

## Amino Acid Digestibilities in Manitoba-Grown Peas for Pigs

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The National Research Council recommends the use of true ileal digestible amino acid coefficients in formulating pig diets as a means to increase the accuracy of dietary amino acid supply. This will not only be cost effective but also will minimize the amount of nitrogen excreted in pig manure. Although peas (*Pisum sativum*) can serve as an excellent source of protein for pigs, true ileal amino acid digestibilities in pea cultivars grown in Canada (and Manitoba in particular) have not been determined.

Therefore, this project was conducted to determine the true ileal digestible amino acid content in different locally grown pea cultivars.

Four Cotswold growing pigs with an average initial body weight of about 24 kg were used. Apparent, standardized and true ileal digestibilities of amino acids and protein in three pea cultivars and in a diet containing a mixture of three pea cultivars (i.e. AC

Melfort, CDC Mozart, and Eclipse) were determined using standard procedures. Apparent digestibility coefficients of amino acids are not additive in a mixture of feed ingredients thus making it difficult to accurately supply amino acids in swine rations. As a result, standardized or true amino acid digestibility coefficients, which more accurately reflect the available amino acid in a feedstuff and are more additive in a mixture of feedstuffs, should be used.

### KEY RESULTS OF THE PROJECT

**Apparent ileal digestibilities:** Apparent ileal crude protein digestibilities were not different among diets and averaged 70.2%. On average, apparent ileal digestibilities of essential amino acids ranged from 66.3% for threonine to 84.9% for arginine.

**Standardized ileal digestibilities:** Standardized ileal crude protein digestibilities (SID) were not

different among diets and averaged 78.8% (Table 1). In general, the SIDs for the essential amino acids were lower in the Mixture diet compared to the other three diets and these differences were significant for arginine, isoleucine, and valine. On average, SID of the essential amino acids ranged from 77.6% for valine to 89.1% for arginine (Table 1).

**True ileal digestibilities:** True ileal crude protein digestibilities (TID) were not different among diets and averaged 92.8% (Table 2). Among the essential amino acids, significant differences in TID were observed for lysine, phenylalanine, and valine. On average, TID of essential amino acids ranged from 91.7% for histidine to 104.4% for threonine (Table 2). Overall TID for the determined essential amino acids was 93.6%.

Table 1. Standardized ileal protein and essential amino acid digestibilities (%) in a pea-based diet fed to growing pigs.

Item	Pea diet				Average
	Profi	Swing	Croma	Mixture*	
Crude protein	78.5	79.2	78.8	78.6	78.8
<i>Amino acids</i>					
Arginine	91.9	94.0	91.6	79.0	89.1
Histidine	69.8	84.5	81.2	83.4	79.7
Isoleucine	82.6	84.6	80.8	66.4	78.6
Lysine	84.8	86.3	83.5	80.8	83.8
Leucine	82.7	82.9	80.1	77.1	80.7
Phenylalanine	82.8	84.2	80.0	78.1	81.3
Threonine	80.5	82.2	77.3	72.4	78.1
Valine	81.3	82.4	78.9	67.8	77.6

\*Mixture of peas contains AC Melfort, CDC Mozart, and Eclipse varieties.

Table 2. True ileal protein and essential amino acid digestibilities (%) in a pea-based diet fed to growing pigs.

Item	Pea diet				Average
	Profi	Swing	Croma	Mixture*	
Crude protein	92.3	93.9	91.6	93.2	92.8
<i>Amino acids</i>					
Arginine	99.0	99.9	98.0	97.0	100.5
Histidine	90.1	92.4	91.1	93.0	94.2
Isoleucine	98.4	96.0	94.8	97.3	100.6
Lysine	96.9	96.0	94.4	95.8	95.8
Leucine	96.9	93.9	93.3	97.6	97.6
Phenylalanine	98.6	96.8	94.9	98.3	100.4
Threonine	106.7	101.3	102.3	107.2	110.4
Valine	101.9	97.7	97.4	103.2	105.1

\*As in Table 1.

The amino acid lysine is an essential amino acid and often the first limiting in pig feeds. Figure 1 shows the apparent, standardized and true ileal lysine digestibility in the pea diets evaluated. These data clearly show that apparent ileal digestibility measurements underestimates amino acid availability in feedstuffs for pigs thus underscoring the need for determining and using true amino acid digestibilities in formulating swine feeds.

#### TAKE HOME MESSAGE

The overall apparent and true digestibilities of lysine in peas were similar to the values reported for soybean meal, further demonstrating the high quality of pea protein for pigs.

Compared to true ileal amino acid digestibilities, apparent ileal digestibilities were more variable among the four diets. Therefore, using true digestibility coefficients in formulating swine feeds should improve accuracy.

As expected, standardized ileal amino acid digestibilities were higher than apparent ileal digestibilities and less variable among diets. This suggest that using standardized digestibility coefficients, which are easier to

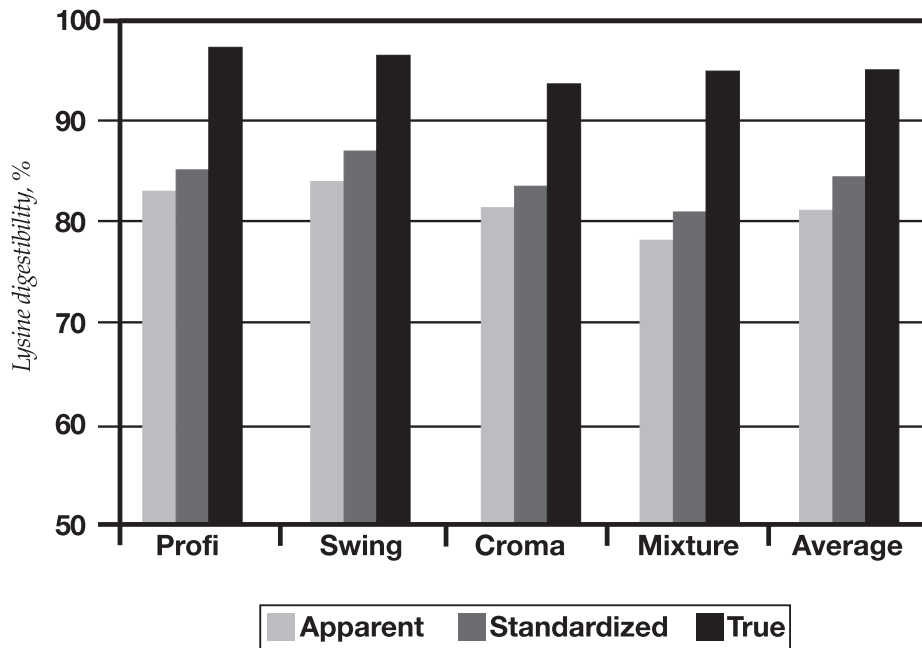


Figure 1. Apparent, standardized, and true ileal lysine digestibility (%) in pea-based diets fed to growing pigs.

determine, will offer practical means of accurately supplying amino acids in swine rations.

True ileal amino acid digestibilities in Manitoba-grown peas are high (> 95%) and less variable among pea cultivars. This suggests high availability of pea amino acids to pigs.

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## What Does It Cost to Raise A Pig?

By: Mike Yacentiuk P. Ag. Manitoba Agriculture, Food and Rural Initiatives

The table on page 4 has been prepared to serve as a guide for calculating total production costs. To more accurately reflect the true cost of your swine operation, values specific to that operation should be substituted for those provided. All swine production units should attempt to calculate their production costs and subsequently their breakeven price. The breakeven price can be used to assist with risk reduction decisions such as forward pricing of pigs. The following costs are point-in-time as of December 10, 2003 and do not represent the average for the year.

Buildings are valued at new cost and feed is *commercially prepared*.

As can be seen in the table, feed accounts for the largest portion of total production costs comprising 59.9% and 34.0% of the farrow/finish and farrow/wean units respectively. In the nursery units, the feeder pig is the greatest single cost with feed accounting for the next largest cost. Due to depressed market prices and the resultant impact on feeder pig prices, feed is currently the largest single expense in the grow/finish units accounting for 45.0% of the total cost of production.

The first and short-term approach to reducing production costs is a complete review of feed costs, as this component constitutes a significant portion of variable costs. Controlling feed cost (ration cost and feed efficiency) is the only way to substantially influence variable cost. Improving animal genetics and health, reducing feed wastage, phase feeding, split-sex feeding and cooperative purchasing are some factors that should be employed in a swine operation to reduce feed costs.

The second and long-term approach to improving profitability is to increase the

throughput of the operation. Realistic goals must be set and realized in order to remain competitive.

**Other factors to consider are:**

- Are you getting the best price for your pigs: are the pigs in the appropriate weight range; are you reducing risk by using forward pricing strategies?
- Have all of your input costs been reviewed for their cost effectiveness?
- Are you willing to become part of a network; either purchasing or production? Is contract rearing of pigs an option you should be considering?
- Do you keep accurate production and financial records that are used in

management decisions? If required, could you itemize your costs on a per unit basis (i.e. per pig, per kg saleable pork, etc.)?

- Is your farm attaining the highest levels of productivity and efficiency? Is training or upgrading for you or your staff in order?
- Do you have a bio-security protocol and quality assurance program in place?
- Do you use an advisor to discuss with and evaluate all the various aspects of your farming operation?

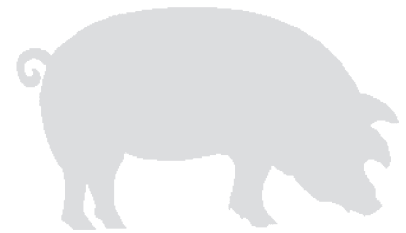
For more information on these and other topics, contact your nearest Manitoba Agriculture, Food and Rural Initiatives swine specialist.

## Upcoming Events

**The Manitoba Swine Seminar** is scheduled for January 28 and 29, 2004 at the Best Western Victoria Inn in Winnipeg.

**The Living with Livestock – Environment and Change** conference is scheduled for October 5 to 7, 2004.

For more information about these events, please contact Dr. Ian Seddon at 204-945-0353 or email: [iseddon@gov.mb.ca](mailto:iseddon@gov.mb.ca)



### Total Cost of Production

Costs	Farrow/Finish (113 kg)	Farrow/Wean (5 kg)	Nursery (5-23 kg)	Grow/Finish (23-113 kg)
Feed	\$90.49 (59.9%)	\$12.23 (34.0%)	\$14.88 (28.3%)	\$62.60 (45.0%)
Variable	30.96 (20.5%)	12.90 (36.0%)	3.92 (7.4%)	14.57 (10.5%)
Feeder Pig	- -	- -	29.75 (56.5%)	47.70 (34.3%)
Fixed	19.14 (12.6%)	5.72 (16.0%)	2.83 (5.4%)	10.31 (7.4%)
Labor	10.55 (7.0%)	5.00 (14.0%)	1.25 (2.4%)	4.07 (2.8%)
<b>Total</b>				
(Per pig sold)	\$151.14	\$35.85	\$52.63	\$139.25