

The Canola Council of Canada recently completed a survey of the nutritive value of canola meal produced by 12 Canadian meal producing plants. Samples of meal were obtained 3 times per year for 4 consecutive years from 2011-2014. Samples were analyzed for all nutrients, including rate and digestibility factors for fiber and protein. The results of the survey, along with numerous research trials has brought to light some new information regarding the feeding value of canola meal for dairy cows(www.canolamazing.com).



In Table 1 below, the values for canola meal were derived from the survey, while the values for soybean meal were obtained from the NRC publication, *Nutrient Requirements of Dairy Cattle* (2001).

Table 1. Nutrient Composition of Canola Meal (Dry Matter Basis)

Nutrient, Dry matter basis	Canola Meal	Soybean Meal
Crude Protein (CP), %	42.0	49.9
RUP, % of CP	53.6	27.0
Lysine, % of CP	5.92	6.28
Methionine, % of CP	2.06	1.45
Histidine, % of CP	3.39	2.77
Acid Detergent Fiber, %	18.4	10.0
Neutral Detergent Fiber, %	29.0	14.9
Fat, %	3.20	1.6
Calcium, %	0.76	0.4
Phosphorus, %	1.17	0.71

Fact 1. On a pound for pound basis, canola meal provides as much digestible rumen undegraded protein (RUP) as soybean meal.

Table 2. RUP Comparison -CNCPS values (Dry Matter basis)

	Canola Meal	Soybean Meal	Treated SBM
Crude Protein (CP), %	42.0	49.9	46.6
RUP, % of CP	53.6	40.0	60.0
RUP, % of meal	22.5	20.0	27.9
RUP Digestibility, %	81.0	93.0	93.0
Available RUP, %	18.2	18.6	25.9

As Table 2 above shows, canola meal contains less protein than solvent extracted soybean meal. However, the levels of available RUP (RUP corrected for the digestibility of the meal in the intestine) are almost the same for canola meal as for soybean meal. In other words, one pound of canola meal, with only 42% protein, can be substituted for one pound of soybean meal, with 49.9% protein, and would provide close to the same amount of RUP that the cow can use to make milk. This would allow ration protein to be lowered. As table 2 shows, treated soybean meal provides more available RUP than either soybean meal or canola meal.

Fact 2. Canola meal has an outstanding amino acid profile

Canola meal has long been recognized for its superior amino acid profile, relative to the needs of the cow. The overall amino acid profile of canola meal is closer to that of rumen microbial protein than other vegetable proteins, providing a very high milk protein score (Figure 1). This means that very little remodelling of the protein is needed, and it readily meets the requirements of the cow for milk production.

Figure 1. Milk Protein Score of Some Common ingredients compared to Rumen Microbial Protein

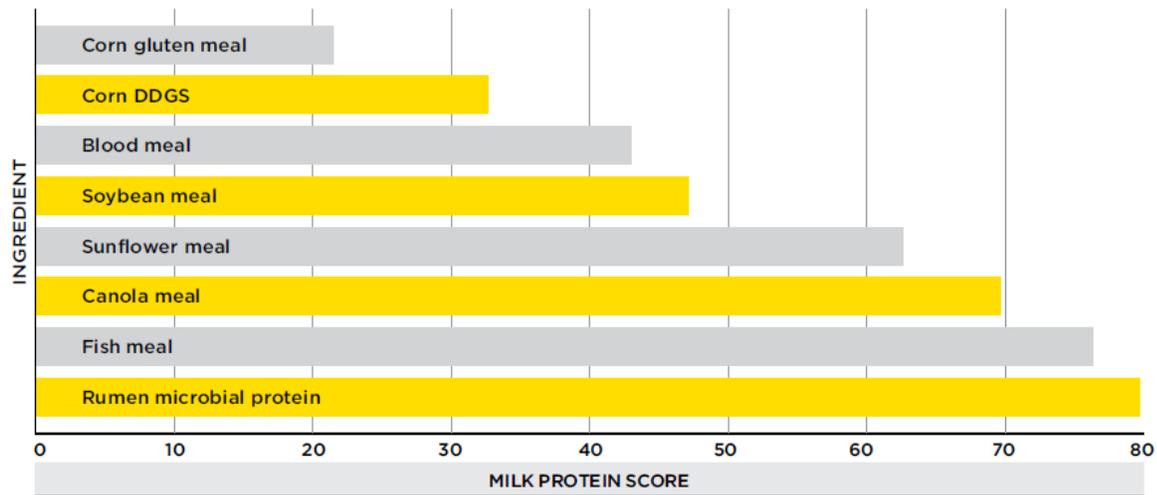


Table 3 below shows the amounts of key amino acids that canola meal provides per unit of meal. If we look first at the profile per unit of protein, canola meal provides almost as much lysine as soybean meal and high bypass soybean meal. Canola meal contains greater percentages of methionine and histidine.

The last three lines of the table compare the three protein sources based on per pound of meal. On the per pound of meal basis, canola provides slightly less lysine, but more methionine and histidine than soybean meal. Interestingly, one pound of canola meal supplies approximately the same amount of methionine as one pound of treated, high RUP soybean meal.

Table 3. RUP Amino Acid Contribution Comparisons

	Canola Meal	Soybean Meal	Treated SBM
Available RUP, %	18.2	18.6	25.9
Lysine, % of CP	5.92	6.28	6.24
Methionine, % of CP	2.06	1.45	1.55
Histidine, % of CP	3.39	2.77	2.82
RUP lysine, %	1.08	1.17	1.61
RUP Methionine, %	0.38	0.26	0.40
RUP Histidine, %	0.62	0.52	0.73

Again this allows diets to be formulated with lower levels of protein and still meet amino acid needs when canola meal is the primary source of supplemental vegetable protein.

Fact 3. Canola meal is an excellent source of phosphorus

Phosphorus is generally one of the more expensive feed additives. Canola meal is a rich source of phosphorus, with most of this mineral in the form of phytate phosphorus. Unlike monogastric animals, this form is available to ruminants, due to the presence of bacterial phytases in the rumen that rapidly degrade phytate, rendering this mineral available.

Fact 4. Greater levels of iodine can be given to cows without increasing milk iodine

Table 4. Canola Meal Effects on Milk Iodine

	Dietary iodine, mg/kg DM					
	0.5			2.0		
Canola meal, % of DM	0	3.9	13.9	0	3.9	13.9
Blood serum iodine, ug/L	99	142	148	175	251	320
Milk iodine, ug/L	358	289	169	733	524	408

Fact 5. The fiber in canola meal is highly digestible

Older publications, such as the 2001 NRC Publication *Nutrient Requirements of Dairy Cattle*, used lignin to estimate the indigestibility of fiber. Although this method may have been useful for forages, it was also applied to concentrate ingredients, without validation.

As a result of research conducted at Miner Institute and Cornell University (Cotanch et al., Proc 2014 Cornell Nutrition Conf.), Canola Council of Canada commissioned a study to determine the rate and extent of NDF digestibility from all 144 survey samples that had been collected. Researchers at Nevada State University (Paula et al., J. Dairy Sci 100(Suppl 2):329-330) determined that less than 20% of the fiber was truly indigestible. They estimated that the actual digestibility of the NDF at 3 times maintenance intake would be 60-65% of the total. This value is double the value estimated in the outdated publication. This means that canola meal should receive a higher energy value than previously thought, although not as high soybean meal.

Fact 6. Net energy (NE) as a percent of metabolizable energy (ME) is greater for canola meal than for soybean meal

In most models, NE is calculated from ME, and therefore there is a fixed relationship between the two. However, there are two reasons why fact 6 is true. First, the amino acid profile of canola meal is closely allied with the amino acid profile needed for milk synthesis. The mammary does not need to degrade excess essential amino acids that are out of alignment with requirements. This saves energy. Second,

less methane is generated from canola meal compared with soybean meal. In a study conducted at the USDA Forage Research Center in Wisconsin (Moore et al, J. Anim. Sci. 94:572), early lactation cows receiving canola meal produced less methane gas, meaning that this energy was available to support milk production or body weight maintenance. There is no question that soybean meal provides more energy per pound than canola meal, but the gap between the two meals is less than was previously thought.

***Les Berghorn** is General Manager and National Sales Manager Afgritech with over 35 years of experience in the dairy feed business. He has been a part of Afgritech since its founding in Watertown, NY in 2011. He has broad knowledge of the Northeast dairy market and understands the needs of the dairy industry.*

***Essi Evans, Ph.D** is President of E+E Technical Advisory Services. She earned her B.S. degree in Agriculture from the University of Maryland, and Masters and Ph.D degrees in ruminant nutrition from the University of Guelph. Working for the feed company Shur-Gain, she was vice president and managing director of research. In 2002, she started her own company to provide technical and managerial support to other establishments, plus assistance with research and product development.*

This article appears in the Nov. 4 edition of DairyBusiness Digital magazine and is used here with permission. The original article may be found at www.dairybusiness.com