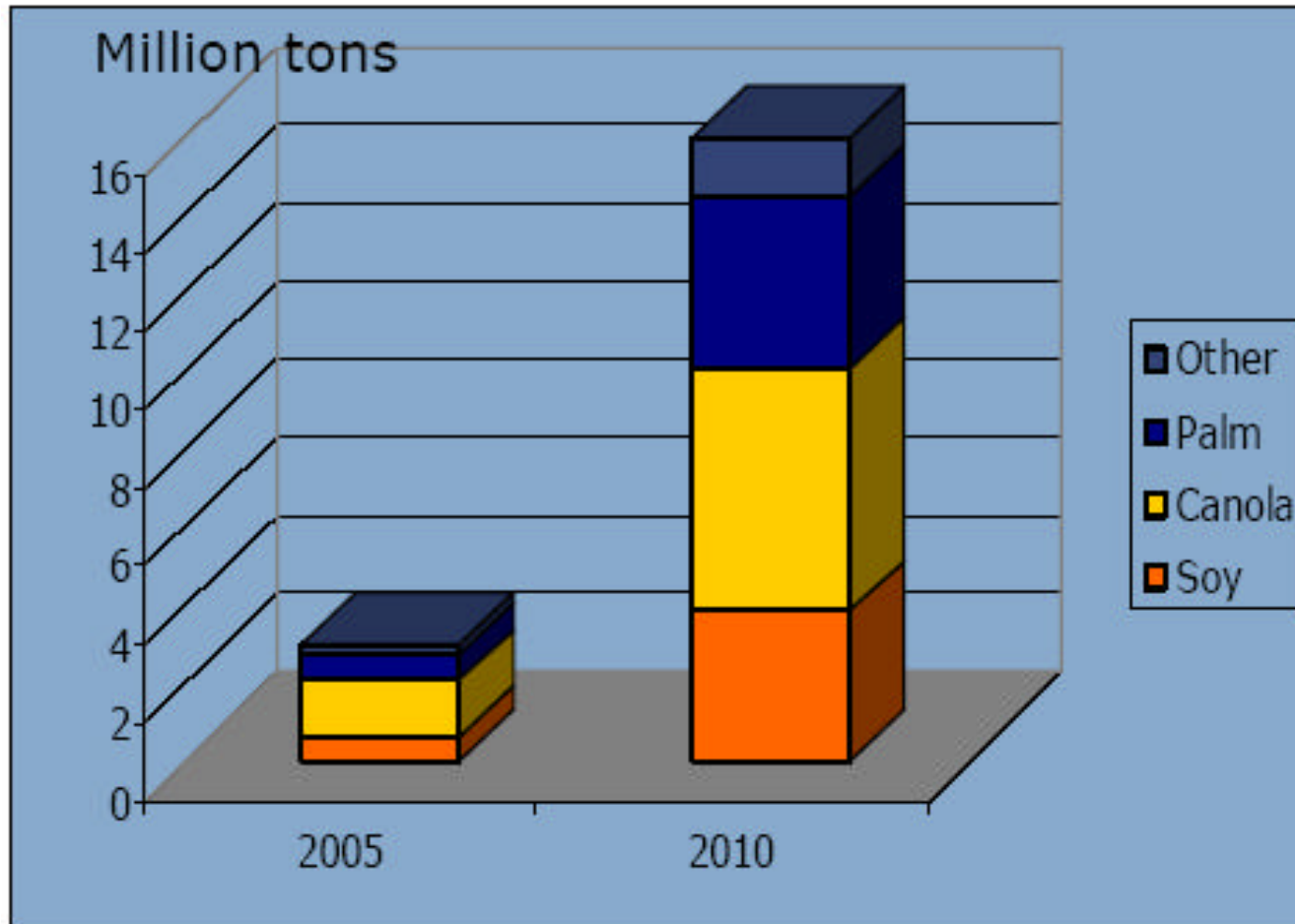
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World use of vegetable oils (soy, palm, rapeseed, cotton, coconut, olive, peanut, sunflower). Rabobank 2006



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Feedstock use in biodiesel production. Rabobank 2006



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Growth in biodiesel production in U.S.

- Vegetable oil (mainly soybean oil) use for biodiesel expected to grow by 2 million tonnes in next 5 years. Edible use will also increase.
- Current soybean S&D
 - Production: 75 million tonnes
 - Crush: 45 million tonnes
 - Meal: 36 million tonnes (domestic use 30 million tonnes, exports 6 million tonnes)
 - Oil: 9 million tonnes (domestic use 8 million tonnes, exports 1 million tonnes)
 - Exports: 30 million tonnes
- Predicted soybean S&D 2012 (based on USB predictions)
 - Production: 80 million tonnes
 - Crush: 55 million tonnes
 - Meal: 44 million tonnes (**domestic use 35 million tonnes, exports 9 million tonnes?**)
 - Oil: 11 million tonnes – all domestic use
 - Exports: 25 million tonnes
- **Key point: Soybean meal supply expected to increase 8 million tonnes (22%)**



Growth in ethanol production in U.S.

- Ethanol production for biofuels expected to increase more than 5 billion gallons in next 5 years.
- Current corn S&D
 - Production: 275 million tonnes
 - Food and Industrial: 70 million tonnes
 - Distillers grains: 10 million tonnes (domestic use 9 million tonnes, exports 1 million tonnes)
 - Ethanol: 30 million tonnes
 - Feed: 160 million tonnes
 - Exports: 45 million tonnes
- Predicted corn S&D 2012 (based on NCGA predictions)
 - Production: 300 million tonnes
 - Food and Industrial: 100 million tonnes
 - Distillers grains: 20 million tonnes (**domestic use 15 million tonnes, exports 5 million tonnes?**)
 - Ethanol: 60 million tonnes
 - Feed: 165 million tonnes
 - Exports: 30 million tonnes
- **Key point: Distillers grain supply expected to increase 10 million tonnes (100%)**



Growth in biodiesel production in Canada

- A Canadian government mandate of 2% and 5% inclusion would result in 1 billion litres of biodiesel. This will likely result in 2-3 million tonnes of oilseed (canola and soybean). Given quality parameters, it is expected that the major oil used will be canola oil. Edible canola oil production is also expected to increase.
- Current canola S&D
 - Production: 8.5 million tonnes
 - Crush: 3.5 million tonnes
 - Meal: 2.0 million tonnes (domestic 0.5 million tonnes, exports 1.5 million tonnes)
 - Oil: 1.5 million tonnes (domestic 0.5 million tonnes, exports 1.0 million tonnes)
 - Exports: 5.0 million tonnes
- Predicted canola S&D 2012
 - Production: 12 million tonnes
 - Crush: 6.5 million tonnes
 - Meal: 3.7 million tonnes (**domestic 1.0 million tonnes, exports 2.7 million tonnes?**)
 - Oil: 2.8 million tonnes (domestic 1.5 million tonnes (1.0 biodiesel), exports 1.4 million tonnes)
 - Exports: 5.5 million tonnes
- **Key point: Canola meal supply expected to increase 1.7 million tonnes (85%)**



Expected biofuel outcomes with regard to North American feed industry

- Feed grains. 35 – 40 million additional tonnes for ethanol production. Supply of corn and feed wheat for animal feed should not be too constrained by increased demand for ethanol production since supply growth and reduced exports should compensate. The 35 – 40 million tonnes of increased demand over the next 6 years represents less than 10% of total supply, and the increase in demand is expected to be incremental and gradual. There may be periodic price spikes due to shortages and the ability of the ethanol market to pay a premium.
- Protein ingredients. Over 20 million tonnes additional supply. Soybean meal supply is expected to increase 8 million tonnes, canola meal supply is expected to increase almost 2 million tonnes and distillers grains supply is expected to increase over 10 million tonnes. This 20 million tonne increase in the supply of these 3 protein ingredients is a 40% increase over the base of 50 million tonnes current production. Increased exports outside of Canada and the U.S. could account for up to 10 million tonnes but there will still be a net increased North American utilization of at least 10 million tonnes.



Price expectations for corn, feed wheat and protein ingredients

- Corn and feed wheat prices are expected to increase moderately (5% – 10%)
- Protein meal prices are expected to decrease due to initially surplus supplies for domestic demand and pricing to export markets. It is estimated that there will be a 25% price decrease for soybean meal and potentially larger price decreases for distillers grains and canola meal due to their concentration in cattle feeding (market limitations).



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Chicago Soybean Meal Prices



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Expected long term implications

- Increased use of protein ingredients for alternative uses. Use as fuel or fertilizer commonly considered. Canola meal and distillers grains have similar thermal value to coal. Establish base value at coal prices – currently about \$60/t.
- Develop edible markets for distillers grains and canola meal
- Increase in energy value of protein ingredients – especially canola meal*
 - Processing
 - Breeding new varieties
 - Enzyme technology

* A priority for the Canadian canola industry



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Canola meal value increase (\$/T) with 10% nutrient increase

Nutrient	Broiler chicken	Hog grower	Dairy
Protein: 35% vs 38.5%	\$8	\$3	\$10
Lysine: 2.02% vs 2.22%	\$3	\$3	\$0
Digestible lysine: 78% vs 88%	\$3	\$3	\$0
Energy: 100% vs 110%	\$15	\$3	\$2



Energy Content of Meal – Next Steps

Determine best methods to achieve higher meal energy content:

1. Quantify the potential to improve meal energy content through breeding (lower fibre, lower ash, higher protein). Study commercial potential of existing high-energy canola varieties (yellow seed napus, canola quality juncea). Study effects of potentially using and oil and protein content targets (whole seed basis) in WCC/RRC system
2. Re-evaluate potential of alternative processing technology on meal energy content (dehulling, temperature)
3. Study potential and cost/benefits of feed enzyme technology to increase meal energy



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Canola Quality Improvement Priorities

- Increase oil content of canola seed
 - Revise breeding recommendations
 - Economic stimulus (oil component pricing)
- Reduce and better manage chlorophyll levels
- Focus on low saturated fat levels
 - Accurate breeding standards
- Increase energy in canola meal
 - Processing and breeding



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Expected growth of Canadian canola industry by 2015

Acres	14 million
Yield	44 bu/acre
Production	14 million tonnes
Oil content	45% ? higher
Domestic crush	7.5 million tonnes
Food use, seed equiv	4.0 million tonnes
Biodiesel use, seed equiv	3.5 million tonnes
Exports, seed	6.5 million tonnes



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Canola Cooperation Agreement between Australia, Canada and the United States

- Cooperate on research
 - Complement, not duplicate
 - Joint where appropriate
- Cooperate on canola branding
 - Same messages
- Cooperate on market development and technical support
 - In shared markets
- Cooperate on standards and trade issues where relevant



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Thank you

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