Beef, pork, and chicken research and field demonstrations conducted in Cambodia: How, who, successes and difficulties

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Multidimensional Trade-Off Analysis of Integrated Animal-Horticulture Farming Systems for Improved Smallholder Farmer Adoption Recommendations

Funding by the Horticulture Innovation Lab, February 20, 2017 through July 31, 2019.
Livestock Demonstrations Conducted

- **Cattle focused demonstrations:**
  - Mineral block feeding for growing cattle
  - Rice straw storage

- **Swine focused demonstration:**
  - Feeding the swine breeding herd a mineral and vitamin supplement
  - Feeding a complete diet containing soybean meal compared to a local feeding practice for growing pigs

- **Poultry focused demonstration:**
  - Feeding a complete diet containing soybean meal compared to a local feeding practice for growing chickens
Swine Research Conducted

- Nutrient analysis of common local feed ingredients for swine farmers in Cambodia
- Effect of complete diet feeding level and morning glory supplementation on growing pig growth performance
- Effect of rice bran grade and protein supplement, base mix, and/or soybean meal on growing pig performance
- Effect of soybean meal level in a rice bran based diet on growing pig performance and economics
Keys to “getting it done”

• Faculty, students and staff all that “care deeply” about the achieving the mission
• Partners that do not view this as short term work – but long term benefit to the citizens of their country
• Farmers believing that practices being tested can help, not hurt their animals – need mutual trust of in-country personnel and foreigners
Cattle Lick Block Demonstration

• Total of 45 growing cattle used for 6 months. Block contained salt and other minerals to support body function and growth.

• Growing cattle offered a mineral block gained 24.4 kg more. Thus growing cattle with lick blocks would reach the same body weight ~52 days sooner.

• This is a major finding that would allow producers to potentially market the animals sooner thus allowing for more resources of grass, stored feed and labor to be used for additional cattle.
Success and Challenges

• Farmers were excited to weigh the cattle – they have never done this prior to learn about cattle growth.
• Farmers sell by the animal not weight (they believe): thus farmers have a difficult time finding value in buying a block (investing ~ USD$10) and understanding how it would return a net profit by selling the animal sooner allowing for more total forage for breeding or younger cattle to graze.
Rice Straw Storage Demonstration

- Rice straw is often collected and stored after rice harvest in December to February. Rain water soaks into the pile can be significant causing rotting of forage.
- Rice straw is often fed June through October (dry season).
- 40 rice straw piles (20 uncovered and 20 covered) were used for 6 months. Pile height, width and nutrient analysis of straw was measured.
Success and Challenges

• Dry matter of uncovered decreased (more moisture) by ~2%, while covered only changed by ~0.5%
• No changes in crude protein most likely due to the low initial concentration of crude protein in rice straw (~5% CP)
• Stored covered piles had a less reduction in height (Shrinking), indicating less breakdown (decomposition)
• Covered pile straw was “brighter” color at 6 months
• Farmers gave feedback that they plan to use the tarp in the future to cover straw piles. The tarp (~ USD$40) provided should last many years without weathering.
Sow Vitamin and Mineral Demonstration

- A base mix is a nutritional supplement that contains vitamins, macro and trace minerals.
- 39 reproductive aged gilts and sows were used for 12 months.

### Daily feeding:
- **Prebreeding and during pregnancy:** 75 gram/day
- **Lactation (nursing):** 225 gram/day

### SOW BASE MIX

<table>
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<tr>
<th>COMPOSITION IN 1 KG</th>
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<tbody>
<tr>
<td>Vitamin A : 206 250 IU/kg</td>
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<tr>
<td>Vitamin D3 : 42 200 IU/kg</td>
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<tr>
<td>Choline : 13 700 mg/kg</td>
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<tr>
<td>Vitamin E : 1 690 mg/kg</td>
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<tr>
<td>Vitamin B3 : 1 240 mg/kg</td>
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<tr>
<td>Vitamin B5 : 685 mg/kg</td>
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<tr>
<td>Vitamin B2 : 206 mg/kg</td>
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<tr>
<td>Vitamin K : 84 mg/kg</td>
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<tr>
<td>Se (Na₂SeO₃) : 7.4 mg/kg</td>
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<tr>
<td>Lysine (L-Lysine HCl) : 3.3 %</td>
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<tr>
<td>Methionine (DL-Methionine) : 0.95 %</td>
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<tr>
<td>Threonine (L-Threonine) : 3.3 %</td>
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<tr>
<td>Calcium (CaCO₃) : 20 %</td>
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<tr>
<td>Digestible Phosphorus (DCP) : 5.6 %</td>
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<tr>
<td>Salt (NaCl) : 12.5 %</td>
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<td>Carrier (Rice hull) : q.s to 1 kg</td>
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**INGREDIENTS:**
- Vitamin A, D3, E, B3, B5, B2, K, B6, B12, Choline Chloride, Folic Acid, Biotin, Ferrous Sulfate, Zinc Oxide, Manganese Oxide, Copper Sulfate, Sodium Selenite, Calcium Iodate, L-Lysine HCl, DL-Methionine, L-Threonine, Limestone, DCP, Sodium Chloride, Rice hull.

**INDICATION**
- Supplement essential vitamins, minerals and amino acids for Sow.

**USAGE**
- Mix 36.3 kg SOW BASE MIX / ton of complete feed for sow.

**STORAGE:** stored in dry and cool place.

*The color does not effect the quality.*

Contains no hormones, antibiotics or medicines

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<tr>
<th>Lot :</th>
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<tr>
<td>Production date : Check NSX/MFD on the packaging</td>
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<tr>
<td>Expiry date : Check HSD/EXP on the packaging</td>
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Net Weight: 25 kg
Success and Challenges

- Piglet weaning weights increased after females received base mix by 7 and 14% over the next two litters.
- The number of live piglets born was increased 11-12%.
- After about 2 months of feeding many sows starting growing more hair and gaining body condition (personal communication with farmers).
- Base mix supplements are not a common ingredient in Cambodia and not offered in local feed stores currently. We wanted to introduce this type of ingredient as it is commonly used in many countries across the world.
Swine Research – Enhancing Capacity

- Existing swine facilities at Royal University of Agriculture were limited in size and availability for new research
- In order to develop graduate students and enhance faculty capabilities other locations sought
- A commercial swine farm designed for growing pigs was located and owners willing to be involved with research
  - Involved barn modifications for more pens (replication)
  - 1 hour from RUA, housing was developed on-site for student workers
- Barn designed for 60 growing pigs, the largest commercial swine research facility in Cambodia was developed!!
Commercial Swine Research Facility
Commercial Swine Research Facility
INCOME OVER FEED COST

Probability = 0.009

USD$/pig

- Supplement
- Supplement low
- Basemix
- Base + SBM

29.16
31.08
32.16
39.04

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Research and Extension
INCOME OVER FEED COST

- Complete Feed: 41.39 USD$/pig
- Restricted: 33.42 USD$/pig
- Restrict + morning glory: 33.89 USD$/pig
Swine Research – Enhancing Capacity
CE SAIN Technology Park 2018: new swine demonstration barn built
Thank you!