High Performance Facilities

• Goal to meet the expectations for:
  • Animal Performance
  • Nutrition
  • Genetics
  • Health
  • Animal Well Being
  • Producer Well Being
  • Cost Effective
  • Reduce Energy Use
High Performance Facilities

- **Key Parts to the System**
  - Construction Integrity
  - Ventilation Design
  - Monitoring
  - Control

- **People**
  - Animal Husbandry Skill Set
  - Training
  - Accountability
High Performance Facilities

• Challenge is to get facility, equipment and controls to work together.
• Keeping pigs healthy takes more than antibiotics!
• Pig Behavior – pig is captive to their environment. Our responsibility to manage it!
  • Food, Water, Air
  • Maximize consumption
  • Reduce stress
• Ability to gather and look at data to fine tune the system.
• Data available real time.
What Type of data?

- Temperature
- Humidity
- Light, Lumens
- CO2, NH3...
- Stages
- Feed Consumption
- Water Consumption
- Water Pressure
- Fans, Heaters, Equipment
- Static Pressure
- Weights
- ...

...
Proper Air Flow

Airflow from Ceiling Inlets

- **Sufficient static pressure at inlet**
  - Incoming cold air jet
  - Mixes with incoming air
  - Removes moisture and gases

- **Insufficient static pressure at inlet**
  - Cold air drop
  - Recirculation zone

An ideal rotary airflow pattern and well-mixed environment inside the room is created.

Cold air drops directly onto animals and a recirculation zone is created causing moisture and gases to remain in the room.
Improper Air Flow

Figure 1: Not enough airflow. A large (~7.5°F) temperature gradient has developed down the length of the barn creating a cold environment at one end with high air speeds and a warm and stuffy environment at the other.
Proper Air Flow

Figure 2: Well-designed airflow. A small (~2°F) temperature gradient has developed down the length of the barn creating a more
High Performance Facilities

- Increase fan belt tightness
- Clean dirty fans
- Increase tunnel open area
- Improved management or operation decision

Diagram showing a cloud-based system with a controller, computer, and room data for monitoring and adjusting temperature.
Control

- The function of the controller is to manage the mechanical systems and provide a stable and uniform thermal environment inside the room. Since this is the final component in the ventilation system, the performance of the controller is completely dependent on the equipment selected, installation of that equipment and its configuration. This essentially means, regardless of controller cost or sophisticated technology, the controller will be unable to perform at its highest level or the way it was specifically designed to operate, when the ventilation system is designed wrong and/or installed poorly.

- The controller has no knowledge of the equipment, installation of equipment or other features in the room that could impact the environment. Hence, the system must be designed and installed correctly to give the controller the best chance at providing a suitable environment. Further, a controller is only as good as it is programmed. That is, a poor initial setup or frequent setting changes can severely inhibit the ability of the controller to function properly.
MAXIMUS Farm Controller - OVERVIEW

- Ventilation / Heating
- Water management
- Bin weighing
- Growth curves
- Bio-security / Chore monitoring
- Lights
- Generator monitoring
- Power consumption
- Bird/Hog weighing
- Dialer
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ESF - SOW MANAGEMENT

• This system is **precise**, **efficient** and **adaptable** to a wide range of needs and situations in a new or an old building.

• **Easy to use** for gilts and sows.

• **Entirely mechanical**, the ESF stall has no electrical component.

• **Automatic data acquisition** on an individual level allows producers to **know more** about each animal eats and how it grows.

• **Small quantities** of feed at the time
• **Agitator activated** feeding
• **Efficient** feeding
• **Monitor** pig movement throughout the barn
• **Ability to adjust** individual sow feeding based on sow condition
Basic Parameters/Assumptions:

- 22 sq ft per sow (range 19 – 23)
- 12 sows / feed station (range 12-20)
- 12 sows / water station (range 12-20)
- 2 sets of Double Feed Stations / pen
- 1 pen = 1 farrowing Room
- Static system
- Preg Check Positive Fills
- Water separated from Feed
- Personnel Pass Through Gates
- Lights placed above Feed Stations
Maximus ESF Conversions

• REMODEL
  • One ESF Pen = 1 Farrowing Room
    • Sort by Farrow Date ONLY
    • Mixed Parity Sows – Gilts and Sows mixed together
  • 12 rows of stalls became 3 pens wide
  • 6 rows of stalls became 2 pens wide
  • Stall and walkways = ~20 sq ft / sow, Pens and walkways = 22 sq ft / sow
  • 1/3 of Barn stalls – 2/3 of barn space Pens
MAXIMUS MANAGEMENT SYSTEM

A 100% INTEGRATED SOLUTION

• New paperless *user friendly* data entry
  • Works offline

• Data collected at the farm and in *real-time*

• *Eliminates* data quality issues

• Enables faster *decision making*

• *Real-time* monitoring

• Trend *analysis* at the individual and group levels
CLOUD BASED LIVESTOCK MANAGEMENT SOFTWARE

• Cloud/Web based
  • Accessible from anywhere in the world as long as you have Internet access

• Hosted by Maximus
  • No server purchase required
  • No licenses to buy, monthly service fee
  • We take care of the backups, server upgrades and security

• Multiple platforms
  • Enter and access your data and reports on your smart phone, i-Pad, PC

• Multiple users
  • As many users as you want can access the program with no extra costs

• On Demand Reporting
  • Reports can be easily customized, scheduled, emailed, exported to multiple formats
Keys to High Performance Facilities

• 4 Parts to the System
  • Construction Integrity, Ventilation Design, Monitoring, Control
• Set it up right and continue to fine tune it.
• Real time data monitoring & analysis
• Communication - expectations
• TLO
  • Training!
  • Learning!
  • Own it!
Questions???
• **Ventilation data paint picture of facility management** - Brett C. Ramirez, Iowa State University Department of Agricultural and Biosystems Engineering Graduate Research Assistant

• **High-performance hog facilities a top priority** - Brett C. Ramirez, Iowa State University Department of Agricultural and Biosystems Engineering Graduate Research Assistant

• **Infiltration: Your unplanned inlet can reduce air quality** - Brett C. Ramirez* and Harishchandra Jadhav, Iowa State University Department of Agricultural and Biosystems Engineering Graduate Research Assistants

• **Controller-gathered thermal data helps identify, reduce heat stress in growing pigs** - Brett C. Ramirez, Iowa State University Department of Agricultural and Biosystems Engineering Graduate Research Assistant

• **Ventilation data paint picture of facility management** - Brett C. Ramirez, Iowa State University Department of Agricultural and Biosystems Engineering Graduate Research Assistant