Number 1

# FOCUS on Innovative technologies

## Simplifying the development of plant-based products

**Many examples from national and international markets show the economic potential of plant-based alternatives. At the Plant Based World Trade Fair in New York in December, it became clear that plant-based foods are firmly established as their own segmented market, with continued growth.**

To enable conventional food producers to also benefit from the demand, the Ahrensburg-based company Planteneers has developed the Plantbaser – a digital configurator that greatly simplifies product development.

Hermann W. is trained as a butcher, and works as product manager for a medium size meat producer. His company previously sold only conventional meat and sausage products, but is looking to expand the portfolio. Going forward they want to appeal to additional target groups with plant-based alternatives, and open up new sales channels.

They intend to enter the market with a plant-based burger patty, and have studied the competition and its product offerings. Basically, product development is the next step.

Hermann has already defined some parameters with his team: The vegan burger needs to fit in with the health megatrend – that means not containing any allergens, not much salt or sugar, and ideally no E-numbers.

In theory, the product is ready, but in practice, the company does not have the help of an R&D department. This is where the Plantbaser comes in.

### Product development in the office

Instead of in a laboratory or a test kitchen, Hermann starts product development on the laptop in his office. The configurator guides him through all the relevant criteria. He already knows what kind of product he plans to make, and ticks the boxes for his existing equipment – cutter, mixer, mincer, former. Then comes the choice of protein source. Hermann decides on pea protein.

At the same time, he does not want any nuts, gluten, soy or palm in the formulation. Then comes the definition of the specific product characteristics. He selects the animal version as the benchmark: a beef burger patty. Based on this, he uses the controls to adjust the patty's properties, guided by numerous photos and videos.

Dr Dorotea Pein, Director Product Management at Planteneers, explains: "For this visualisation we made countless products and videos. The quality of the content was a central requirement. After all, the configurator has to represent to the customer visually how the product tastes and what the mouthfeel is.

"Videos and photos were the way to achieve this goal – each formulation was made, measured, taste-tested by a panel of experts, and then filmed and photographed. We did this for over 200 burger patty variants alone. For each product category, the Planteneers R&D team precisely defined the properties that are important to customers.

"Based on their decades of experience in direct dialogue with customers around the world, they know what companies are looking for in product development. The team measured and scaled these properties, and captured them visually."

### A final product in 16 minutes

Customers can immediately see the texture changes onscreen as they increase or reduce the fat or protein content. In Hermann's opinion the colour is already just right, but he wants more visible fat spots. A click, and it is done. The fat spots are now clearly visible. But the patty should also look a bit juicier. This too is resolved with a click. Hermann uses photos to choose the desired characteristics.

The soft texture after grilling, which he can see very well in the video, stays. In the next step, he sets the salt content for the right flavour. By means of the spider diagram he can easily see that his plant-based patty contains less salt than the reference meat product, and so meets the development criteria. He adds the intense BBQ flavour of the original to his plant-based alternative. Finally, he dials in a savoury, meaty note, and his individual burger patty is ready for a sample order, in just 16 minutes.

Now the Planteneers experts get to work. They make samples of the desired burger patties and send them to the customer. After 10 days Hermann has four sample sets on his desk. He tries the first patty himself and likes it. The team taste-tests the remaining three patties. They determine that the product does not hit the mark 100%.

So the stored configuration is modified for the parameters that were not yet quite right. The team focuses specifically on these criteria and a second sample set is ordered. It meets requirements, and Hermann contacts Planteneers via the Plantbaser. The Planteneers representative for his region discusses with him the next steps towards large-scale trials and order placement.

### Taste-testing after two weeks

As a rule, the individually developed product sample is ready to test about two weeks after ordering, either as a product ready for tasting, or as a powder customers can process themselves. The ready-to-eat version comes as a set of four individual products; up to three sets can be requested per order. The same goes for powders, which are available in three different grammages. In addition to material and personnel costs, there are expenses for refrigerated shipping, so samples are not free of charge.

Immediately upon ordering a product sample, the customer also gets the ingredients list and specifications, plus step-by-step preparation instructions and exact information on the equipment needed, by download to a personalised customer account.

Companies can also check the status of product sample orders in this account. The product details are likewise stored there. "Ideally, the sample meets all expectations. In that case, the customer can order the respective compounds directly from Sales," explains Dr Pein. "If the flavour or texture are not quite there yet, the customer can try a new configuration, or simply get in touch with us at Planteneers."

### High interest in meat alternatives

Just a month after launch, over 2,000 visitors had already tested the Plantbaser. The particularly lively interest in meat alternatives shows that there is still high growth potential in the market. Medium-size meat product manufacturers in particular stand to benefit from the Plantbaser, since this tool eliminates the need for dedicated plant-based expertise or an own R&D department for new product development.

"Digital product development saves customers a huge amount of time. With the Plantbaser, the many coordination processes can be reduced to the minimum necessary, and companies can get their new products ready for market much more quickly and efficiently," notes Dr Pein. "With the aid of the configurator they can give their ideas tangible form. At the same time, it greatly simplifies the process of developing innovations."

### Ongoing expansion

Currently customers can create their own plant-based alternatives to burger patties and cold cuts. Planteneers is adding sausages to the line-up, and will successively build out other categories. Specialities like feta will be added to the existing plant-based alternatives to cheese and yogurt. In the deli foods category, mayonnaise is already offered and other products will be configurable soon.

The goal is to cover the entire Planteneers portfolio in the Plantbaser in 2022. ■

www.planteneers.com

Number 2

# FOCUS on Innovative technologies

## Unique high-speed automation of the cut-up process

**Chicken wings, legs and breast are incredibly popular pieces and a highly wanted sight on the world's dinner tables. Cut-up chicken parts are often found in quick service restaurants too, such as the famous buckets. To keep up with the high demand, high-speed automated cut-up lines are needed to produce the required amounts of all kinds of chicken parts.**

Marel offers processors an automatic modular in-line cut-up system capable of handling up to 7,200 broilers per hour. The ACM-NT system will handle both air and water chilled products. At this moment the system is in successful everyday operation with processors around the world, from USA to China and from Australia to Poland.

### Labour issues

Cut-up and deboning departments need a large amount of skilled staff if they are not automated. Marel offers plenty of options for turning these processes into in-line automatic operations without losing yield or compromising product quality or presentation. Marel's ACM-NT cut-up system is an excellent solution to cutting all the products required. Thanks to its modular configuration using wing, leg and breast cutting modules, the system performs skilled cuts, which could be only done manually before.

Automation of the cut-up department does not mean that labour will disappear from the processing plant altogether. Job functions are, however, shifting away from real physical contact with meat and from heavy labour towards inspection and checking.

Furthermore, equipment will always need proper maintenance and service. Manpower will be needed on a daily basis to keep all machines running at optimum efficiency.

### Typical cuts

Marel's ACM-NT is fully modular. If and when processing requirements change, modules can be moved or added. The system will cut carcases into wing, front half and whole anatomic leg portions. If required, wings can be cut into separate inner and middle joint portions. In some markets wings are cut with back meat, breast meat or both attached. ACM-NT's wing cutter can be set to give these options too.

Depending on the filleting method afterwards, processors can choose to integrate a Breast Cap Cutter or a Front Half Cutter in the system. Cut breast caps are filleted in Marel's AMF-i intelligent breast filleting system. Front halves can supply an FHF-XB system filleting system.

### Butcher quality

Users are particularly impressed by the high quality of the legs cut by the system; yield and presentation are as good as when legs are butchered manually. The secret of the ACM-NT's JL anatomic leg module is that it 'pulls' rather than cuts legs from the back half. Legs retain their natural shape and there is no damage to the hip bone.

Roy Driessen, Industry Marketing Manager Poultry at Marel, has a few words to say on the wide variety of ACM cutting modules available. "I am not exaggerating when I say that we can do automatically virtually every wing, front half and leg cut required by processors worldwide. In this we have benefited from being a truly global organisation. Each part of the world has its own specialties, for which we developed automatic solutions."

### Intelligence in high-speed cut-up lines

High speed cut-up lines make increasing use of intelligence to ensure consistent top quality and consistent top yields. Super-accurate, up-to-the-minute in-line weighing and vision systems provide the necessary input data, which is then processed by Marel Innova PDS software.

Innova PDS can determine exactly how each carcase is to be cut, also which products to release for sale whole. Quite simply, Innova PDS enables processors to match incoming carcases in the most profitable way possible to incoming orders for whole and cut product.

### Software

Roy quotes two further examples of intelligence: "Combined rate limiting and floating-point control work with data from in-line weighing systems. Products from two or more Marel ACM cut-up systems are distributed over multiple front half or breast cap deboning systems.

"The combined rate limiting software ensures that these downstream operations can choose their batch from all combined products out of multiple ACM-NT lines. Floating-point control optimally distributes heavy and light products to deboning lines for a fixed throughput. Production managers will therefore be able to set their deboning systems more precisely, while using available products. Yield, product quality and productivity will all benefit."

### Q-Wing automation

With its unique new Q-Wing system, Marel brings welcome automation to wing handling. The system ensures supremely accurate and reliable grading to a totally objective and consistent standard. It also saves skilled labour and provides an excellent logistical solution for packing and reworking wing products.

Q-Wing consists of IRIS vision systems controlled by dedicated Q-Wing software, the necessary conveyor systems for keeping automatically graded wing parts separate, bulk packing stations and a rework area for the possible upgrade of product downgraded by the system.

Q-Wing requires separate cutting modules for 'A' and 'B' quality wing portions and will handle all wing products whether whole wings or individual wing joints cut from up to 15,000bph.

Roy continues: "With Q-Wing in place, processors can truly unlock their wing potential. They can now make the very best use of each and every wing or wing joint."

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***With Q-Wing in place, processors can make the very best use of each and every wing or wing joint. ACM-NT's JL anatomic leg module 'pulls' rather than cuts legs from the back half so legs retain their natural shape.***



***Marel's ACM-NT enables processors to match incoming carcases in the most profitable way possible to incoming orders. Virtually every wing, front half and leg cut required by processors worldwide can be done automatically.***

*Continued from page 19*

## Speeding things up

The first modular automatic cut-up systems began to appear some 40 years ago. The Stork ACM-2000 launched in the early 1980s could handle up to 2,000 carcases per hour; today's ACM-NT systems can handle 7,200 carcases per hour. Systems were usually fed manually by a single operative.

Over the years development work focused on improving carrier design and cutting techniques and on making the systems faster and more flexible.

Today, Marel's ACM-NT system is all about faster line speeds. Roy elaborates: "Our customers are under continuous pressure from their customers to deliver quality product more cheaply and faster. We have to help them by delivering equipment which delivers top quality and top yields at the highest level of productivity and the lowest possible cost of ownership. Things can always be better and this is what drives us."

Roy sounds a note of caution: "It could sound as though our ACM systems are only for sophisticated high-volume plants handling different cuts for a range of retail and fast food customers. This is not true. Our ACM-NT Compact has been designed for lower volume plants, which have limited space, want to do basic cuts and have no need for intelligence. It offers these plants exactly the same high standard of cutting as our standard ACM systems."

## Carcase balance

When talking sustainability, carcase balance is a crucial concept. Quite simply, this means making the most profitable use of every component of the carcase.

In some markets some components are more valuable than others. The US has traditionally been a breast meat market, the Far East a leg meat market. Things are, however, changing. In the US, for example, leg meat is becoming ever more popular.

At Marel, the task is to make leg meat production more attractive, helping to achieve a better carcase balance.

"This was the driving force behind the development of our high-speed, in-line Thigh Fillet System," Roy continues. "This system, installed as part of an ACM-NT cut-up installation, gives butcher quality thigh meat deboned automatically at ACM-NT throughput levels with hardly any human labour needed. In-line automatic deboning of drumsticks is also possible in the ACM-NT line, creating a total leg deboning functionality. Users are delighted."

Roy concludes: "We have to anticipate changes in the market for cut product and develop the right solutions in good time. This is an ongoing challenge and keeps us on our toes." ■

www.marel.com

Number 2

# FOCUS on Innovative technologies

## Providing a transparent solution for pork producers

One of New Zealand's leading pork processors is benefiting from an integrated Enterprise Resource Planning (ERP) system devised and installed by food and drink IT specialist CSB-System. Freshpork, established in 1985, processes around 4,000 pigs each week from its six locations across the country.

The company's continued growth had led it to move away from manual and paper-based processes to computerised systems, but these were initially individual niche solutions.

This meant there was still a lot of work required to keep the various systems in sync, with much double entering of data. There was also a significant reconciliation effort required to run the business on a daily basis.

### Data reconciliation

"Data reconciliation with its time-consuming, error-prone issues was our biggest bugbear," Odhran McCloskey, Freshpork's IT Manager, told International Food & Meat Topics.

"We also had poor visibility of stock levels across our business, and stocktaking exercises always highlighted the degree of error inherent in it."

With CSB-System these isolated systems have now been replaced with an integrated solution with uniform data for all operations, based on streamlined production processes that have been fundamentally optimised.

One of the major benefits of the new software is its ability to link abattoir, cutting floors, packing, dispatch and distribution, sales and finance.

"CSB was the solution that scored well across all the areas we needed to cover," said Odhran.

"Another important factor was that the CSB people we interacted with during our assessment understood our industry and terminology.

While some other software suppliers could 'talk the talk', we really felt that CSB genuinely understood the pork business and the role that an ERP could play in the sector."

A further advantage of the CSB solution is that it is not only the IT department which is reaping the benefits of the system.

### Optimised production plans

All employees have now gained the transparency they need to optimise production plans and operations.

They are able to see the flow of their products in real time going through the system, from carcase to manufactured products to finished goods and shipments, with all financial impacts on these products and the supply chain. Having a single system means there is no reconciliation required in the background. In addition, the stock on hand can now be verified at any given time, including visibility of the production process and relevant reports on daily operations.

"One of the main goals for this implementation was to have a single flow of goods in a centralised system, while covering all our industry-specific and customer requirements and we did achieve it."

While Freshpork processes approximately one third of New Zealand's pork for stores across the country, competition remains tough.

"We are under pressure both from the industry and the markets.

We have to focus not just on our core business but also consider how we can add value," said Odhran. "Therefore, we will shortly take a look at our cutting floor to improve our bills of materials, coverage planning, production and yields.

"Recipe management is something CSB is particularly good at and again we can see ourselves making more use of this.

In other words, CSB is our world for anyone sitting in front of a computer or moving products around," he concluded. ■

www.csb.com

Number 3

# FOCUS on Innovative technologies

## Direct steam technology expands production capacity

**A leading Israeli dairy producer has expanded its production capacity for plant-based drinks with the installation of an HRS DSI Series pasteuriser as part of a new production facility to process raw ingredients. Before this the company had to import part-processed products from an associated facility in Europe.**

The client is one of the largest dairy and food companies in Israel and having previously brought in plant-based drinks in bulk from an associated European company for bottling, in 2021 they invested in a new production line to allow them to process raw materials (such as oats, soybeans, coconut and hazelnut) in-house as part of an expansion of their dairy alternatives business.

Consequently, the new production facility includes many elements including grinding, extraction and bulk supply for bottling elsewhere.

### Direct Steam Injection

The HRS DSI (Direct Steam Injection) forms part of a complete UHT (ultra-heat treatment) system supplied by HRS for integration into the new production facility.

One of the challenges was the space available for the UHT portion of the production facility. HRS was able to design a complete, cost-competitive heat treatment solution based around the HRS DSI and other heating and cooling technologies which was skid-mounted to facilitate installation and commissioning in the available space.

Direct steam injection provides a number of advantages over traditional UHT systems based on heat exchangers, particularly when it comes to the viscous nature of plant-based 'milk' drinks.

The biggest advantage is in terms of speed, with direct injection taking a fraction of the time to heat (and then cool) the product compared to other methods of pasteurisation such as indirect heating using heat exchangers. This matters as the faster the product is heated and cooled, the less impact the heat has on the product – in the case of plant-based drinks this can include discolouration, caramelisation and the introduction of off-tastes.

**An HRS MI Series heat exchanger is used to cool the processed material after direct steam injection.**


**The UHT system supplied by HRS includes Direct Steam Injection (DSI) and a MI Series heat exchanger.**

"With direct steam injection you get a sudden and immediate increase in temperature," Francisco Hernández Ortiz, food business development director at HRS Heat Exchangers, told International Food & Meat Topics.

"We have standard pre-heating phase using an HRS MI Series heat exchanger which takes the product to 80°C, and we then inject the steam which immediately increases the product temperature to 140°C. A flash cooler is then used to return the product to 80°C within a few seconds, so the heat has time to pasteurise the product, but other heat effects, such as caramelisation, do not have time to occur." After this, chilled water and a glycol solution are used to cool the product to the final temperature of 4°C.

A second major advantage of using steam injection rather than traditional heat exchanger technology is that it avoids issues with fouling of the heat exchanger, which can be a problem with the viscous nature of some plant-based drink products.

"As there is no heat exchanger, there is no surface and so there is no fouling," Francisco continued. The HRS equipment was delivered in early September 2021, although delays with other parts of the line meant that it was not installed immediately.

HRS pre-commissioned the unit on site from late November, but before final commissioning using actual product could take place, a covid outbreak closed the Israeli border to all travellers.

"The way the HRS DSI Series and associated equipment is designed meant that we could undertake the necessary commissioning work remotely, so that the unit was operational by January 2022," explained Francisco. "I then visited in person in March to carry out a few final pieces of commissioning and since then the unit has been running without any issues." ■

**Direct steam injection provides a number of advantages over traditional UHT systems.**

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