Feeding Pigs

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Animal feeding is about balance

- Feeds matched with animal needs
- Cost of diet and performance impacts
Valuing feedstuffs

Should be based on nutrient content

1. Nutrient present
2. Nutrient in form animal can access

How do we know if nutrient is present and available?
Nutrient Content of Feedstuffs

• Individual lab tests + feeding trial = Ideal

• Reference books and nutrition guides = starting point

• Experience + records of on-farm performance
Nutrients in proper ratio

- Amino acids are building blocks of protein
- All 21 amino acids must be present
- Essential amino acids = body cannot make

If you are short on one amino acid = protein synthesis cannot occur

First limiting amino acid: lysine (pigs)
Nutrients in proper ratio

Ideal protein = amino acid ratio exactly right

Calcium and phosphorus similar situation...
Bone is not made from calcium alone!
3 Key Factors for Feed Value

Energy content:
metabolizable energy (ME), net energy (NE)

Availability of first limiting amino acid:
standardized ileal digestible lysine (SID Lys)

Available Phosphorus (Avail. P)
Why ME, SID Lys, and Avail. P?

• Animals eat to meet an energy requirement
• Energy content of diet determines feed intake

• Amino acids are major component of muscle
• Lysine is first limiting amino acid

• Phosphorus is essential and VERY expensive
How do we know what the animal needs?

• Nutrition/feeding guides are a starting point
• Listen to, but be wary of advice from vendors
• Monitor and record animal performance over the long term
• Well kept feeding and production records worth their weight in gold!
Nutritional Needs are Not Constant

- Stage of development, growth, or production influences nutritional needs
- Growing animals vs mature animals (maintenance)
Young fast growing animals

- Higher concentration of essential amino acids
- Higher concentration of available phosphorus

*Because animal is building lots of tissue and needs the material (nutrients) to do so*

*Also, animal needs less energy for maintenance so will ultimately eat less feed*
Young fast growing animals

• Higher concentration of energy...

*Because a smaller gut might fill up before energy needs met*

Want to feed to genetic potential of the animal
Protein for Pigs

Crude protein is not a good indicator of protein quality or diet balance

To build muscle...
1. Amino acids must be present in correct ratio
2. Amino acids must be available to the pigs GIT

Lysine usually 1\textsuperscript{st} limiting amino acid
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Protein Feeds

• SBM is excellent compliment to starchy grains
• Corn-SBM diets are known quantities (CP may be acceptable measure)

Key consideration: How does my feedstuff choice impact **NET FARM INCOME**
What can you pay for alternatives?

- Assume $8.00/bu corn
- $385/ton soybean meal
- Baseline diet... 76% corn, 24% sbm = $300/ton

You can afford to pay 80-85% of the price of sbm for these alternatives (MAYBE)

1. Sunflower seed... pigs eat 32% more feed
2. Field peas... pigs eat 2-5% more feed
3. Roasted soybeans... pigs eat 5% less
Hidden Costs of Alternatives

- Meat quality affects
- More days on feed
- Feed mixing and handling
- Feedstuff quality assurance

*Alternatives should not be rejected because of the unknowns, but we must be aware and plan accordingly.*
Roasted Soybeans

- Raw soybeans contain trypsin inhibitors
- Dry roast for 3-5 minutes
- Exit temperature of 125°C (257°F)
- 5% max to pigs <25 lb
- 15% max to market pigs >130 lb (last 80 days on feed to avoid soft fat)
- Sows and pigs 25-130 lb no limit
Trypsin Inhibitor

- Pigs eat dietary protein, but need amino acids to build muscle
- Cascade of enzymes in small intestine break dietary proteins down to amino acids
- Amino acids absorbed and used to build muscle

Trypsin inhibitor reduces this process

Pigs unable to access amino acids present in feedstuffs with high amounts of trypsin inhibitor
Alfalfa (Medicago sativa)

- Excellent source of vitamins and minerals
- High crude protein and promising AA profile
- Poorly digested due to fiber = pig cannot access amino acids
- 60% to gestating sows if economical
- ↑ alfalfa, ↓ growing pig performance
- 10% alfalfa will ↓ backfat depth in finishing pigs
Canola Seed ≠ Rapeseed

(\textit{Brassica napus})

- Euric acid and Glucosinulate (depresses feed intake) levels vary
- Able to feed without roasting, should grind
- Wean-to-finish 15\% (soft fat concerns)
- Sows and boars 10\%
- Possibly more to gestating sows but avoid excess energy \(\rightarrow\) over-fat sows
Canola Meal

• Excellent amino acid profile
• Less available to pigs... need ~25% more to replace soybean meal
• Very competitive if 65-75% of the cost of SBM
• Can replace 25% of sbm in starter diets
  50% of sbm in grower diets
  100% of sbm in finishing and sow diets
Sunflower Seed with Hulls
(*Helianthus annus*)

- Relatively free of anti-nutritional factors
- Low in lysine = not a perfect SBM replacement
- 15-20% crude fiber... *if only you could easily remove the hulls*
- Max amount in starter diets 15%
- Max amount in grow-finish diets 10%
- Max amount in sow diets 25%
Fababean or horsebean (*Vicia faba*)

- As with most legume seeds... good source of Lysine, generally low on Methionine
- Very low levels of trypsin inhibitor = you can feed without heating
- May have issues with weed control and harvesting

15% max to starters
20% max to grow-finish
10% max to lactating sows
Lentils (\textit{Lens culinaris})

- Widely consumed as a protein source by humans throughout the globe
- \textbf{We actually know very little about feeding lentils to pigs...}
- Low levels of trypsin inhibitor = can feed to pig without heat treatment
- Good source of lysine, lower in threonine and methionine than soybean meal
Dry Bean (*Phaseolus vulgaris*)

- Should be steamed at 100°C (212°F) for 75 minutes to destroy trypsin inhibitor and hemagglutinin (toxin)
- Required processing lowers protein digestibility
- May replace 40-50% of soybean meal in diet
- Relatively low palatability
Lupin (*Lupinus albus*)

- Commonly used throughout New Zealand and Australia
- Historically high in alkaloid, but new "sweet" varieties widely adopted
- Can be fed without heat treatment
- May decrease dressing percentage
  - 15% max to starters, 25% to grow-finish, 15% to lactating sows
Field Pea  
(*Pisum sativum*)

- Excellent source of lysine
- Wide variety of quality due to cultivar and growing conditions
- Availability of nutrients similar to SBM
- 80% less trypsin inhibitor than raw soybeans... heat treatment usually not economical

15% max to starters, 30% max to grow-finish, 15% max to sows
Alternative Proteins

• Alternatives to soybean meal exist
• We simply know less about these alternatives
• Alternatives are likely more variable
• Proceed with caution...
• How does my feedstuff choice impact

**NET FARM INCOME?**
Feeding Small Grains
Small Grains

• An excellent source of energy
• Not a good replacement for soybean meal
• The amino acid profile of small grains is not matched to what the pig needs
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Ergot

- Do not feed ergot contaminated grain to gestation sows
- <0.1% ergot sclerotia to finishing hogs
- Reduced feed intake, lameness, gangrene, convulsions, death
Other issues

• Scab—can lead to mycotoxins in grain

• Trypsin inhibitors... especially in older varieties of triticale and rye

• Low test weight = high fiber, low starch
Pasture as Feed for Pigs
Depends on the Pasture!

Lush green clover, alfalfa are full of nutrition for pigs

Dry, mature grass, considerably less
Pasture and Pigs

• Historically, the best way to insure adequate nutrition was pasture…

• Especially certain vitamins

• Since 1970’s supplemental vitamins readily available
Today

• Legumes in pasture can provide protein to pigs as well as important vitamins…
• Remember a pig is not a cow
• Rotate pastures to prevent disease build-up
• Internal parasites can be problematic
Forage and Pigs

Gestating sow derives most nutrition from pasture
Sows have longest, most developed gut = they can capture some products of fermentation
Young pigs… not so much
Feed Handling

• Will your equipment handle the feedstuff?
• Can you handle the amount of feedstuff you need to purchase to get the lowest price?
• Can you feed the volume of feedstuff before it degrades?
• Do you have storage facilities for multiple feedstuffs