FPRF Technical Services Newsletter

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" All generaliza-tions are false, including this one"

- Mark Twain

President's Column

Strategic intents are central to charting organizational future, as it defines what a particular organization intends to accomplish in a period of time in order to achieve a competitive advantage. However, the strategic intent involves more than the organization's vision for the future. A strategic intent should be a big stretch, very concise and measurable. For FPRF it has been to be the leader in translating research into effective practice solutions for the rendering industry. The foundation has addressed this through making grants for research, education, advocacy efforts, and bringing people together to collaborate and share ideas.

However, the foundation must be prepared for culture change and have an unwavering commitment, at every level of the foundation, to step beyond the present and decide what the organization will become. The foundation doesn't need to be large in size or budget to implement this strategy, but if we are concerned about more than survival then we will have to create our own future.

People today are increasingly concerned with where their food comes from and how it is produced. The future portends significant changes in response to shifts in how public views the roles of animals in providing food and companionship. Funding for research will continue to decline as a percentage of government appropriations, so public universities will garner more funding from endowments and grants. Research will focus on more species of animals and on a greater role of animals in society. Research projects will be more complex and have longer horizons, ultimately focused more on sustainability. It is here where we can align ourselves, and there is no doubt in my mind that the rendering industry will keep playing a major role in our society well into the next century.

Sergio F. Nates, Ph.D.

Country Focus (Philippines) – Sergio Nates

Livestock Production

The Philippines has large industries producing pig and chicken meat. The cattle industry, which mainly produces meat, is much smaller than these two industries. Pig farming is the second largest commercial agrifood industry in the Philippines, after the banana industry. The industry is dominated by small and medium sized producers, of which there are estimated to be between 750,000 and 800,000 operations. The largest pig farming operations in the Philippines are operated by Foremost Farms, Monterey Farms (San Miguel Corporation), Robina Agri-Partners (Universal Robina), Federal Farms and PI Group.

The Philippines poultry industry is focused mainly on chicken. Production from the duck industry equates to around 7% of poultry industry output. While there are small and medium sized commercial farms, the bulk of production comes from the large sized integrated businesses run by General Milling Corporation, San Miguel Pure Foods, Swift Foods, Tyson Agro-Ventures, Universal Robina (Robina Agri-Partners) and Vitarich.

Philippines Aquaculture Industry

Aquaculture's contribution to the Philippine economy is growing. The country's farmed seafood production increased 8.7 percent in 2008, outpacing total agriculture and fisheries production at 3.9 percent.

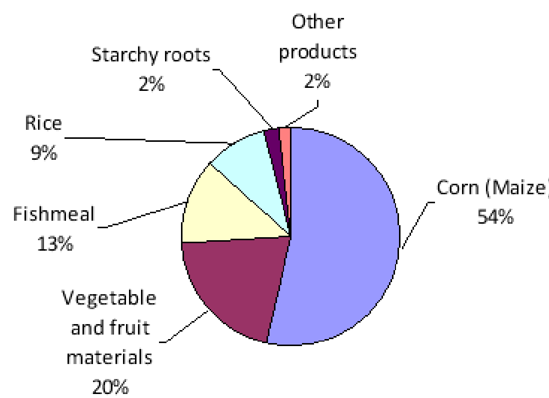
Due to this trend, the Bureau of Fisheries and Aquatic Resources (BFAR) is stepping up promotional efforts for aquaculture, including a large effort to increase *L. vannamei* (Pacific white shrimp) production, which cohabitates well with milkfish. The Philippines ranks amongst the top fish producing countries in the world (FAO, 2008). The Philippines is the second biggest producer of seaweeds contributing to 0.7 million tons or 7.4% of world production of 10.5 million ton, second to China in the world production of tilapia and first among the Asian producers of milkfish.

The fisheries industry provides employment to around 1 million people or 5% of country's labor force. Around 26% of these people are engaged in aquaculture, 68% in municipal and small scale fisheries and 6% in commercial fisheries. Out of the total fisheries production in 2008, aquaculture contributed highest share of 46% followed by commercial and municipal fisheries at 27% each. Amongst all the fisheries sub-sectors, aquaculture registered the highest growth rate of 8.7% in 2006 compared to the previous year. Most of this increase was brought about by large increases in aquaculture production (more than 6% annual production increase over this period). There have been modest increases in commercial capture fisheries (2.5% per year increase over the period).

Philippines Feed Industry

The Philippines produces around 6 million tonnes of agricultural products and related waste products that are used in local animal feed (Figure 1).

Figure 1. Animal feed ingredienst in the Philippines



The Philippines currently has about 700 businesses involved in its animal feed industry. The industry is relatively fragmented with 10 of the businesses operating about 60% of the industry's total capacity. The largest companies involved on the industry are San Miguel Corporation (25% of production capacity), Cargill Philippines (14%), Swift Foods (13%), General Milling Corporation (12%), Vitarich (11%), Universal Robina, Sun Jin Philippines, Foremost Farms, Tyson Agri-Ventures and Grain Handlers. San Miguel is the Philippines largest corporation and has animal feed operations all over the country.

R&D Update (Progress report)

09B-1 **Effect of Phase-Feeding Beef Tallow on Quality Characteristics of Subcutaneous Fat and Fresh Pork Bellies from Growing-Finishing Pigs fed Dried Distillers Grains with Solubles – Jason K. Apple, Ph.D.**

Summary to Date

Crossbred pigs, from the mating of progeny of Newsham Genetics GPK-35 females to PIC 380 sires, were blocked by initial BW into six weight blocks, and, within blocks, pigs were stratified according to gender and litter origin into pens of 6 pigs on Wednesday, March 24. In addition, pens of pigs were randomly assigned to dietary treatments within each weight block. However, beef tallow arrived at the University of Arkansas Division of Agriculture, Department of Animal Science Feed Mill on Friday, March 26 and yellow/restaurant grease was delivered on Monday, March 29;

therefore, the beginning of the research was delayed until diets could be formulated, mixed, bagged, and delivered until Wednesday, March 31.

Specific Objective

Compare the effects of feeding 5% beef tallow during the grower phases to feeding 5% beef tallow during the finisher phases on the subcutaneous fat and fresh pork belly quality of pigs fed 30% dried distillers grains with soluble.

Procedures

Approximately 216 crossbred pigs (progeny of Newsham Genetics GPK-35 females x PIC 380 sires) will be blocked by gender and initial BW into six weight blocks, and, within blocks, pens of pigs (6 pigs/pen) will be randomly assigned to 1 of 6 dietary treatments (Table 1). Pens within a given block will contain equal numbers of barrows and gilts. Diets are formulated to represent standard commercial inclusion levels of DDGS. All diets will be formulated to meet or exceed all NRC (1998) requirements and will be isocaloric by phase (refer to attached experimental diets). Pigs will be housed in a curtain-sided building with slatted floors, and each 1.5 × 3.0-m pen is equipped with a single-hole feeder and wean-to-finish waters for *ad libitum* access to diets and water. Ambient temperature will be maintained at a minimum of 25.5°C during the grower phases and 18°C during the finishing phases using supplemental propane heater as needed. Individual pig BW, as well as pen feed disappearance, will be measured for each feeding phase to calculate ADG, ADFI, and G:F.

Table 1. Beef tallow inclusion rates in experimental swine diets[A,B].

Production Phase	Grower 1 (23-41 kg)	Grower 2 (41-59 kg)	Finisher 1 (59-82 kg)	Finisher 2 (82-104 kg)	Finisher 3 (104-125 kg)
Negative Control	0%	0%	0%	0%	0%
Positive Control	5%	5%	5%	5%	5%
BT1	5%	5%	0%	0%	0%
BT2	5%	5%	5%	0%	0%
BT3	0%	0%	5%	5%	5%
BT4	0%	0%	0%	5%	5%

[A] Beef tallow (5%) will replace yellow grease (4.67%) and sand (0.33%) such that all dietary treatments within a given production phase will be isocaloric.
[B] Grower 1, Grower 2, and Finisher 1 diets will contain 30% DDGS. Finisher 2 diets will contain 15% DDGS and Finisher 3 diets will contain no DDGS.

At an average BW of approximately 125.0 kg, pigs will be tattooed on both shoulders before being transported to a commercial pork packing plant, and slaughtered according to industry-accepted procedures. Fat and *longissimus* muscle depths will be measured on-line with a Fat-O-Meater probe and hot carcass weights will be recorded before carcass chilling. After approximately 12 h of the chilling period, bellies from the right side of each carcass will be identified with the pig's tattoo number, and jowl fat samples and backfat samples will be collected, individually packaged and identified, and transported on dry ice back to the University of Arkansas for fatty acid analysis. During fabrication, fresh pork bellies (IMPS #408) will be collected, vacuum-packaged, boxed and transported under refrigeration to the University of Arkansas Red Meat Research Abattoir for quality data collection.

Upon arrival at the abattoir, fresh pork bellies will be removed from vacuum-packages, and the length and width of each belly, as well as temperature (belly firmness will only be measured on bellies with a temperature of ≤ 4°C), will be measured before measuring belly firmness according to the bar-suspension ("flop") method of Thiel-Cooper et al. (2001). Belly firmness angle (the upper angle of the isosceles triangle formed by suspending the belly across the bar) will also be calculated using the equation of Whitney et al. (2006): $\cos^{-1}([\{0.5 \times L^2\} - D^2] / \{0.5 \times L^2\})$; where L is the belly length and D is the distance between belly ends when suspended perpendicular to the bar. Then, a 3.8-cm-diamter strip of the belly from both the caudal and cranial ends will be removed and used to objectively measure belly firmness according to the Instron puncture test of Trusell et al. (2009), and approximately 5 g of subcutaneous fat will be removed from the area of the first teat (cranial strip) for fatty acid analysis. Instrumental color (L*, a*, and b* values), as well as Japanese muscle and fat color scores, will be measured on both the lean (*rectus abdominus*) and fat portions of each belly. The remaining belly will be weighed, vacuum-packaged, and transported to a commercial bacon processing plant, where each belly will be identified during curing and thermal processing, and three 2.2-kg samples of bacon will be collected from the anterior, central, and posterior portions of each bacon slab for measuring acceptable/unacceptable slices, as well as for cooking characteristics and sensory panel evaluations of cooked bacon.

Duplicate fat samples from the jowl, backfat and belly fat will be weighed before being freeze-dried at -50°C and under < 10 mm of Hg of vacuum for 60 h. Then, the freeze-dried fat samples, as well as samples of diets collected during each feeding phase, will be subjected to direct transesterification according to the procedure of Murrieta et al. (2003). Saturated NaCl and a hexane solution containing an internal standard (glyceryl tridecanoic acid; 13:0) will be added before the hexane is evaporated off, and tubes will be vortexed before centrifugation for 5 min at 1,100 × *g* and 20°C to separate phases. Then a portion of the hexane layer containing the fatty acid methyl esters (FAME) will be transferred to GLC vials containing a 1.0-mm bed of anhydrous sodium sulfate. Separation of FAME will be achieved with a Hewlett-Packard 5890 Series II GLC, equipped with a 100-m capillary column, an automatic injector, and He as the carrier gas. Identification of peaks will be accomplished using purified standards obtained from Nu-Chek Prep (Elysian, MN), Matreya (Pleasant Gap, PA) and Supelco Inc. (Bellefonte, PA).

All data will be analyzed as a randomlized complete block design, with pen as the experimental unit and blocks based on initial BW. Analysis of variance will be generated using the mixed-model procedure of SAS (SAS Inst., Inc., Cary, NC).

Results to Date

There are no results at this time; however, we are actually ahead of the timeline presented in the funded proposal.

Fats & Oils Analyses

Because we have just recently obtained the fats to be included in our diets, we have not performed the appropriate analyses to date. Yet, we will perform the analyses as quickly as possible and present those results in the next progress report.

Noteworthy Article

Rotz C.A., Montes F., and D.S. Chianese (2010) The carbon footprint of dairy production systems through partial life cycle assessment. J Dairy Sci. 93(3):1266-82.

Greenhouse gas (GHG) emissions and their potential effect on the environment has become an important national and international issue. Dairy production, along with all other types of animal agriculture, is a recognized source of GHG emissions, but little information exists on the net emissions from dairy farms. Component models for predicting all important sources and sinks of CH(4), N(2)O, and CO(2) from primary and secondary sources in dairy production were integrated in a software tool called the Dairy Greenhouse Gas model, or DairyGHG. This tool calculates the carbon footprint of a dairy production system as the net exchange of all GHG in CO(2) equivalent units per unit of energy-corrected milk produced. Primary emission sources include enteric fermentation, manure, cropland used in feed production, and the combustion of fuel in machinery used to produce feed and handle manure. Secondary emissions are those occurring during the production of resources used on the farm, which can include fuel, electricity, machinery, fertilizer, pesticides, plastic, and purchased replacement animals. A long-term C balance is assumed for the production system, which does not account for potential depletion or sequestration of soil carbon. An evaluation of dairy farms of various sizes and production strategies gave carbon footprints of 0.37 to 0.69kg of CO(2) equivalent units/kg of energy-corrected milk, depending upon milk production level and the feeding and manure handling strategies used. In a comparison with previous studies, DairyGHG predicted C footprints similar to those reported when similar assumptions were made for feeding strategy, milk production, allocation method between milk and animal coproducts, and sources of CO(2) and secondary emissions. DairyGHG provides a relatively simple tool for evaluating management effects on net GHG emissions and the overall carbon footprint of dairy production systems.

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