

GrainCorp Oilseeds

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Canola Meal for Pig Feeding

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Canola meal is the major protein meal used within the Australian livestock industries, this being due to the demand for canola oil and the production of meal through the oilseed crushing process. The Australian market has two differing oilseed crushing processes in the form of expeller or solvent extraction plants. GrainCorp Oilseeds operate both processing systems and the specification of the resulting canola meal depends upon the plant from which product is supplied.

The minimum protein content of canola meal varies with the protein level of the seed being crushed. Canola seed protein levels are affected by seasonal growing conditions, with drier seasons tending to result in higher protein seed and meal. The range in protein levels shown occurs between different crushing years and GrainCorp Oilseeds are able to confirm actual protein levels for delivery periods. Canola seed contains over 40% oil and the crushing process aims to maximise oil extraction. Through expeller processing, after initial seed heating, oil is removed through mechanical processing. The canola meal from GrainCorp Oilseeds processing plants has residual oil in the range 9-11%. For canola processed through the GrainCorp Oilseeds Numurkah solvent extraction plant, an additional oil extraction process is applied which results in the finished meal containing 4-5% oil. Canola meal is an ingredient that supplies energy from sugars, starch and oil as well as protein for pig feeding.

PROCESSING AND PROTEIN QUALITY

During the oil extraction process canola seed is heated to increase the efficiency of oil removal, this temperature is in the order of 90-100°C as the meal cake leaves the expeller. As part of the solvent extraction process, the meal undergoes further processing with the solvent hexane used to extract oil. The meal undergoes desolventising and toasting using steam to remove hexane prior

to the meal being cooled and hammer milled. GrainCorp Oilseeds has been a participant in the project work undertaken jointly by the Pork CRC and Australian Oilseeds Federation. This work was able to demonstrate that under typical processing conditions as used by GrainCorp Oilseeds, the effects of processing have a minimal impact upon meal quality. It is during more extreme or less controlled oil extraction that protein heat damage occurs. Heat and pressure applied through canola processing is recognised to have a detrimental effect upon meal quality, with excessive heat damaging lysine and reducing its availability for pig feeding. It has been reported that heat damage can result in over 20% of the lysine in canola meal being made unavailable to the pig, with apparent ileal digestibility coefficients being as low as 70%. These low digestibility results are a direct function of over-heating of meal during the oil extraction process. GrainCorp Oilseeds, in response to research and industry concerns relating to protein damage, has taken a proactive stance in modifying processing conditions to ensure meal damage is minimised. The lysine loss results shown in the table provide confirmation that heat damage is minimal, with those for expeller meal being less than solvent meal. Reverted lysine is the difference between total lysine and reactive lysine, also given the term lysine loss. Lysine loss of 12.7% for solvent and 6.6% for expeller is considerably lower than that measured in other canola meal samples tested.



MINERAL CONTENT

Canola meal is a relatively good source of minerals, particularly trace minerals. The high phosphorus content needs to be adjusted to account for phytate bound phosphorus. The availability of phosphorus is below 30%, with this being increased in pig feeding through the use of phytase enzymes.

AMINO ACID CONTENT

The amino acid profile of canola meal is very consistent and varies with the meals protein level. Amino acid content can be calculated by multiplying the crude protein content of the meal by the proportion of amino acid as a percentage of protein. The following table provides amino acid content for 37% protein meal. Apparent ileal digestibility for each amino acid has been used to calculate the digestible amino acid content for 37% protein meal. Canola meal is an excellent source of digestible amino acids for pig feeding and is high in threonine, methionine and cystine.

ANTINUTRITIONAL FACTORS AND CANOLA USE IN PIG RATIONS

Canola grown in Australia contains a low level of glucosinolates due to the positive steps taken by canola breeders. The average glucosinolate level in seed is less than 10µmoles/g. Heat and moisture applied to seed during oilseed processing result in a decline in glucosinolate levels with these being on average 5.3 and 1.7 µmoles/g for solvent and expeller canola meals respectively. Research has identified that pigs need to consume a diet containing a minimum 2 µmoles/g before any negative effects on pig performance are seen. Based upon the glucosinolate content of Australian canola meal, there is no recognised negative impact on performance due to glucosinolate presence. Feeding trials conducted in Australia have demonstrated that canola meal can be fed in weaner, grower and lactating sow diets at 25%, 30% and 20% respectively without detrimentally affecting pig performance.

MINERAL CONTENT

NUTRIENT	UNITS	SOLVENT CANOLA MEAL	DIGESTIBLE AMINO ACID CONTENT %
Calcium	%	0.7	0.65
Phosphorus	%	1.1	1.02
Magnesium	%	0.55	0.51
Sodium	%	0.1	0.09
Potassium	%	1.25	1.16
Sulphur	%	0.85	0.79
Copper	mg/kg	6.5	6
Iron	mg/kg	190	175
Manganese	mg/kg	105	97
Zinc	mg/kg	65	60

AMINO ACID COMPOSITION OF CANOLA MEAL 37% PROTEIN AS FED BASIS

NUTRIENT	AMINO ACID CONTENT %	AMINO ACID CONTENT %/CP	ILEAL DIGESTIBILITY %	DIGESTIBLE AMINO ACID CONTENT %
Methionine	1.96	0.73	86	0.62
Cystine	2.41	0.89	86	0.76
M+C	4.39	1.62	85	1.38
Lysine	5.55	2.05	85	1.75
Threonine	4.24	1.57	83	1.3
Tryptophan	1.37	0.51	75	0.38
Arginine	6.05	2.24	85	1.9
Isoleucine	3.91	1.45	87	1.26
Leucine	6.87	2.54	88	2.24
Valine	5.06	1.87	88	1.65
Histidine	2.68	0.99	85	0.84
Phenylalanine	3.98	1.47	83	1.22



CANOLA MEAL SPECIFICATION

CHEMICAL ANALYSIS			
NUTRIENT	UNITS	SOLVENT CANOLA MEAL	EXPELLER CANOLA MEAL
Moisture	%	10-12	10-12
Crude Protein	%	36-39	32-35
Oil	%	2-3	9-11
Crude Fibre	%	11.5	10.6
ADF	%	18.1	16.7
NDF	%	28.2	26.1
Ash	%	6.9	6.4

LYSINE LOSS FOR GRAINCORP OILSEEDS CANOLA MEAL - RESULTS FROM PORK CRC/AOF CANOLA MEAL PROJECT

NUTRIENT	SOLVENT MEAL	EXPELLER MEAL
Total Lysine - g/kg	21.5	19.7
Reactive Lysine - g/kg	18.8	18.4
Revert Lysine g/kg	2.7	1.3
Lysine Loss %	12.7	6.6

ENERGY FOR PIG FEEDING

NUTRIENT	UNITS	SOLVENT CANOLA MEAL	EXPELLER CANOLA MEAL
Digestible Energy	MJ/kg as fed	13.0-13.4	14.0-14.2

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FOR ANY FURTHER INFORMATION OR TECHNICAL INFORMATION REGARDING THESE PRODUCTS OR ANY OF THE CANOLA MEAL RANGE PLEASE VISIT OUR WEBSITE WWW.GRAINCORP.COM.AU, EMAIL CSOILSEEDS@GRAINCORP.COM.AU OR CALL US 03 5862 1666.

Your Local Sales Representative is: