

# **Summary of USB Animal Nutrition Research Projects from FY09-FY20**

By Philip Lobo September 10, 2019

## **United Soybean Board - FY20 USB-funded Animal Nutrition Research Projects**

### **1. Increasing soybean meal use in diets for finishing pigs from 240 lb. to market**

**Project #: 2030-352-0516**

Recent research has shown that in addition to meeting the individual amino acid requirements, there is a minimum amount of crude protein needed in the finishing phase from 240 lb. to market to optimize growth performance (Soto et al., 2019). The study's objective is to determine the ideal amount of SBM needed in finishing pig diets from 240 lb. to market in order to optimize growth performance.

### **2. Exploring the potential growth stimulating effects of soybean meal in finishing pigs**

**Project #: 2030-352-0517**

Two comprehensive studies (grower and finishing pigs) will be conducted to evaluate the effects of DDGS inclusion (0 or 25%) and crystalline lysine use (0, 4, 8, and 12 lbs. per ton) on growth performance, carcass characteristics, and economic return. The results are expected to demonstrate the potential benefits of soybean meal.

### **3. Evaluation of soybean meal particle size on nutrient digestibility and growth performance of poultry Project #: 2030-352-0526**

Evaluate effects of soybean meal particle size on the true metabolizable energy and amino acid digestibility of soybean meal in roosters and the effects of soybean meal particle size on growth performance, apparent metabolizable energy, and ileal digestibility of amino acids and phosphorus in soybean meal in broiler chickens.

## **United Soybean Board - FY19 Funded Animal Nutrition Research Projects**

### **1. Influence of Soy Isoflavones and Viral Infection on Hogs Carcass and Microbiota**

**Project #: 1930-352-0509-A PI: Ryan Dilger**

This study will evaluate the effects of dietary soy isoflavones, inherently present in soybean meal, fed to PRRS-infected pigs and the changes/improvements in animal performance, carcass weight, carcass yield, loin muscle area, loin quality, and belly characteristics. At this document's production, results were pending.

**2. Benefit of High Dietary Levels of Soybean Meal Fed on Commercial Swine Farms**  
**Project #: 1930-352-0509-B PI: Mike Tokach**

Recent research indicates benefits of feeding higher levels of soybean meal to health-challenged pigs. The modes of action are not clearly defined and further research is warranted to confirm the response to diets containing high levels of soybean meal fed to pigs in high-health settings versus those in commercial conditions with varying levels of health challenge. This research is designed to utilize a multi-site approach with four locations, a university setting (high-health) and three commercial research facilities (health-challenged), feeding diets with increasing levels of soybean meal and evaluate pig performance. At this document's production, results were pending.

**3. Determining Productive Energy Content of Soybean Meal**  
**Project #: 1930-352-0509-C PI: Bob Goodband**

For many years, nutritionists have used digestible energy (DE) and metabolizable energy (ME) to estimate the energy content of feed ingredients used in swine diets. These values suggest that soybean meal has 105% and 98% the energy content of corn, respectively. Recently, the net energy (NE) system has been used to determine the energy content of feed ingredients. Using this methodology, soybean meal is estimated to have approximately 78% the energy content of corn. This study is designed to estimate the productive energy of soybean meal in swine diets. At this document's production, results were pending.

**4. Evaluating effects of non-starch polysaccharides in soybean meal on net energy, broiler performance, gut health and microbiota**  
**Project #: 1930-352-0509-D PI: Craig Coon**

The movement in the global poultry industry toward an antibiotic/coccidiostat-free grow-out system has created the need for alternatives to reduce gastrointestinal inflammation while improving feed conversion and net energy value of the feed. Identifying specific soybean non-starch polysaccharides (NSP) that support proliferation and colonization of non-beneficial microbes will provide soybean geneticists needed information for future NSP reduction. The genetic elimination of the non-beneficial NSPs will enable increasing the concentrations of valuable economic traits, such as soybean oil and protein, and will increase the feed net energy value of soybean meal. This study will evaluate soybean meal NSPs and their effects on net energy, broiler performance, and gut health/microbiota. At this document's production, results were pending.

**5. Re-evaluating the Metabolizable Energy of Soybean Meal in Poultry Diets**  
**Project #: 1930-352-0509-E PI: Carl Parsons**

Animal nutritionists have valued soybean meal's metabolizable energy contribution to broiler diets at about 23% lower than the metabolizable energy level that soybean meal contributes to swine diets. Several leading poultry nutritionists believe that the estimate assigned to soybean

meal's energy value is low. This study will re-evaluate the energy content of soybean meal in poultry diets. At this document's production, results were pending.

**6. Soybean Meal in Feed Life Cycle Analysis Project #: 1930-352-0509-E PI: Michael Wang**

Multiple competitors in animal feed have conducted feed-related life cycle analyses to differentiate their products. This study will compare the environmental footprints of diets formulated with soybean meal to diets formulated with distillers dried grains and synthetic amino acids for both broilers and swine. It will quantify the environmental impacts of these feed ingredients along the supply chain. At this document's production, results were pending.

**United Soybean Board - FY18 Funded Animal Nutrition Research Projects**

**1. Evaluation of soybean meal particle size on nutrient digestibility and growth performance of poultry Project #: 1830-352-0509-A PI: Carl Parsons**

This project generated the soybean meal for FY20 project 2030-352-0526 above. Final results are dependent upon the results of the aforementioned FY20 project.

**2. Soy isoflavones and immune recovery following viral infection in pigs Project #: 1830-352-0509-B PI: Ryan Dilger**

This study evaluated the effects of dietary soy isoflavones, in order to demonstrate that that the specific immunomodulatory effects observed with soy isoflavone supplementation in the PI's most recent study will confer growth performance and immunological benefits well beyond the acute period in PRRSV-infected pigs. The goal was to show a time-dependent biological mechanism by which soy isoflavones exert immunomodulatory effects and their influence on growth performance over the growing period in pigs raised under conditions mimicking industry standard. For results click [here](#).

**United Soybean Board - FY17 Funded Animal Nutrition Research Projects**

**1. Literature Review of Soy Bioactives in Pigs Project #: 1730-352-0511 PI: Ryan Dilger**

Over the past 6 years, there has been increased evidence that higher quantities of soybean meal provide immunological benefits to young pigs during disease challenge. Extensive data on soy bioactives exists in human health, but not for the swine industry. This project summarized all available literature on the effects of soy bioactives when fed to pigs allowing related animal feed programming to communicate the results to animal nutritionists. For results click [here](#).

**2. Evaluation of Schillinger High Protein Ultra Low Oligosaccharide (HPULO) at Perdue Farms  
Project #: 1730-252-0410 PIs: Randy Mitchell, Nick Bajjalieh**

The goal of this project was to evaluate the use of high protein ultra low oligosaccharide (HPULO) soybean meal in a commercial broiler feeding application. It incorporated procedures and learnings from previous smaller scale university research projects leading to a series of broiler feeding trial comparisons involving whole-house flocks for an entire production cycle. Results were intended to document the commercial opportunity associated with HPULO meal. For results click [here](#).

**3. Farmers Independent Research of Seed Technologies (FIRST) initiatives  
Project #: 1720-152-0108 PI: Nick Bajjalieh**

The goal of this project was to evaluate available soybean seed varieties on a regional basis and provide unbiased yield and seed composition results plus inform U.S. soybean producers of the long-term financial benefits of selecting high-yielding, high quality soybean varieties, and assist USB to define the U.S. soy advantage, for all audiences. For results click [here](#) and [here](#).

**4. Soybean carbohydrate composition analysis Project #: 1730-352-05 PI: Mark Berhow**

The primary focus of this project was to evaluate/develop NIR technology applications for soybean carbohydrate measurements and contents. For results click [here](#), [here](#), [here](#) or [here](#).

**United Soybean Board - FY15 Funded Animal Nutrition Research Projects**

**1. Health effects of soybean meal-fed pigs with special emphasis on isoflavones  
Project #: 1530-512-5223 PI: Ryan Dilger**

Building upon recent findings that feeding increased concentrations of dietary soybean meal confers benefits to young pigs infected with porcine respiratory and reproductive syndrome (PRRS) virus, this proposed project sought to:

1. Quantify variability in soy isoflavone content within value-added soy products
2. Develop an isoflavone-free soy product for testing our hypothesis that these bioactives are responsible for immunomodulatory effects in PRRS virus-infected pigs
3. Provide direct evidence of whether soy-derived isoflavones are responsible for the observed growth performance benefits in young pigs infected with PRRS virus

For results click [here](#) and [here](#).

## **2. Health effects of soybean meal-fed pigs with special emphasis on amino acids**

**Project #: 1530-512-5222 PI: Nick Gabler**

There is growing consensus that SBM may provide protective benefits to pigs experiencing disease challenges, especially in mid-late finishing phase of production. Anecdotal and unpublished data suggest that limiting the levels of synthetic amino acids in disease-challenged pigs can result in improved growth and financial performance. The objective of these experiments was to confirm this benefit, increase SBM consumption and to improve the growth and feed efficiency performance of health challenged pigs, simultaneously. For results click [here](#), [here](#), [here](#), and [here](#).

### **United Soybean Board - FY14 Funded Animal Nutrition Research Projects**

#### **1. Increasing the use of soybean meal in nursery pig diets through the application of super doses of phytase Project #: 1430-512-5207 PI: Eric van Heugten**

Previous in-house evaluations by The Hanor Company indicated that the addition of higher than typical levels of phytase to nursery pig diets enable higher levels of soybean meal (SBM) usage while maintaining overall performance. By displacing other more expensive protein sources with SBM, the ingredient cost per ton of feed and associated feed cost per pig can be reduced. This proposal was for two animal feeding research trials intended to further understand and document this opportunity. For results click [here](#).

#### **2. Optimum quality soybean meal trial Project #: 1430-512-5220 PIs: Greg Engelke, Gordon Denny**

The intent is to open a dialogue in which soybean processors make a better quality soybean meal that would be more valuable to domestic animal feeders, with a special focus on improved Feed Conversion Ratios (FCR). The cost of making optimum quality SBM will be objectively calculated along with the value of improved FCRs. The goal was for feed manufacturers to realize more value from SBM, making themselves more profit while creating improved customer loyalty for the processor along with compensation for any increased processing costs.

### **United Soybean Board - FY12 Funded Animal Nutrition Research Projects**

#### **1. Further Evaluation of Reduced Oligosaccharide Soybean Meal (SBM) in Poultry Project #: 2387 PI: Carl Parsons**

This study determined amino acid digestibility of control and low-oligosaccharide soybean meals (SBMs) in cecectomized roosters, the total metabolizable energy correct for nitrogen

(TME<sub>n</sub>) of the SBMs in conventional roosters, and the standardized ileal digestibility of amino acids (AA) in the SBM. For results click [here](#).

## **2. Piglet performance on trait-enhanced soybean meal Project #: 2312 PIs: David Holzgraefe, Victor Perez**

This project conducted a nursery experiment to measure pig performance. The dietary treatments consisted of traditional vs. low oligosaccharide SBM, as well as traditional vs. low oligosaccharide soybean white flakes. For results click [here](#) and [here](#).

## **3. Metabolizable energy of trait-enhanced soybean meal in grower-finisher swine Project #: 2315 PIs: David Holzgraefe, Victor Perez**

Energy is the most expensive component in livestock diets, so a SBM with more available energy may represent an economical advantage for the swine industry. This project estimated both digestible and metabolizable energy content of conventional and low oligosaccharide SBM for pigs. The determination of those values in low oligosaccharide SBM should facilitate its adoption in pig diets. Further, those energy values will be determined for both grower and finisher pigs. For results click [here](#).

### **United Soybean Board - FY11 Funded Animal Nutrition Research Projects**

#### **1. Dietary Energy Utilization of Soybean Meals Originating From Varieties Having Altered Sugar Composition Fed to Broiler Chickens**

**Project #: 1305 PIs: Bill Dozier, Kurt Perryman**

This research evaluated soybean meals originating from varieties having altered sugar content with broiler chickens. Three experiments were conducted. In experiments 1 and 2, metabolizable energy (ME) and amino acid digestibility of soybean meals were determined. Results in experiments 1 and 2 were used to formulate diets in experiment 3. In experiment 3, broilers were fed diets containing different soybean meals supplemented with or without an exogenous enzyme during a 42 d production period. Measurements consisted of growth performance, food pad lesions, and processing yields. For results click [here](#).

Other results abstracts:

Perryman, K. R. and **W. A. Dozier, III**. 2012. Apparent metabolizable energy and apparent ileal amino acid digestibility of low and ultra-low oligosaccharide soybean meals fed to broiler chickens. *Poult. Sci.* 91:2556-2563.

Perryman, K. R. and **W. A. Dozier, III**. 2012. Apparent metabolizable energy and standardized ileal amino acid digestibility of low oligosaccharide soybean meals fed to broilers. *Poult. Sci.* 91 (Suppl. 1):201.

Perryman, K. R. and **W. A. Dozier, III**. 2011. Effects of low oligosaccharide soybean meal and  $\alpha$ -galactosidase supplementation on growth and meat yield responses of broilers during a 40 day production period. Poult. Sci. 90 (E-Suppl. 1):18.

### **United Soybean Board - FY10 Funded Animal Nutrition Research Projects**

#### **1. Dietary Energy Utilization of Soybean Meals Originating From Varieties Having Altered Sugar Composition Fed to Broiler Chickens**

**Project #: 0305 PIs: Bill Dozier, Kurt Perryman**

This research evaluated soybean meals originating from varieties having altered sugar content with broiler chickens. Four experiments were conducted. In experiment 1, metabolizable energy (ME) of soybean meals were determined. Results in experiments 1 were used to formulate diets in experiment 2. In experiment 2, broilers were fed diets containing different soybean meals supplemented with or without an exogenous enzyme (carbohydrase) during a 42 d production period. Measurements will consist of growth performance, foot pad lesions, and processing yields. For results click [here](#) and [here](#).

Other results abstracts:

Perryman, K. R. and **W. A. Dozier, III**. 2012. Apparent metabolizable energy and apparent ileal amino acid digestibility of low and ultra-low oligosaccharide soybean meals fed to broiler chickens. Poult. Sci. 91:2556-2563.

Perryman, K. R. and **W. A. Dozier, III**. 2012. Apparent metabolizable energy and standardized ileal amino acid digestibility of low oligosaccharide soybean meals fed to broilers. Poult. Sci. 91 (Suppl. 1):201.

Perryman, K. R. and **W. A. Dozier, III**. 2011. Effects of low oligosaccharide soybean meal and  $\alpha$ -galactosidase supplementation on growth and meat yield responses of broilers during a 40 day production period. Poult. Sci. 90 (E-Suppl. 1):18.

### **United Soybean Board – FY09 Funded Animal Nutrition Research Projects**

#### **1. Assessing the Nutritional Energy Value of Stacked Trait Low Phytate/Low Oligosaccharide Soybeans in Animal Feeding Applications**

**Project #: 9393 PI: Carl Parsons**

Study examined the metabolizable energy of a low-phytate, low-oligosaccharide soybean meal in broiler chicken diets. For results click [here](#).