The fully connected meat supply chain

QUINTIQ

A Dassault Systèmes company

The whole is greater than the sum of its parts

The meat supply chain is long and complex, starting from farm, slaughterhouse, processing, packaging and logistics, right up to retail and catering. Sharing of data across the chain is minimal, if non-existent. Different departments work in silos. The left hand does not always know what the right hand is doing.

Over the course of helping beef, poultry and pork producers from Europe and North America solve their planning puzzles, I found they all shared a similar challenge: How to get the most value out of a carcass. To maximize value, the right quality and cuts need to be assigned to the corresponding demands. These challenges are due to lack of visibility of data and processes, a problem that stems from a disconnected supply chain.

For example, a major producer of beef, pork and lamb in North America was planning the disassembly of its livestock using multiple inputs of massive data from different sources. Its planners had no visibility of actual supply versus the potential supply that it could get based on specific meat cuts. Capacity planning was compromised and customer demands were not fulfilled efficiently.

Lack of collaboration is holding back meat processors from fulfilling their production potential and maximizing their profitability. A fully connected supply chain delivers efficiency end to end, and provides planners the decision-making support they need to help the company realize its business goals.

In this eBook, find out what a fully connected meat value chain looks like, and discover the planning capabilities you need to add value to your products as you move through the different planning stages. The right planning system supports every link in the supply chain — sales, logistics, supply chain, procurement, operations, planning, customer service and management.

I hope this eBook will equip you with the knowledge to map out your strategies that will drive your company towards achieving its business goals.

Koen Jacobs
Business Unit Director Manufacturing
EMEA and North America, Quintiq

What's inside?

01 So what does a fully connected meat supply chain look like?

It is highly efficient in producing optimal plans

Integrated planning system
Many meat producers lack cross-functional and cross-company visibility. This leads to suboptimal decisions that result in unfulfilled orders, shortage of raw materials and a stressful time for planners. Full visibility across the entire supply chain is the basis for better decisions at all stages — from production planning to transportation scheduling.

Chaos and confusion reign when different plans are used in different plants. Multiple spreadsheets, cumbersome data gathering and incomplete information make it impossible to have a single source of truth. An integrated planning platform allows planners and collaborators within the company to have full visibility of the supply chain. They are able to look at data from all angles, and compare multiple scenarios or the effects of different decisions.

Supply chain agility
To support planners in producing the best plans at all times, the planning system has to be agile to respond fast to fluctuations in demand, changes in market conditions, and supply variations.

Imagine this: if the response to a promotion goes beyond expectation, is the supply of raw materials enough to meet the spike in demand? Even if they are available, what about processing resources like machine availability and workers with the right skills? Manual planning using spreadsheets cannot produce a new plan fast enough — it would be obsolete by the time a solution is found.

Optimized plans
To generate the best possible plan for operations and business requires optimization technology to run calculations at top speed, while taking into account actual supply, changing demand, shelf life constraints, available workforce and more. Planners can easily make changes and re-optimize plans for production capacity, raw materials and logistics at every stage of the planning process — right up to the moment before execution.

> To generate savings across the supply chain, plans must be made for your business reality. A plan that doesn't take into account the unique constraints and rules of your business is of no use

Mark Reissig
Quintiq Manufacturing Consultant

It cares for customers, consumers, animals and workers

Health and safety concerns
Extra care is required to avoid contamination of different qualities of meats between the processing of different products, for example, bio-grade and free range.

Changes across the production process can affect food safety and the maintenance of different meat qualities. Meat producers with a robust supply chain are able to monitor their products' shelf lives and prolong them through different processes. For example, the limited shelf life of primals can be extended through freezing or vacuuming. Shelf life can be also reset through further processing like cooking, frying, grilling or baking.

Customer preferences
Customer requirements add another layer of complexity to generating a good plan. A low-price supermarket may be more flexible and welcome different ranges of meat while a premium supermarket is fixed on meat of a specific quality and freshness. A fully integrated planning system takes into account the complexity of various constraints to generate feasible plans.

Workforce safety
Meat producers need to comply with labor rules to ensure the safety of their workers. According to data from the US Department of Labor, meat and poultry plants consistently report higher injury rates than the manufacturing industry overall.

The single largest factor contributing to worker injuries is the speed at which the animals are processed. There are also concerns that high line speeds compromise food quality and can lead to contamination. In such a highly dangerous environment, it is critical that workers have the right skills and do not work beyond the stipulated hours to minimize the risk of accidents.

Workforce optimization enables planners to create optimal employee schedules with ease. It incorporates the company's business objectives, operational constraints and rules to assign the right people to the right tasks, at the right time. This goes right down to assigning fixed and flex labor.

Optimization can help with decisions such as deciding between assigning temporary workers to fulfill demand and putting the existing workforce on overtime. It also goes beyond workforce scheduling to offer insights that will help planners make significant improvements to key performance indicators (KPIs).

Animal welfare
More and more consumers now want to know where their meat comes from. According to 'Top Findings of the Power of Meat 2017' presented at the Annual Meat Conference 2017[1] in Dallas, USA, consumers are looking for the story of meat. Shoppers are increasingly seeking transparency into meat/poultry ingredients and production practices. This has fueled double-digit growth for organic, antibiotic/hormone-free, grass-fed and other special attributes.

> Fully integrated planning is the key to balancing profitability and responsibility. Planners and other stakeholders need to see the effects of each plan to make informed decisions

Gijs Hofman
Quintiq Manufacturing Consultant

It is fiercely competitive

According to Euromonitor International, meat producers are finding it increasingly tough to stay competitive as cheaper alternatives to meat become more available. Health, ethical and environmental concerns have put a dent on consumption and are affecting processed meat sales. Meat producers need to engage with the tastes and demands of consumers to come out on top. [2]

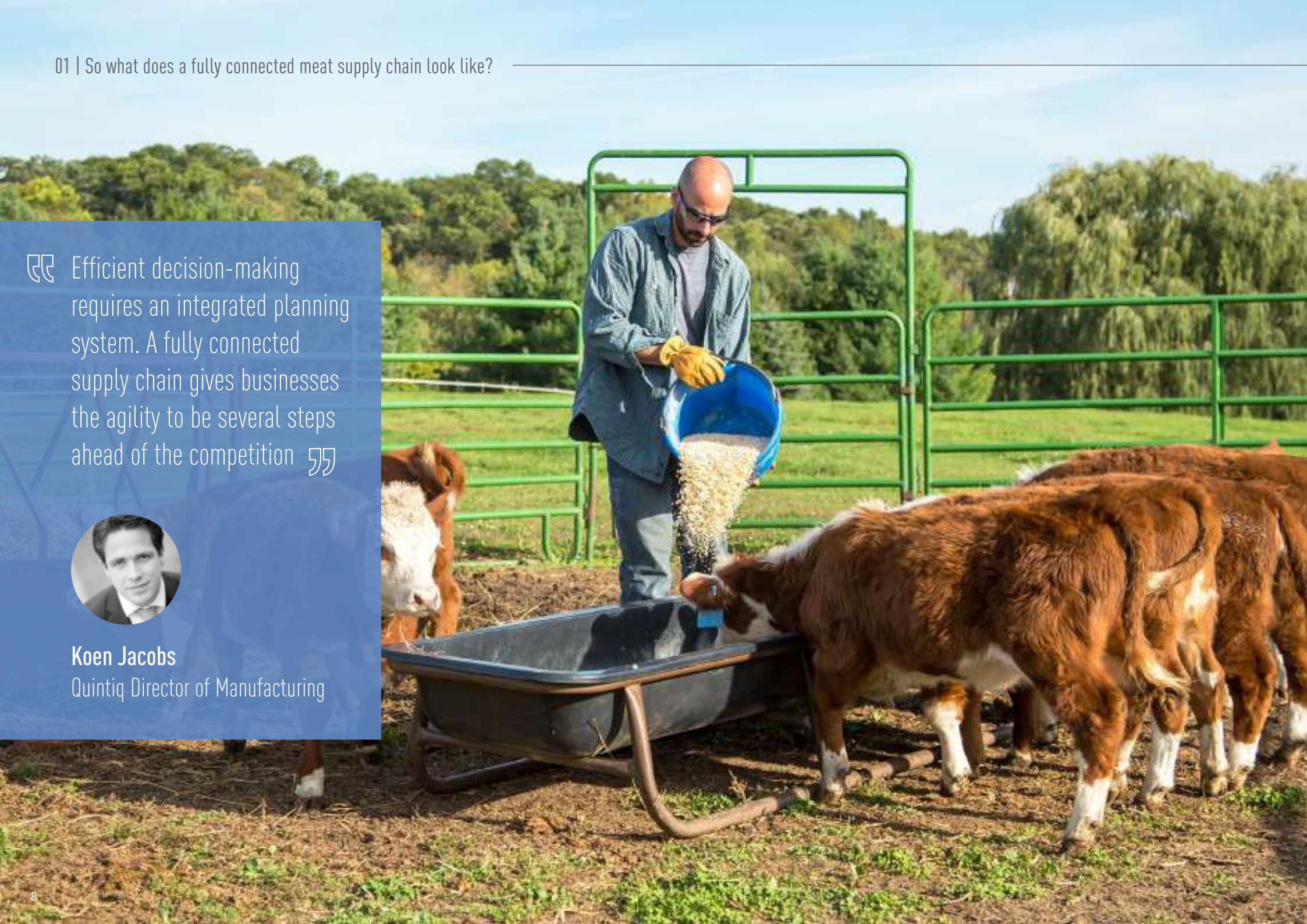
To outperform the competition, resilient meat producers are strengthening their operational flexibility to boost their responsiveness to market changes. In March 2017, McDonald's USA announced that its Quarter Pounders will be made with fresh beef instead of frozen beef. Other competitors like In-N-Out Burger already have a headstart in enticing fresh-food lovers. Meat producers who are ahead of the pack are the ones that can easily change their operational gears to meet the changing demand.

[1] Top Findings of the Power of Meat 2017 presented at Annual Meat Conference 2017
http://www.cattlenetwork.com/sites/protein/files/power-of-meat-2017-top-10-findings.pdf
[2] Global processed Meat (Part 2):
Competitive Landscape, Challenges and Opportunities, Dec 2014
http://www.euromonitor.com/global-processed-meat-part-2-competitive-landscape-challenges-and-opportunities/report

What a fully connected meat value chain looks like

These are the processes that map out actions you can take to extract value from your supply chain and improve efficiency, boost productivity and reduce wastage. In the third chapter of this eBook where we go through the planning challenges of the meat industry, you will see how the fully connected supply chain supports the planning needs of meat producers.

Demand planning	Supply planning	Inventory optimization	Master production scheduling (MPS)	Distribution requirements planning (DRP)	Material requirements planning (MRP)	Order management	Detailed scheduling	Predictive analytics
• Collaborative forecast • Sales forecast • Statistical forecast • Promotion management • Price elasticity • Causal relationship • Continuous improvement of forecast accuracy • Order promising	• Optimal product mix • Long-term livestock needs • Demand and supply balancing • What-if scenarios simulations	• Replenishment strategies • Stock targets • Manage variability by defining buffers	• Operational planning to meet SLAs and stock targets • Finite capacity planning • Forecast consumption • Manage surpluses and deficits • Define labor capacity	• Inbound and outbound distribution needs • Define intra-company distribution • Replenishment lead-time	• Material replenishment • Plan critical materials	• Demand sensing by point-of-sale data	• Optimal sequencing of operations proposed by MPS • Adhere to health and safety rules • Process last-minute order changes • Manage delivery cut-off times • Balance labor allocation • Optimize loads, and plan docks and ramps	• Predict material specification • Continuously improve master data parameters • Predict maintenance intervals • Price optimization



> Efficient decision-making requires an integrated planning system. A fully connected supply chain gives businesses the agility to be several steps ahead of the competition

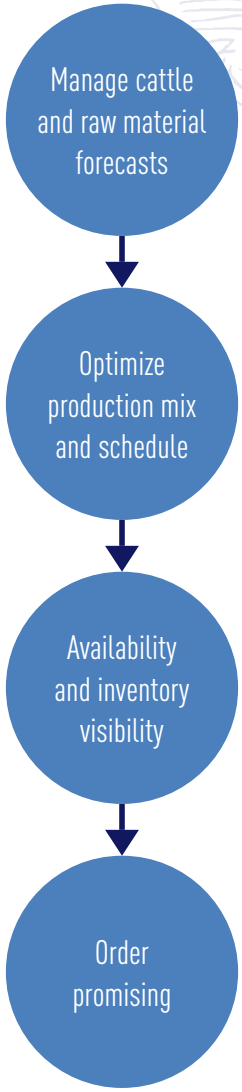
Koen Jacobs
Quintiq Director of Manufacturing

02 End-to-end strategies to maximize the value of your supply chain

The meat sector is a low-margin, high-volume industry. When mistakes happen, they are very expensive and can easily push businesses into a loss-making position. Add to that economic pressures, the changing retail structure where a smaller number of retailers command a larger market share, and the array of customer demands that call for meat to be treated as fast-moving consumer goods rather than a commodity.

It's no longer about raw meat by weight or cut. It's about different brands, ranges (premium, standard or budget) and packaging. All these call for clearly defined planning stages to move the process from preparing resources to delivering according to the service level agreements (SLAs):

Manage stock animals and raw material projection
Production planning for meat starts with the number of heads to be processed per shift. This drives everything else in the system. Centralization of data allows everyone in the supply chain to look at the same information and use the same numbers. The incoming cattle flow is broken down by cattle type, sales program and meat grade. In a fully push flow process, whatever comes in will have to be processed. The system validates the numbers to ensure accurate projections and alerts planners if the numbers do not add up — for instance, slaughter does not equal what is needed.



Optimize product mix and schedule
Once the raw material projection is ready, the next step is deciding what to produce with it. At this planning stage, the question is how the raw material forecast fits into specific cuts broken down by brand and grade. The system takes into account the order commitment and assigns the required number of pieces or weight to fulfill production for a particular stock-keeping unit.

If there is excess supply of raw material that could not be sold to customers, it is channeled to trade to avoid wastage and minimize loss as traders readily accept meat in bulk with shorter shelf life.

Availability and inventory visibility
The customer service team needs to know what is available — total supply, total demand, by plant and by finished products — to make sure that inventory is moved out quickly. This will prevent situations where products have to be sold on the less profitable secondary market. Customer service knows what can be promised to customers because they have visibility of product and inventory. When a customer call comes in, customer service is able to quickly tell the customer if the demand can be met on the date requested.

Visibility of aged inventory is drilled deeper to reveal aged and non-aged inventory. This will help push out products based on remaining shelf life or on a first in, first out basis. Availability can also be transferred from one warehouse to another.

Order promising

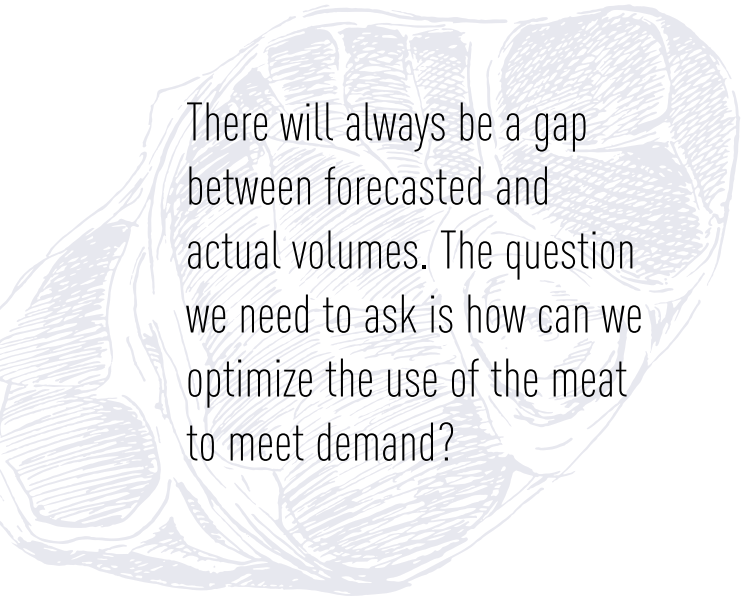
Raw material projection and the production plan offer visibility of what is available to meet orders. The promise takes into account all constraints such as product age, production limits and shipping limits.

There are multiple possibilities of what can be produced. For example, back ribs are obtained when the prime rib is removed from its bones. One cannot get back ribs when the prime rib is cut differently.

Until those ribs are sold, both options need to be shown to be available for sale. The availability goes to whoever manages to sell the ribs first, and the plan is immediately updated in real time to reflect the impact on production and shipping limits.

03 Challenges in the meat industry and how to overcome them

Underlining the various challenges are a disconnected supply chain and lack of supply chain visibility. When a supply chain is fully connected, information is easily shared with all stakeholders. Everyone is aware of the demand and the resources available. Conflicting key performing indicators (KPIs) are balanced with optimization so that the company's business goals are met as a whole. Every department is on the same page, with the same end goal in sight.



There will always be a gap between forecasted and actual volumes. The question we need to ask is how can we optimize the use of the meat to meet demand?

The disassembly planning challenge

How to satisfy expected sales and keep customers happy

Meat production is filled with many uncertainties. How to have the right product in the right place, at the right time to meet the sales requirements? What are the constraints? What products to make? What to get from suppliers?

Not knowing what to expect from demand makes it tough to come up with an accurate disassembly plan. Volatility in demand is dictated by retailers, large promotions, and last-minute orders and quantity revisions.

Livestock disassembly is a calculation-intensive process. It requires an advanced planning system that allows you to work on different animal types, product types, cuts and plant locations to determine optimal cut paths. Disassembly planning is further complicated because no two animals are alike. Each differs in size and weight.

Maximizing profitability in a low-margin, high-volume industry

Every penny you can squeeze out of each carcass will contribute to your profit margin. The numerous cutting options that can be applied to a carcass to fulfill demand calls for planners to choose the most optimal plan.

Advanced analytics take the guesswork out of predicting the different cuts, quality and volume. Create accurate production plans that prevent product surpluses and deficits that will have a negative impact on profit margins.

Full visibility of your supply chain allows your planners to see actual supply versus potential supply based on specified cuts and match them up accordingly, from ribs down to the complexity of optimal planning for steak cuts, beef cubes and ground beef with different percentages of fat content that maximizes carcass utilization in meeting all orders so that wastage is minimized.

Managing shelf life constraints for multiple meat sources and products

To get the maximum value from carcasses, you should aim to deliver meat to end customers with enough shelf life to avoid rejections that would lead to wastage. An integrated planning system provides your planners with the shelf life knowledge that allows them to effectively manage your products' lifespans. For example, they can decide whether to freeze a product to extend its shelf life, or sell it off at a lower price to free up storage space.

Planning complexity here comes from the different temperatures required for different products. The combination of different temperatures and storage durations affect shelf life. Carcasses kept at -18°C (-0.4°F) can last six months, but may be extended to 15 months when kept at -30°C (-22°F). Yet another layer of complexity is added to the mix when products are made from various meat sources.

The processing challenge

How to fulfill demand no matter what
The meat industry needs to manage different horizons to meet customer orders. In beef production for example, it starts as early as 18 to 28 months ahead — the time it takes to bring a cow to maturity. Accurate forecasting is needed to negotiate supply with farmers.

However, the reality is the demand signals have very short notice. The 24-month plan changes at the operational weekly level when store promotions are planned. Even if there are no promotions, there are events to consider, like football matches, and good weather that coincides with bank holidays. These tend to cause a spike in demand for barbecue meat.

Planning becomes more complex at the store level where most consumers make purchase decisions on a whim on the day of shopping. Different locations would also have different demand patterns. For example, a store in the city would have shoppers picking up a few things along the way versus a store in the suburbs where customers tend to do their weekly shopping.

Ebbs and flows affect the shape of demand. Shoppers may splurge on premium cuts at the start of the month after salary is paid, and save with cheaper cuts or budget quality towards the end of the month.

At the weekly level, shoppers may buy steaks and minced meat earlier in the week; and stock up on roast cuts for the Sunday roast.

Your planning system should have the capability to analyze actual historical sales. This will give you some guidance on the likely shape within a month or week, to help you cater to the retailer's demand to stock shelves and build promotional details. It should drill down to packaging level, answering questions such as what to pack and the volume to pack to sell at the highest profitable price, and avoid downgrading meat (for example, cutting prime cuts into cheaper alternatives).

The low-margin, high-volume nature of the industry, and strict service level agreements (SLAs) that come with penalties and bonuses, greatly affect margins. affect margins. This requires solid decision support to produce the best possible production plans based on real-time product availability. Supply and demand forecasts provide information for disassembly and processing to deliver the exact product mix.

Planning production lines and workforce to deliver according to customer requirements
Although many parts of the processes in meat production are automated, it is still a labor intensive business as skilled butchers are needed for slaughtering and deboning. Workforce planning also needs to cover technical teams, maintenance, cleaning, packing and internal logistics

A planning system with optimization capability supports your planners in creating optimal worker schedules that respect business objectives, operational constraints and worker agreements. Your planners will be able to:

- Match employee skills to individual tasks
- Plan shifts that conform to business rules and constraints, while avoiding double assignments or overbooking
- Plan for flex labor or overtime to fulfill orders
- Clearly see the impact of decisions across the entire workforce and reschedule tasks quickly when disruptions arise

A best-in-class planning system goes one step further to show how to solve shortages and where the animal parts will come from

The disconnect and siloed approach in supply chain planning

A single source of truth

Planning is a two-way street. To create plans for each process in the supply chain, your planning team needs data such as demand forecasts, raw material supply, processing capacity, freezer space availability and stock outflow. Lack of information results in poor plans that causes bottlenecks in processing, warehousing and shelf-life planning.

Planning using one system brings demand, supply and inventory planning onto a single platform, which offers visibility across your supply chain. Your planners will have the answers to questions such as:

- What to produce to fulfill SLAs?
- How much to keep?
- How much buffer to produce for?

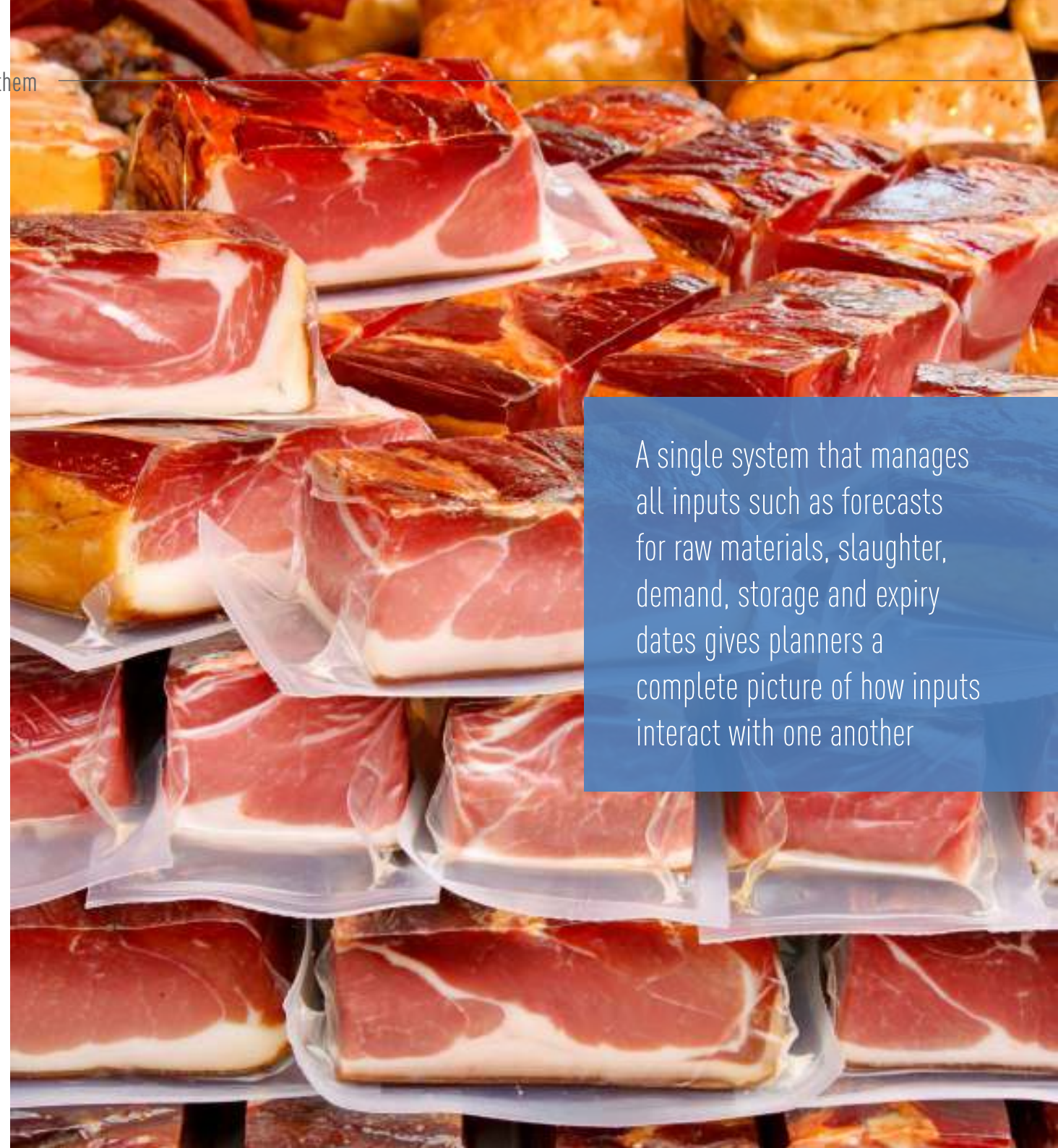
Without visibility, your customer service team will not be able to make promises to customers with confidence. They cannot give an immediate answer to a customer who wants to know what is available and when it can be delivered. When promises are made but orders are unfulfilled, customer confidence plummets.

An integrated planning system gives your planning team access to information and visibility of your company's entire operations.

In a complex operational environment, the range of products can run into the thousands — with multiple conversions, grades, product ages and other crucial quality factors. The different customers requiring special branding and promotion-specific packaging and labelling multiply the massive amounts of data.

A planning team supported by the right planning system will be able to adjust stock targets to exploit opportunities and minimize the effects of disruptions. They know precisely how and when to let the facility 'breathe in' (increase stock targets) and 'breathe out' (reduce stock targets). When a major outage occurs, they can confidently rebalance stock priorities to protect delivery performance.

When demand exceeds forecast, your planning team will know when to build up stock without affecting overall delivery performance. They can make intelligent adjustments to stock targets on a daily basis.



A single system that manages all inputs such as forecasts for raw materials, slaughter, demand, storage and expiry dates gives planners a complete picture of how inputs interact with one another

Real-time information
A fully integrated planning system that processes fast-changing data allows your sales team to confirm if an order can be fulfilled and reserve the necessary materials. They will have:

- Instant visibility into the perpetual inventory
- Precise access to the alternative cut path's potential inventory
- Optimized production plans for higher margins

Knowing exactly what is available at any time and at all levels gives your sales team a more accurate picture of what can be sold and delivered. Shortages can also be spotted and addressed. Your planners will be able to:

- Determine availability to promise (ATP) and capability to promise (CTP) quantities in real time
- Link order acceptance to the production schedule

Better agility to respond to the market and disruptions
The disconnect between disassembly and processing is a barrier to creating strategic plans. Without critical information, managers cannot price for profit, address product shortages, create value plans, ensure optimal production and set feasible targets. This reduces your company's agility in responding to market changes and disruptions in supply, demand and production.

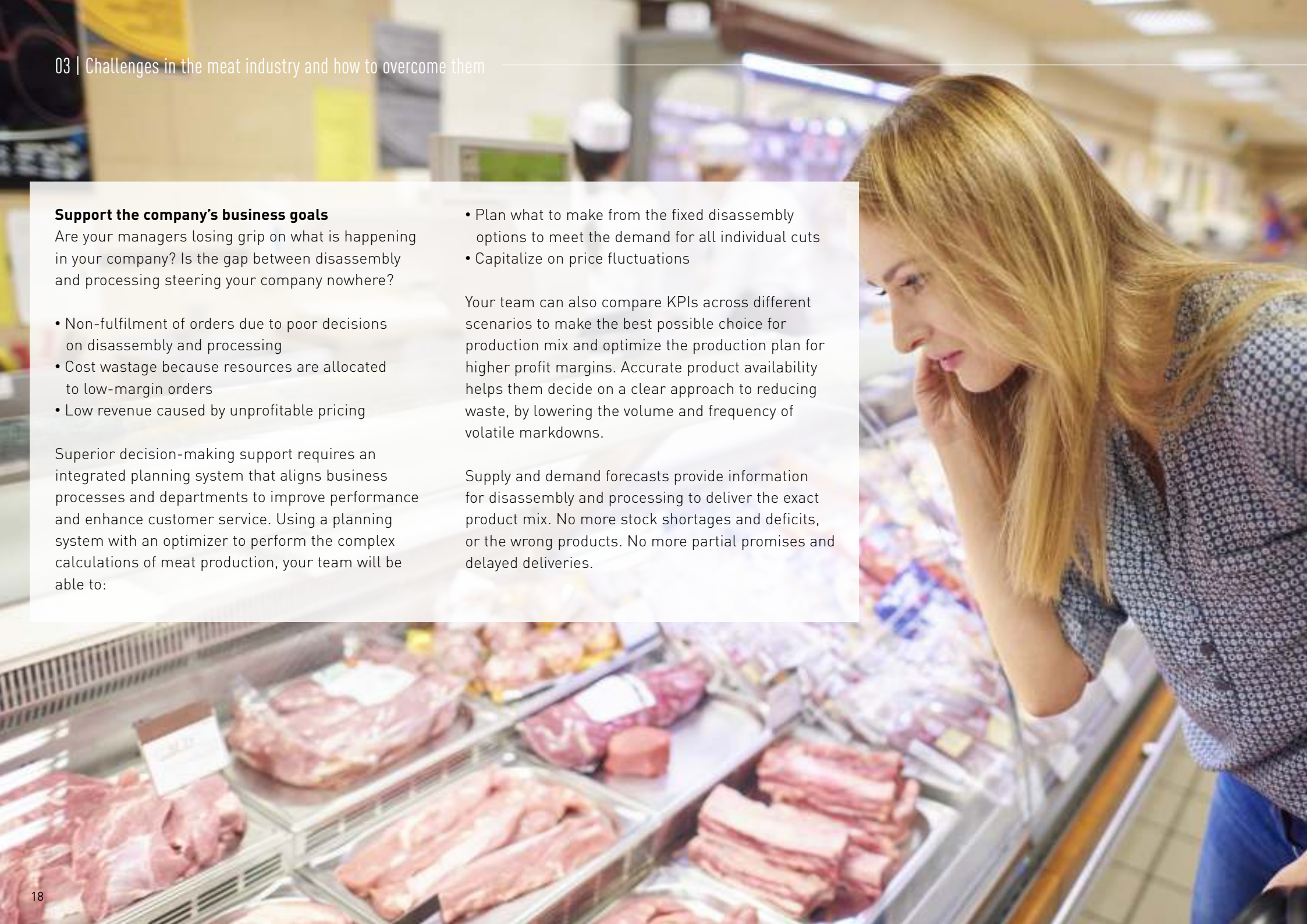
Many companies have plenty of data scattered across various systems. To put a finger on the pulse of your company's operations, you need an integrated planning system that supports decision-making all the way from production plant to boardroom level.

The key to building an agile supply chain is to have the right information at the fingertips. Just as important is the ability to immediately calculate and understand the impact of events across your entire supply chain. Minimize the side-effects of disruptions by continuously optimizing and re-planning schedules, while keeping an eye on the end goal.

With the right system, your managers can quickly respond to changing market conditions and customer orders, and even unpredictable consumer preferences. Creating what-if scenarios helps them find the right mix that will boost profits and other relevant business KPIs.

In today's business environment where things can change at a moment's notice and customers expect faster turnarounds, planning agility gives your company a clear advantage over the competition. Offer high service levels while keeping inventory levels low. Sell the right products at the right prices, at the right time, always.

Real-time information on prices and costs allows your team of managers to determine the best possible product mix and its sale to capitalize on price fluctuations



Support the company's business goals
Are your managers losing grip on what is happening in your company? Is the gap between disassembly and processing steering your company nowhere?

- Non-fulfilment of orders due to poor decisions on disassembly and processing
- Cost wastage because resources are allocated to low-margin orders
- Low revenue caused by unprofitable pricing

Superior decision-making support requires an integrated planning system that aligns business processes and departments to improve performance and enhance customer service. Using a planning system with an optimizer to perform the complex calculations of meat production, your team will be able to:

- Plan what to make from the fixed disassembly options to meet the demand for all individual cuts
- Capitalize on price fluctuations

Your team can also compare KPIs across different scenarios to make the best possible choice for production mix and optimize the production plan for higher profit margins. Accurate product availability helps them decide on a clear approach to reducing waste, by lowering the volume and frequency of volatile markdowns.

Supply and demand forecasts provide information for disassembly and processing to deliver the exact product mix. No more stock shortages and deficits, or the wrong products. No more partial promises and delayed deliveries.

04 How a leading meat producer is using the fully connected supply chain to solve its planning puzzles

Quintiq offers end-to-end visibility of real-time and accurate information to balance supply and demand. We've helped some of the world's top meat producers improve their operational efficiency to increase the speed of order acceptance, manage material constraints, and meet customer and consumer preferences. Quintiq's fully integrated solution with optimization and advanced analytics technology offers businesses the flexibility and power to handle all stages of the supply chain — from production planning to transportation scheduling.

Here's the story of one such producer in North America:

Size	Nine beef plants with a daily processing capacity of 27,000 heads
	Three pork plants with a daily processing capacity of 51,000 heads
Planning puzzle	Meat disassembly

This meat producer was struggling with a scheduling system that met the basic requirements but did not provide true optimization. The system could not handle the complexity of disassembly planning for a multitude of brands, conversions, grades, product ages and other variables. It was unable to come up with a standardized order placement process or accurate order delivery as it could not predict the availability and quantity of every stock-keeping unit in every location.

How Quintiq solved the planning puzzle:

Real-time visibility of the disassembly process
Quintiq's scheduling solution integrated seamlessly with the company's existing systems architecture and kept track of thousands of stock-keeping units and millions of records. It showed a complete picture of how all the inputs interact with each other. Planners now have end-to-end visibility of the current operational reality and full control to change the outcomes.

Real-time access to product availability
By comparing KPIs across different scenarios, planners are able to make the best possible decisions on production mix. Order confirmation is sped up and the order placement process is standardized. This meat producer can now guarantee ATP and CTP to its customers.

The meat producer's challenge	The Quintiq solution
Planning using spreadsheets and multiple inputs of siloed data	Cattle and raw material forecasting
Difficulty in managing constraints due to cut hierarchy, different units of measurement (pieces vs weight), production limit and forecasting for outlying warehouses	Optimized product mix schedule
Maximizing order fulfilment and adhering to constraints while retaining scheduler control and flexibility	Visibility of availability and inventory
Sales could not confirm if they could accept orders	Order promising

Don't let your planning puzzles and supply chain complexity eat you up. End-to-end visibility gives you full control of your supply chain. Take the first step towards improved decision-making, robust growth and higher revenue — **contact us** today.

Want to know more?
Join our webinar,
Meeting the challenge of complexity in the protein supply chain
here at Quintiq.com

Offices: quintiq.com/locations
Email: info@quintiq.com | **Web:** quintiq.com