

# Back to the Future: Using Production and Financial Records to Plan, Project and Manage Forward

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## ■ Introduction

In all sorts of ways it's a new world for pork producers in North America. One consequence of the industry's financial stress has to do with the need for much more intense and sophisticated use of fundamental production and financial records. Not only do producers need this for their internally-focused production and risk management activities, but in today's new world they also have highly engaged 'partners' in the form of lenders and packers (and others, of course, but lenders and packers are primary).

These partners now want much more detail, want it much more frequently, and want it to focus much more on forward-looking management. This includes projected pig flow, projected cash flow, and transparency into the risk management actions taken by their pork suppliers (packers) or their loan portfolio clients (lenders).

## ■ Production and Financial Records

A list of just some of the new-world requirements includes the following:

- Integrated inventory flow (sow + nursery + finishing + feed + carcass + movements) that supports forward tracking, backward tracing, and projections; "product" tracking.

- Database design to support robust production system hierarchical layout (flow, business unit, pyramid, pod, supervisors, producer/grower, site, barn, room, row, pen, and crate/stall).
- Detailed nursery/finishing/wean-to-finish group tracking
- Integrated inventory tracking with forward and backward tracking and tracing plus linkage to outcomes; flow→ sow farms → nursery-finishing sites → nursery-finishing barns → nursery-finishing groups → sales → carcass data
- Automated inventory roll-up across an entire production system
- Automated projected pig flow roll-up across an entire production system
- Integrated feed tracking; link details of feed deliveries at the ingredient level with sow farm + nursery groups + finishing/wean-to-finish groups + carcass; includes all feed ingredient detail including medications and additives. Linkage from feed delivery data back to feed mill or warehouse with additional linkage to ingredient data (lot numbers, etc). Forward and backward tracking and tracing.
- Sophisticated and robust movement tracking; 'flow' attributes – production flow, customer flow, genetic flow, health flow, 'product' flow, etc. These must support an unlimited number of production segmentation grouping attributes that fall under the rubric of flow.
- Integrated animal treatment and antibiotic use tracking. Antibiotic purchase tracking; warehouse supply tracking coupled with integrated feed tracking. Forward and backward tracking and tracing.
- Animal welfare measures and tracking – sampling protocols and sample or audit event recording integrated into production system database. Full compliance reporting capability.
- Animal handling measures and tracking — integrated into movement events. Full compliance reporting capability.
- Pre-harvest HACCP event recording and tracking; storing pre-harvest HACCP plans in database for actual versus plan reporting. Full compliance reporting capability.
- Pig flow and projection models with granularity at the level of 'day', i.e. ability to project pig flow by day across an entire production system;

automated linkage to margin models (6-month forward forecast on ingredient prices, futures prices, cash prices)

- Cash flow models linked to pig flow models for projecting cash requirements by week (but with ability to do it by day) across an entire production system)

## ■ Pig Flow and Projection Models

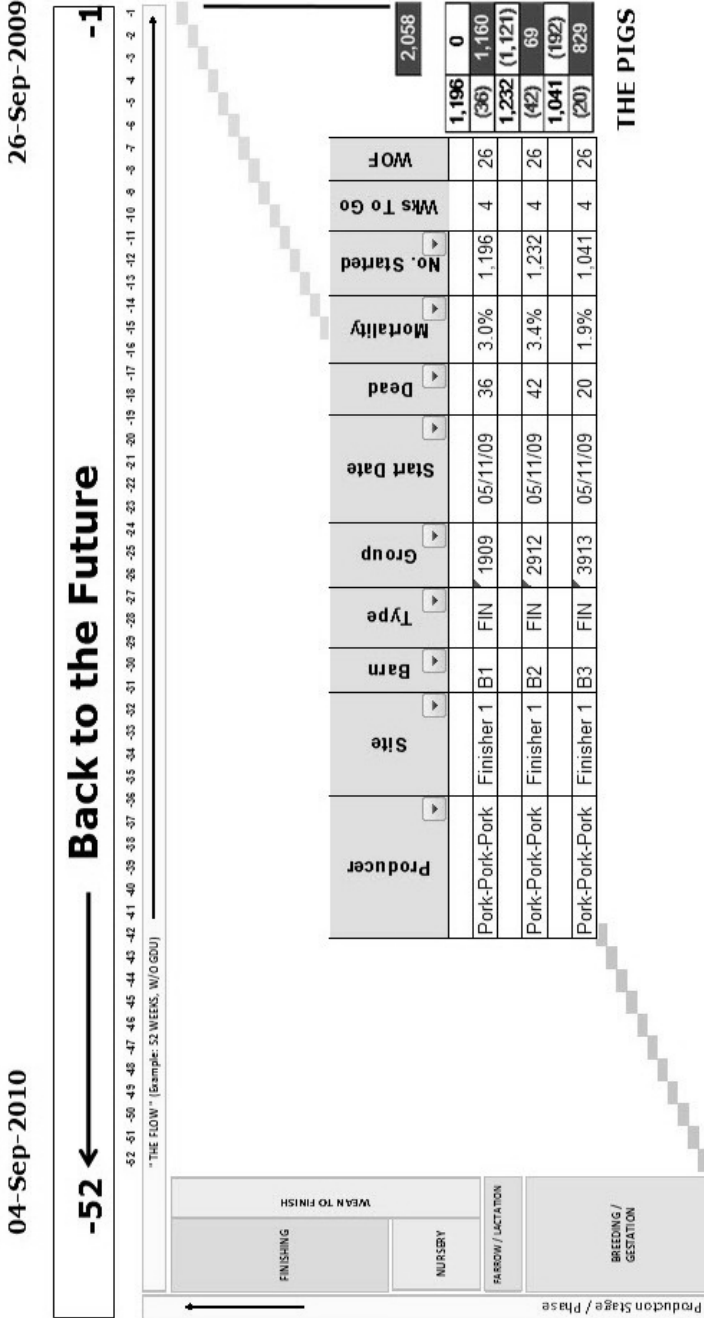
This breakout session will focus on pig flow and projection models that link to cash flow models. We've been working on this for the past several years. At this point, our customers -- using our software -- have by virtue of time and volume created a large database comprising nursery-finishing production and performance data linked to marketing data (sales, kill sheet, individual carcass). Having accurate, complete, usable nursery-finishing and market hog sales data across roughly 18% of the total North American daily pig inventory has enabled us to do solid R &D work on pig flow models in a way that has never before been possible in North America.

One of the ways we've come up with for projecting pig flow and managing pig space (sites and barns) is based on visually reporting the flow (**Figure 1**). The flow moves from left to right, and can include the sow farm (weekly breeding groups) as well as the nurseries and finishers. An important "ah ha" to the layout was to track the expected close week going backwards (right to left). Once you have this foundation, you can build a mirror image of the data that reports projected data by calendar week moving left to right, which ends up making a lot more sense to most people than seeing a report on which time is "going backwards to the future".

Because this data is linked to real-time changes in inventory -- based on sales, movements, and deaths -- it allows you to build projected requirements for feed (ingredients), the expected expenses, and the expected sales revenue along with a dynamically up-to-date set of risk management actions (hedges and options) that have been or will be taken

This breakout session will discuss at several real-life examples of flow reporting and projections based on it.

Figure 1. Visual Projection of Pig Flow



## ■ Background: Movement Tracking

Movement tracking ends up being the key underlying technology required to effectively project pig flow. But, it's not the simple movement data entry that you may be familiar with from your work with 'old school' software. For example, you might think – logically - that the sale of weaned pigs would be linked to sow farms. Often, that's true, and in fact was our version 1.0 design. But many times “weaned pigs” are sold out of a nursery or a wean-to-finish unit (I know: not supposed to happen).

In fact, production systems move weaned pigs into nurseries with the express intent of selling them within a few days because the timing or logistics/transport didn't work to sell them right off the sow farm. The same thing happens with the sales of feeder pigs out of a finishing barn rather than out of a nursery. It gets even more complicated when, say, eight sow farm sources are contributing weaned pigs to a single truck and half the truck is going to one customer, half to another. Or, yet more complicated when, say, not only are there multiple sources but there are multiple products (e.g. weaned pigs and feeder pigs) on the same truck (I know: not supposed to happen). Our first attempts at movement recording fell far short. We did a complete re-write in order to support the complexity of tracking “products”, flows, sales types, contract types, and so on and so on.

In Movements v2.0, we built in the flexibility and adaptability lacking in our first implementation. We gave users the ability to sell or move any product type, i.e. sows, boars, weaned pigs, gilts, etc. from any location, and then built error logic to check the movement integrity. Even that was fraught with danger. Example: Should you prevent the movement of a sow to a finishing barn? (Answer: No). Design breakthroughs for movement tracking included:

- the concept of user-defined product-event codes such that users can not only set up their own set of codes by product and movement-sale type but they can also specify how the product-event code should behave;
- multiple line-items on a movement event with multiple sources, multiple destinations, and multiple product-event codes;
- asynchronous source-destination linking.

Here's an example: Producer moves 1,500 pigs to a nursery.

Producer intends to sell 500 weaned pigs from that nursery within a week after moving in. Producer wants to exclude the 500 pigs sold from the calculation for the number of pigs started in the nursery. Why? It screws up that group's calculation for death loss (and other items as well). Doesn't look good on the closeout.

Producer sets up a product-event code called “weaned-pig-sale-from-nursery” and defines its behavior as “don’t count these pigs in the calculation for starting number of pigs.” Producer is happy, closeout looks good.

## ■ **Background: MetaFarms**

We founded MetaFarms in 2000 with the intent of developing new Web software applications for animal agriculture. Our intent was to create a software and database foundation that could meet the needs of multiple species – swine, beef, poultry, dairy, and aquaculture. We focused on creating a foundation that would support enterprise-level software applications. Our thinking was driven by the belief that the live production component across all animal protein businesses did not need yet another single-purpose or single-point software application. What is needed is a foundation and set of applications that “tie everything together.” The idea was to get the right foundation in place and then build out – on top of the foundation – particular applications targeted at particular species.

Since 2000, MetaFarms has grown into a business with a best-practice, world-class data center; a large investment in the underlying technology used to provide our software services – including complete virtualization of the server farms and storage area network; a robust, underlying Web-services and database foundation for our applications; Web applications for the swine, beef feedlot, and egg-layer industries; a strong, diverse, and global customer base that includes some of the largest protein businesses in the world as well as some of the smallest.

i-Production™ (Integrated Production Management)™ is our set of software applications and services for the pork industry. It is built-from-scratch, Web software for managing live hog production systems. It includes applications for managing sow farms (Sow Manager™), nursery-finishing (Finishing Manager™), and sales/carcass data (Sales Manager™) It includes modules for managing feed data along with richly-featured and robust functionality for tracking movements, flows, and “products.” i-Production™ also provides interfaces to the main feed mill software programs used in North America. Customers use these interfaces each day to download feed deliveries (diets, ingredients, and costs) and automatically link the feed to sow farms and nursery/finishing/wean-to-finish groups. Similarly, each day – using interfaces we’ve built - customers download kill sheet load (lot) summary data and individual carcass data from major pork processors and link it to their finishing/wean-to-finish groups.

One of i-Production's™ most important capabilities is its programmability. Web software providers can “expose” their application's core functionality by providing API's (application programming interfaces) for many of the underlying features and functions. You can see this today in the open programming interfaces provided by Google, Amazon, EBay, Salesforce, etc. In our case, customers and third-parties are using i-Production™ as a platform or engine for building their own applications. Programmability is one of the outstanding features of Web software applications that are built using what are called “web services.” This means that our customers can create their own applications to pull data, perform calculations, or link i-Production™ with other applications to create more powerful and proprietary “mashups.” We have customers today who have used this programmability to create proprietary sales projections applications, inventory tracking applications, and automated data transfer applications. In fact, because of the programmable nature of our software, we also have “non-customer customers” meaning customers who use our software as a back-end engine to power their own internal applications. They use our services but their employees never see the software itself. A good example would be a customer who wants to use our application to manage carcass data (download, scrub for data integrity, add value by assigning things such as chronological load number, link to finishing groups) and then – using web services — pull that data automatically into their own internal software.

## ■ Conclusion

With the correct foundation in place, which includes a robust, integrated database that maps to a production system's complete physical layout; a well-designed movement tracking system that allows for real-time inventory reporting; a solid nursery-finishing group tracking system; and a well-designed hog sales tracking system with full individual carcass detail, it is both technically and practically feasible to build accurate pig flow projection models that enable accurate cash flow projection reports.

## ■ References

Stein, T.E. Pork production information systems and data analysis: Back to the future. 2010. In Proceedings, Allen D Lemay Swine Conference 37: 4-22, 2010.