Nutritional Value of Dry Extruded-Expelled Soybean Meal for Swine

Part I: Characterizing its Nutrient Composition

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Soybean meal is widely used as a protein supplement in livestock diets. Like other pulses, raw soybean contains anti-nutritional factors that reduce digestibility of nutrients and cause poor growth performance. Thus, to effectively use soybean products in swine diets, they must first be processed to inactivate the elements that may reduce the nutritive value.

Various heat treatment procedures including jet-sploding, micronization and roasting have been used to process soybeans for feed. However, recent advances in processing technology have led to the use of dry extrusion as a processing technique for soybeans.

Dry extruded-expelled soybean meal (DESB) is a soybean meal product that has a higher fat content than regular solvent-extracted soybean meal. It is produced through dry extrusion. This product is currently available to swine producers in Manitoba. Although, heat treatment of soybeans could increase the availability of nutrients, especially amino acids, over-heating could also reduce the availability of lysine which is often the first limiting amino acid in most swine diets. Furthermore, the chemical composition of soybean meal varies from one processing plant to another due to different processing procedures and differences in the chemical composition of the soybeans available to each plant. For this reason it is important to know the chemical composition of locally available DESB before using it as a feed ingredient in the swine industry.

Recently, a study was undertaken at the University of Manitoba to evaluate the nutritive value of dry extruded expelled soybean meal for pigs. Samples for the study were obtained from a local processing plant and identified by chemical composition and protein and amino acid digestion. In this article only the nutrition composition information is presented. Information on protein and amino acid digestibility will be reported in part two of this series.

In addition to the DESB samples, a sample of commercial, regular, solvent-extracted soybean meal was also evaluated as a control. All samples were analyzed for dry matter, crude protein and amino acids. The two samples of dry extruded-expelled soybean meal evaluated in this study had different chemical compositions.

Dry extruded expelled soybean meal had higher dry matter, fat, methionine and cysteine contents but lower protein content and other amino acids compared with regular solvent-extracted soybean meal (Table 1). Dry extruded-expelled soybean meal had more than four times more fat than the amount contained in regular solvent extracted soybean meal. Since oil is a concentrated source of energy and the most expensive component of swine diets, it seems logical that this should be considered when using this ingredient in swine diets. Also, the high oil content could be beneficial in feed handling by reducing the dust production.

Basically, there are nutritional benefits to be gained from using different extruded-expelled soybean meal varieties by taking advantage of different processing procedures.

In the meantime, knowing the chemical composition of dry extruded-expelled soybean meal in advance, can help ensure proper feed preparation. Additional studies will be required to better understand the benefits of the added fat content in dry extruded soybean meal relative to regular solvent extracted soybean meal.

Table 1. Chemical composition of soybean meal types

Nutrient	RSB[a]	DESB-1[b]	DESB-2[c]
Dry matter	89.95	96.15	96.85
Crude protein (6.25 x N)	46.81	42.63	43.50
Fat (hexane extract)	2.41	9.51	10.23
Amino Acids			
Indispensable			
Arginine	3.21	2.79	2.66
Histidine	1.10	1.02	1.04
Isoleucine	1.86	1.59	1.68
Leucine	3.20	2.86	2.79
Lysine	2.77	2.61	2.68
Methionine	0.52	0.53	0.58
Phenylalanine	2.19	1.90	1.95
Threonine	1.82	1.66	1.67
Valine	1.86	1.74	1.69
Dispensable			
Alanine	1.86	1.74	1.69
Aspartic acid	4.79	4.36	4.24
Cysteine	0.64	0.66	0.67
Glutamic acid	7.16	6.66	6.66
Glycine	1.82	1.71	1.68
Proline	2.56	1.98	2.05
Serine	2.32	2.09	2.06
Tyrosine	1.60	1.30	1.33

[a]RSB = regular, solvent extracted soybean meal
[b]DESB-1 = dry extruded-expelled soybean meal (sample 1)
[c]DESB-2 = dry extruded-expelled soybean meal (sample 2)

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Group Housing for Gestating Sows

Straw-based housing systems for grow/finish pigs are growing as a percentage of the industry. The capital requirement is low and the system is simple. However, management pressure is greater and success depends on the skill of the workers to understand and act on behavioral messages from the pigs.

More producers are inquiring about group housing for dry sows. Those who use this method need to manage the aggressive behavior that is part of this approach. Typically, the aggression is related to survival instincts and is stimulated during feeding.

Limit feeding prevents the animals from gaining too much weight during the gestation period. High energy intakes and the resulting increase over ideal body fat can have negative connotations for both sows and gilts. In gilts that are just bred, early embryonic mortality can result from high energy intake in the ten days following breeding. Over fat gilts can also be slow to show heat which can delay breeding. Excess energy intake can stimulate the MMA complex (mastitis, metritis, agalactia) in both sows and gilts. Over consumption leads to trouble in farrowing, poor milk production and poor rebreeding. All of these problems are manageable with crates but can be difficult in groups.

Skip-a-day feeding is used in an effort to provide enough feed at one time so that aggression is reduced at feeding time. Socially dominant sows will quickly eat a single day's feed and then bully other sows and eat their allotment when small amounts are given. Two days worth of feed given every second day increases the time each sow has to eat. While this method is frequently used, it does not eliminate overeating by dominating sows or weight loss by the submissive sows.

Feeding crates can allow a high degree of control over body condition and also allow the sow to be free most of the time. Manual catch and release require more time in this activity but gain the benefit of group housed animals. A slight modification in this approach is the self-catching feeding crate which reduces labour but increases the capital cost.

The highest degree of control is through the use of electronic sow feeding stations. They allow for individual feeding programs and auto sorting sows through computer programming. These are the most capital intense systems, but data shows these systems cost about the same as conventional crates but have the advantage of group housing. They can be installed in straw-based or concrete flooring systems.

Producers who have production problems with their group housed sows should review the merits of these systems and discuss options with equipment suppliers and MAFRI swine specialists.

Information prepared by John Maltman, Manitoba Agriculture, Food and Rural Initiatives

Should Producers Contract Peas?

Let's assume we will be feeding pigs weighing 30 kg a diet that contains 3400 Mcal DE/kg and a 1.00% lysine level. All other nutrients exceeded the NRC (National Research Council) requirements for swine at this weight.

These requirements can be met by feeding the following diet.

		$/Tonne
54.5%	Wheat	110.25
18.8%	Barley	91.88
22.2%	Soybean meal	327.00
1.0%	Canola oil	900.00
3.5%	Grower premix	980.00

This is equal to wheat at $4.00/bushel and barley at $2.00/bushel. The above diet would cost $193.25/Tonne, not including any processing costs.

A nearby farmer wants to contract out peas at $5.00/bushel or $183.75/Tonne. Would this be a good deal if soybean meal was selling at $327.00/Tonne?

The diet would now consist of:

		$/Tonne
48.6%	Wheat	110.25
15.1%	Barley	91.88
11.8%	Soybean meal	327.00
20.0%	Peas	183.75
1.0%	Canola oil	900.00
3.5%	Grower premix	980.00

The cost of this diet would be $186.09/Tonne. A producer could pay $5.97/bushel for these peas or $219.40/Tonne and equal the initial soybean meal diet at $193.25/Tonne.

If a producer could obtain the peas at $4.00/bushel, that diet would then cost $178.74/Tonne.

Feed costs remain the major expense in pig production. Various feedstuffs are available to be used in swine diets such as canola meal, lentil screenings and others. If you want cost comparisons or rations formulated, contact your nearest Manitoba Agriculture, Food and Rural Initiatives office.

Information prepared by Ron Bazylo, Manitoba Agriculture, Food and Rural Initiatives

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