Canola: an ingredient with opportunity

With traditional feed ingredients becoming scarcer and more expensive, livestock producers and feed manufacturers are searching for alternatives. Could canola meal, also known as rapeseed meal, be an option?

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Canola seed can be used to replace expensive feed ingredients.

Rapeseed has been known to ancient civilizations for thousands of years. Historically, the oil of the seed was initially used in parts of Europe and Asia to fill lamps and produce light. Later, at the beginning of the 20th century and during World War II, rapeseed oil served extensively as a lubricant in steam engines. In the 1960s and 1970s, canola oil was eventually also recognised as an excellent source of cooking oil in food production. Today, canola oil is appreciated for its many health benefits related to its high content of omega-3 and omega-6 polyunsaturated fatty acids aiding in the prevention of numerous cardiovascular diseases.

It began during WWII

Large-scale commercial production of rapeseed and canola began during World War II. Concurrently, intensive genetic selection began to further enhance the productivity of the crop. Rapeseed is botanically a member of the so-called mustard (*Cruciferae*) family. Today's canola cultivars are primarily derived from *Brassica rapa* (Polish rapeseed) and *Brassica napus* (Argentine rapeseed). Although rapeseed oil and meal production increased, nutritionists struggled in dealing with the sharp flavour and the high anti-nutritive glucosinolate content of the meal that impaired extensive rapeseed meal usage particular in monogastric animals early on. In the 1960s, the Canadian government began promoting a significant success story in Canadian agricultural research. They supported the development and production of canola varieties low in erucic acid ("Single 0").

Later, in 1974, a University of Manitoba plant breeder, Dr Baldur Stefansson, presented the first so-called "Double 00" *Brassica napus* variety with less than 2% erucic acid (previously 23-45% of oil) and less than 30 µmoles/g aliphatic glucosinolates in the oil-free meal (down from 120-150 µmoles/g). The term was quickly termed "canola" (Canadian oil) to be able to differentiate this product from traditional rapeseed. Today there are ongoing efforts to reduce anti-nutritional factors even further through conventional plant breeding techniques, although not all canola is GMO-free.

Figure 1 - World canola/rapeseed production in million tonnes per year from 1993- 2004 (Montana State University, 2005)

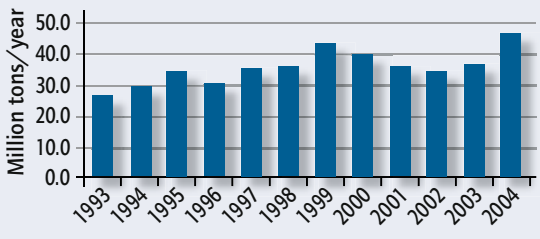

Table 1 - Major canola producing countries worldwide (million metric tonnes/year) from 2004-2006 (World Canola Trends, 2006)

Country	2004	2005	2006
EU-25	11.174	15.336	15.335
China	11.420	13.182	11.400
Canada	6.771	7.728	8.450
India	6.800	7.000	6.400
Australia	1.622	1.533	1.100
USA	0.686	0.613	0.681
Pakistan	0.235	0.241	0.260
Russia	0.192	0.276	0.250
Ukraine	0.051	0.149	0.250
Bangladesh	0.218	0.230	0.230
Total	**39.170**	**46.290**	**44.36**

Differences in composition

On a regional basis, compositional differences in rapeseed/canola meal and quality do exist. Not all parts of the world involved in cultivating, producing or trading canola meal rely on "Double 00" variety's because they are either too expensive or are not adapted enough agronomically. Examples here would include Chinese, Indian and/or Arabic rapeseed production and trade that has entered the international ingredient market. The identity determination is particularly complicated in China. There has been a great increase in the importation of Canadian canola seed into China in recent years because of the sharp increasing demand for oil. Most of the resulting meal is then again exported to various other countries (mostly Asian) while, at the

same time, large quantities of local Chinese rapeseed is processed and exported as well.

Global canola production

Figure 1 shows the global production of canola/rapeseed from 1993 to 2004. Production increased from 26 million tonnes in 1993 to about 42 million tonnes in 1999. Production declined gradually from 1999 to 2002 and it increased again to approximately 46 million tonnes in 2004.

Major canola producing countries or regions of the world from 2004 through 2006 are shown in *Table 1*. Assuming the EU-25 as one regional block, the EU has the highest canola production in the world and it has strongly increased from approximately 11 million tonnes in 2004 to over 15 million tonnes in 2006. Within the EU-25, France is the largest canola producer and exporter. Conversely, China ranks second in world canola production with 11.4 million tonnes followed by Canada (8.45 million tonnes) and India (6.4 million tonnes). Australia and the US rank in a distant 5th and 6th place with the production of 1.1 and 0,681 million tonnes in 2006, respectively. The table clearly justifies the need to make a quantitative/qualitative distinction between Chinese/Indian-based rapeseed and canola seed when debating canola and rapeseed as a feed ingredient for poultry globally.

The evolution of the Chinese and Indian domestic rapeseed production is shown in *Figure 2*. China in particular has dramatically increased their rapeseed production from about 2 million tonnes in the 1980s to almost 12 million tonnes in 2006. India's production has been less consistent; nonetheless, it tripled from 2 million to about 6 million tonnes during the same period of time.

Canola meal trading standards

Trading standards for canola meal refer specifically to seeds from *Brassica napus* and *Brassica rapa* that are genetically selected for low levels of glucosinolates and low concentrations of erucic acid. Canola meal is the residue product after oil extraction either on the basis of solvent (most common) or press extraction. A number of countries have established trading standards for canola meal. Typically, they specify moisture, oil, crude protein and crude fibre content. In addition, the total glucosinolate content of the oil-free meal cannot be higher than 18 µmols/g (Canola Council of Canada, 2005). *Table 2* exemplifies the Australian standards.

Chemically, glucosinolates are commonly divided into 2 categories, namely aliphatic- (70%) and indolyl (30%) glucosinolates. Their bitter taste is largely responsible for some of the palatability problems associated with canola meal in monogastric animals. The glucosinolate content does vary by variety, geographical region, growing and processing conditions, although trading standards may not reflect this. *Figure 3* shows data from a recent study on Australian "Double 00" canola meal from 1995-2003. Average glucosinolate levels for the year ranged from 6.0 to 10.0 µmoles/g (Mailer, 2004). Levels were lowest in 1996 through 1998 (6.0 µmoles/g) and increased again to 8 and 10 µmoles/g from 1999-2000 and 2003, respectively. These were considered as crop years with little rainfall, thus indicating that the canola crop underwent some draught stress. Overall, the depicted glucosinolate levels are very low and readily tolerated by most poultry when fed in appropriate quantities. ■

Table 2 - Current Australian Trading Standards for canola meal (Mailer, 2004).

Component	Limit	
	Solvent	Pressed
Oil content (minimum, %)	0.5	4.0
Moisture content (maximum, %)	12.0	11.0
Glucosinolates (µmoles/g in oil-free meal)	< 30.0	< 30.0
Crude Protein content (minimum, %)	34.0	32.0
Crude Fiber content (maximum, %)	15.0	14.0

Figure 2 - Evolution of canola production (million tonnes/year) in India and China from 1972-2006 (World Canola Trends, 2006)

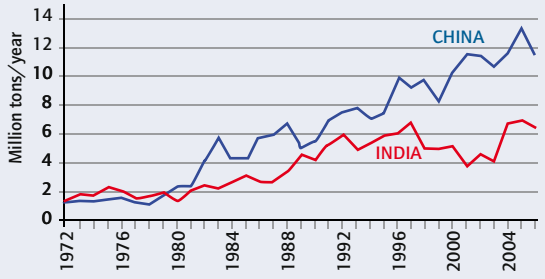

Figure 3 - Average glucosinolate content in Australian canola seed (6% moisture) from 1995-2003 (Mailer, 2004)