INTERNATIONAL 38 / 2021

MEATINGPOINT magazine

SUSTAINABLE TECHNOLOGY, PROCESSING & PACKAGING

MEAT SUBSTITUTE PRODUCTS - HYPE, TREND OR THE FUTURE MARKET?

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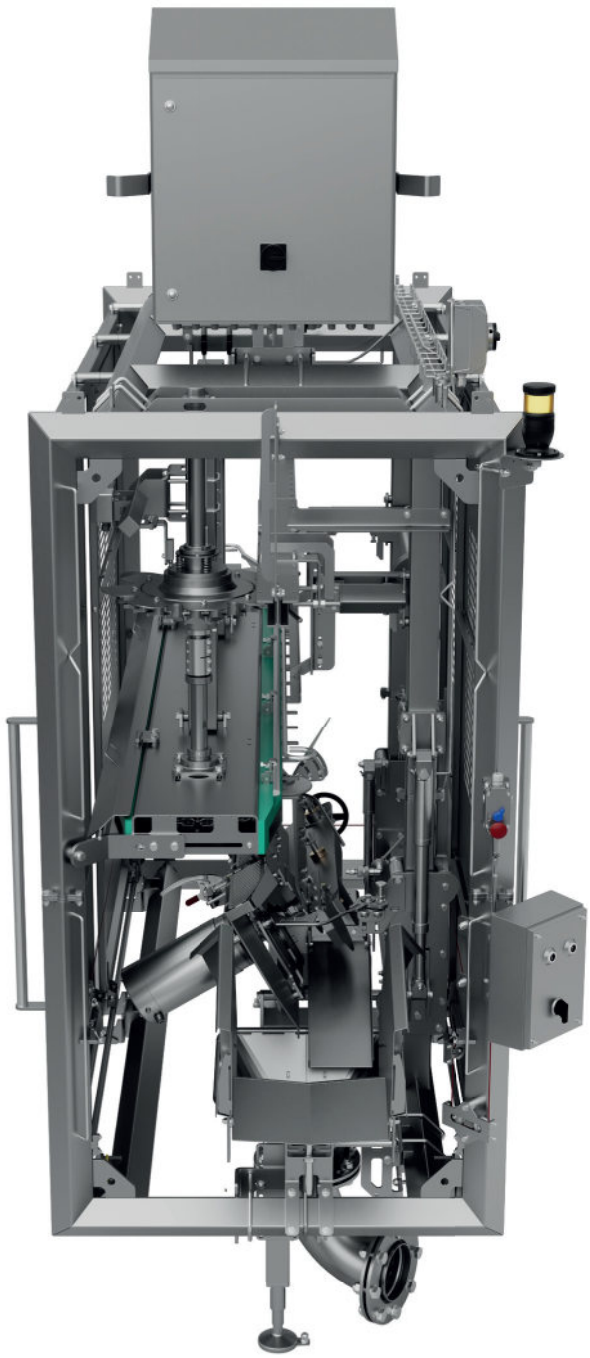

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Dear reader,


Jenny Smart

Plant-based options are no longer a novelty on supermarket shelves in developed countries. The market is experiencing significant growth, which is mainly attributed to the fact that these products have high nutritional value, and low cholesterol and saturated fat content, which appeals to health-conscious consumers. The consumption increased amid COVID-19 due to its high protein content and ability to improve immunity. The segment is expected to grow at a CAGR of 10% from 2021-2027 to reach USD 23.4 billion by 2027. North America represents one of the largest markets of Plant-Based Protein market accounting for 37.3% of the total market by 2027 and Europe remains the second dominant geographic segment with a share of 34.9% in 2018.

A recent report published by the EU-funded SMART PROTEIN project analysed retail data from 11 European countries to reveal exactly how much plant-based consumption increased in the region from 2018 to 2020. According to the research results, Europe's plant-based food industry grew an astonishing 49 % overall in that 2-year period, amounting to a total sales value of EUR 3.6 billion. The report also shows a huge increase in the sales value of plant-based meat over 2 years, with the biggest growth coming from Germany (226 %), followed by Austria (82 %).

Our cover story *"Meat Substitute Products - Hype, Trend or the Future Market?"*, looks into the dynamic market of meat replacement products and provides an insight into the challenges in the production process. Read on pages 14-17.

As always, we feature the industry's latest news and developments, top-notch technological innovations, company profiles, as well as research papers.

Enjoy your read!

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Contents

38 / 2021
Volume 7

IN THE NEXT ISSUE:

* Dicing, Cutting, Slicing
* Smoking, Cooking, Coating, Frying, Air-Conditioning& Ripening Technology
* Weighing, IT Solutions, Process Control, Automation & Robotics
* Sustainable Packaging Trends

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MULTIVAC BECOMES AN R-CYCLE PARTNER

MULTIVAC joins the cross-company initiative R-Cycle. The aim is to jointly drive forward the circular economy for plastic packaging on the basis of an open and globally applicable tracing standard. R-Cycle records all recycling-relevant information from the production process in the form of a digital product passport and makes it available for recycling. To retrieve the stored information, a machine-readable mark – for example a QR or digital watermark code – is applied to the packaging. In this way, waste sorting systems can use market proven detection technologies to identify fully recyclable packaging and form pure fractions within the recycling process. Precise sorting and transparency regarding the exact composition (types of plastic, printing inks, adhesives, additives, etc.) are key to obtaining high-quality recyclate for high-value recycling.

Stefan Scheibel, Vice President Corporate Training & Innovation Center of the MULTIVAC Group, explains: "In our Innovation Center we are always analyzing the latest trends and advising our customers on the market requirements of tomorrow. Digitization along the value chain has enormous potential in this respect for bringing sustainable packaging into a high-quality recycling process. We think of sustainability holistically. Packaging must effectively protect goods – especially food – in order to conserve resources; at the same time, the packaging itself must be designed sustainably and effective recycling processes must be ensured. In this context, exchange with partners from all involved industrial sectors is essential."

Dr. Benedikt Brenken, Director of the R-Cycle Initiative, adds: "With MULTIVAC, we are gaining another important partner and global player in the value cycle. Not only the material of a package, but also its contents represent important recycling-relevant information, which we capture with R-Cycle. We look forward to working together and generating new momentum in the development and implementation of the R-Cycle standard."

"Sustainability is an integral part of our corporate strategy," explains Guido Spix, Group President of MULTIVAC. "We are pleased that by joining the R-Cycle initiative we can support shaping an industry standard and thus make a positive contribution to promoting the circular economy for plastic packaging. The exchange with upstream and downstream processes in the value chain helps us to understand the individual steps even better and to co-develop sustainable solutions."

In addition to manufacturing packaging machines, MULTIVAC also supplies solutions for processing and cutting, marking and labeling, and also quality inspection and handling of products. The portfolio is supplemented by digital products, such as MULTIVAC Smart Services, which help to increase machine availability and thus efficiency. A digital product passport of plastic packaging can also provide valuable information for this, in order to make the packaging process more efficient, faster and therefore more sustainable.

www.multivac.com

RAPS ACQUIRES MAJORITY SHARE IN SPICE FIRM BIOVA

Strategic Expansion Broadens Ingredients Supplier's Organic Portfolio

RAPS GmbH & Co. KG has acquired a majority stake in Biova GmbH. The move sees the well-established supplier of spices and food ingredients focus on growth through strategic acquisition, including the specific expansion of its range and expertise in organic spices. Biova, based in Wildberg near Stuttgart, will continue to operate as an independent subsidiary.

With high-quality and exotic natural salts, peppers, sugars, spices and chilies, the Biova brand has become well established since the company was founded in 2003, and has steadily expanded its portfolio of organic products ever since. Customers include leading suppliers of branded spices, as well as trendy newcomer brands, and Biova's own brand is also available direct to consumers.

RAPS acquisition of the majority share opens up new markets and sales channels for Biova, especially in other European countries. RAPS, on the other hand, will benefit from the ingredient specialist's comprehensive know-how, and will be able to expand its organic portfolio with a variety of new and unusual spices, salts and creative blends. Biova GmbH, with around 20 employees, is set for further expansion and will remain under the management of founder Raphael Deckert, at the Wildberg site.

He comments: "Passing the company, which we have built up with great commitment over many years, into new hands is a huge step. Yet with RAPS, we now have a strong partner at our side who will enable our team to grow, enter completely new markets and provide financial back-up to allow us to do so. With this established company, we have found exactly what we were looking for: Experience, comprehensive support for further successful growth and plenty of freedom for development."

Florian Knell, CEO of the RAPS Group, is also extremely happy with the arrangement: "We are very pleased to have been able to add Biova GmbH to the RAPS family. With the acquisition, we want to grow further, expand the range of high-quality organic products and thus meet increasing demand. Biova is a good fit for us, because as a medium-sized, family-owned company, values such as sustainability, trust and quality are what matter most to us."

www.raps.com

HIGH PERFORMANCE SEPARATORS, DEBONERS & GRINDERS-DESINEWERS FOR THE PORK INDUSTRY

Since the time of its incorporation in 1981, LIMA is a company which has specialized itself in the design, manufacturing and sales of meat-bone separators, deboners and grinders-desinewers for the poultry, pork, lamb, beef and fish industries. The company has a world presence with a network of more than 70 distributors on all continents.

Specifically, LIMA has made a name for itself in the poultry industry since its very beginning. Poultry processors from small to big-scaled deboning cut-up rooms are equipped with LIMA's separators, deboners or grinders-desinewers.

But do you Know what Lima has to Offer to Pork Processors?

LIMA's range of LIMA DSP Deboners has been specifically developed for harder bones such as pork & lamb bones.

Many LIMA's customers in the Pork industry around the world are already taking advantage of the great benefits offered by the DSP technology, by separating meat from typical pork bones such as backbones, neckbones and ribs at LOW pressure.

The objective is clearly to recover the highest quality of meat in texture, as close as possible to ground / minced meat while still ensuring optimal yields and the lowest calcium content in the recovered meat as possible. Such high quality mechanically deboned meat is usually referred to on the market as 'structured' or '3 mm mechanically separated meat'.

LIMA offers a full range of LIMA DSP deboners from 300 to 5 000 kg / hr of input capacity.

The company has also made a strong reputation in the red meat industry (pork and beef) when it comes to maximizing profits out of boneless raw materials with its ranges of Grinders-Desinewers DD/DDS:

The purpose is to valorise good meat such as trimmings, deboned shank meat and aponeurosis into

a high-quality coarse ground meat. This is achieved by separating remaining hard tissues such as sinews, tendons, gristles, cartilage, bone chips as well as foreign plastic bodies at very high yield, from 80% to 95% while Collagen/Protein ratios remain under controlled values and the temperature hardly increases during the process. The recovered meat is NOT MSM (Mechanically Separated Meat) but actual ground and desinewed meat processed from bone-out meat.

Some Pork Grinding-Desinewing Applications:

Meat processors in the Beef industry will also benefit greatly from this range of LIMA Grinders-Desinewers DD/DDS.

The company offers a full range of LIMA Grinders-Desinewers DD/DDS for red meat from 100 to 12 000 kg / hr input capacity.

LIMA has also developed a specific range of pork skin-fat separators C.

The purpose is to mechanically separate the fat from the skin out of pork rinds. Such pork rinds may come as whole pieces without any pre-grinding or smaller cuts from ham, shoulder, belly and back, whether directly from the deboning room or from derinding machines.

A very nice ground fat at optimal yield is obtained as well as defatted skin with preserved integrity, with high technological characteristics through a very hygienic process.

LIMA offers a full range of LIMA Pork fat-skin separators from 750 to 12 000 kg / hr input capacity.

Today more than 95 % of LIMA machines are exported worldwide making LIMA technology a world leader in this field and illustrating the relevance of company's concept of quality in separation.

www.lima-france.com

REX TECHNOLOGIE - VACUUM FILLER & PORTIONING SYSTEMS

The REX RVF 436 is as suitable for the smaller or medium-sized meat-processing operations as it is for larger, highly specialised companies. Its smooth surface, clipping machines, REX hanging lines and attachments.

The tried-and-tested "REX Servo drive" rounds off the innovative control concept. The optional case holding device makes it easy to twist artificial and natural casings.

www.rex-technologie.com

hygienically designed, space-saving machine housing, is self-supporting and made entirely of stainless steel.

The reinforced model of the large rotary vane conveyor system guarantees highest portioning accuracy for a maximum service life. No crushing or smearing: It ensures all kind of emulsions transported gently, especially with larger pieces of meat or raw sausage applications. The rotary vane conveyor system is available with eight, 12 or 14 vanes, alternatively also with blind vanes. A simple pressure levelling piston ensures highest portioning accuracy.

Thanks to the newly developed lifting device, the hopper of the RVF 436 - available in different sizes - can be filled simply and without any mess.

The impressive standard 12" touchscreen control makes the machine easy to operate, thanks to its large-sized control elements. Both the RVF 436 and the RVF 436 S are designed to be suitable for all applications, e.g. for operating

PERFECT FINENESS

The quality of hot dogs and Wieners as well as cold cuts is primarily based on excellent fine sausage meat. Compared to the bowl cutter, production with KS equipment achieves a higher degree of fineness with a comparable bite.

KS emulsifiers are core components of numerous innovative process lines.

They can be flexibly equipped for a wide variety of application-specific emulsifying and homogenisation tasks. The intelligent combination of several cutting principles in one machine makes it possible to manufacture ultra-fine products in a single operation.

With its new emulsifiers of the FL series, KARL SCHNELL offers an innovative further development of the traditional emulsifier. This creates enormous technological advantages for the customer in the production of sausage products.

• Feeding via screw allows better temperature control even with stiff products.

• The integrated KS Cutting System with its wide range of cutting set variants enables almost contactless cutting for exceptional fineness

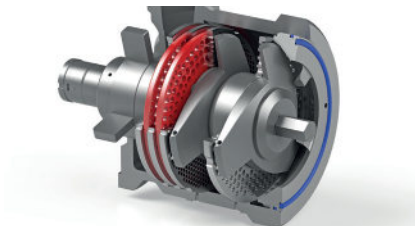
and the best bite with minimal wear on the cutting tools.

• The areas of application are diverse. For example, the production of rind emulsion from frozen, pre-shredded rinds is possible without additional preparation work.

• KS Emulsifiers of the FL series offer an entry into process automation for the production of ultra-fine emulsified products and auxiliary materials.

The heart of the emulsifier is the KS Cutting System - it is highly flexible and ranges from a simple single-stage cutting set to multi-stage high-end systems with rotating hole plates (RotaPlate).

The variety of bore sizes in knife/hole plate and RotaPlate systems enable an optimal result with all degrees of fineness.



Due to different sizes, the systems can be used in various KS machines.

The advantages of KS Cutting Systems are unparalleled flexibility in all areas of application, with low temperature input and extremely short emulsification times.

In addition, they are characterized by a long service life at low production costs.

www.karlschnell.de

THE NEW TROLLEY TUMBLER FOR TUMBLING, MIXING AND MARINATING

Anyone who produces delicatessen salads or vegetable mixes or offers spare ribs, marinated steaks, chicken wings and pulled pork faces a major challenge: the individual components must be well processed. What sounds simple is not easy to achieve. This is because the mixing, tumbling and marinating must be particularly gentle and even. The individual components must not be damaged during the process. Standard Tumblers are often used for this purpose, or

products are mixed by hand. However, these methods often do not produce satisfactory results. In addition, both methods require an enormous amount of time, which might be justified if the result is perfect, but if you have a hand-mixed pasta salad in mind, it is obvious that the result is often unsatisfactory and does not meet today's hygienic requirements.

To meet this challenge, Maschinenfabrik Seydelmann KG has set itself the goal of offering a machine that mixes, tumbles and marinates products particularly gently, intensively and evenly. Further requirements were short processing times and thus increase of productivity, low personnel expenditure and flexible application possibilities. As with all Seydelmann machines, this innovation is also manufactured to the highest standards in hygienic design - robust, durable and easy to clean.

With these requirements as a guidepost, the new Trolley Tumbler could be designed for 200 or 300 liter standard trolleys. The standard trolley, which is filled with the products to be mixed, serves as a mixing container. Loading and emptying of the machine, as with tumblers, is no longer necessary. This allows quick product changes and minimizes product losses. The standard trolley is moved into the machine, lifted and closed with the domed mixing lid. Subsequently, a bi-directional horizontal or cross rotation - depending on the machine design - takes place. In this way the products are mixed gently and intensively in the standard carriage without a mixing unit or paddles (axles). The mixing lid contains a mixing cross, which ensures optimum processing. The mixing cross can be manufactured individually and adapted to the products. For example, a toothed mixing cross for breaking up frozen products or tearing up pulled pork. Thanks to a quick-change system, the mixing crosses can be replaced easily and without tools, making the machine a flexible everyday helper.

Simple operation and an easily understandable control system reduce personnel costs: only one person is needed to operate the machine.

Other processes that can be performed with the Trolley Tumbler include hydrogenation, refining,

coating, massaging, breaking open frozen food and many more. An optionally available vacuum pump, with vacuum values of up to 80 %, also enables optimized marinating and mixing of meat products.

Maximum operating safety is ensured by the safety fencing with a scanned safety door and the laterally

positioned and moisture-protected electronics.

Automatic operation of the Trolley Tumbler is made possible by the Command 700 program control.

www.seydelmann.com

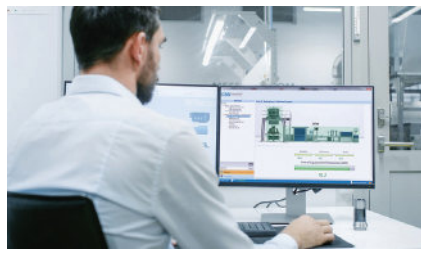
HELPING TO MAKE THE SMART FOOD FACTORY A REALITY

IT's central role in the smart food factory and its ability to deliver efficiency, productivity, traceability and reduced costs will be the major focus of the CSB-System stand at Foodex 2021.

CSB will showcase its range of industry-specific ERP systems that can be tailored to the requirements of businesses of differing sizes and types, from a centrally controlled turnkey solution for international corporations to a best-practice system ideal for small- and medium-sized enterprises.

Such systems can support automated production and packing lines that deliver higher speeds and efficiencies, ensuring the effective flow of data from sales order through planning to production and packing. In addition, the availability of a single central database that links all areas of operation provides effective traceability, which means businesses can monitor and report back on the progress or whereabouts of a product at any time.

This greater connectivity that now exists between machines, factory ERP and customers, encapsulates the growth and emergence of Industry 4.0, allowing plant and resources



to be deployed more efficiently and reducing errors and re-work.

Such advanced software systems enable companies to obtain BRC certification, meeting all legal requirements and providing an enhanced quality management system.

www.csb.com

FCHL: UP TO 25% PRODUCTIVITY INCREASE AND UP TO 37% MANPOWER SAVING

This is what makes FCHL unique: the new Automatic Clipping/ Hanging Machine from Poly-clip System combines four production processes in a single machine, offering a cost saving of up to 37% on manpower while at the same time increasing output by up to 25%.

All-in-one Automatic Machine

The machine efficiently combines clipping with simultaneous looping and automatic hanging and positioning of products on the smoke stick. Its high level of automation ensures continuous, reliable production at a positioning rate of up to 85 loop per minute (depending on calibre and process). The automatic clipping/hanging machine thus benefits from all of the advantages of the tried-and-tested FCA 160 double-clipper. Continuous, precise positioning on the smoke sticks in the hanging unit permits a higher loading density and thus optimum utilisation of smoking and cooking plant capacity. Compared with the use of a conventional filling line, e.g. comprising an FCA 3430 and filler operating in 2 shifts (8 operators), a productivity increase of up to 25% is achieved with 37% less manpower.

What Marks the FCHL Out?

This automatic machine has state-of-the-art PC control, which permits simple operation from a single SAFETY TOUCH and provides rapid, smooth start-up after coupling to the filler. Casing re-load occurs while the clip head is stationary. Product parameters are of course

retrievable from recipe management, and PC control offers rapid and precise signal processing. Thanks to the intelligent drive control unit, extremely precise loop positioning with product settling results in more products on the smoke stick, and thus in a higher output.

Productivity Increases Further with the ASL-R

The output rate increase totals 40% when the Automatic Sausage Loader ASL-R

www.polyclip.com

MÜLLER'S MÜHLE: €14.5 MILLION INVESTMENT IN VEGETABLE PROTEINS

New technology for functional, protein-rich "SMART® Pulses Pro" legume flours / Versatile in use for high-protein and plant-based products

Müller's Mühle, one of the leading suppliers of legume and rice flours, has invested €14.5 million in new refining technology for legume flours. With the help of a modern air separation plant, the company can now produce functional flours with a protein content of up to 65 per cent, enabling protein enrichment and nutritional optimisation of many foods. They are particularly suitable as a basis for plant-based alternatives such as meat, egg and milk substitutes, as well as for snacks, baked goods and pasta. Müller's Mühle uses different legume species as raw materials, and processes them gently to preserve their valuable nutrients. The flours are marketed under the "SMART® Pulses Pro" brand. At source, they are naturally free of allergens and are also clean label.

With their high-quality nutritional and functional properties, "SMART® Pulses Pro" ingredients enable the development of innovative product concepts in the plant-based segment.

Thanks to their protein content and structure-forming properties, "SMART® Pulses Pro" concentrates can be further processed into high-quality texturates that serve as a basis for meat substitutes. In addition to purely vegan and vegetarian products, pulse-based texturates are also suitable for hybrid products in which the meat content is partially replaced.

Be it for baked goods, vegan mayonnaises or dressings: the emulsifying effect of the new concentrates makes it possible to replace eggs in a variety of recipes. But the legume flours are also the base for innovative egg substitutes, such as vegan scrambled eggs.

In addition to protein, Müller's Mühle legume flours provide dietary fibre and minerals, B vitamins and trace elements and, in this respect, are far superior to protein isolates. In terms of sustainability, the flours are convincing due to their resource-saving cultivation: legumes do not require artificial nitrogen fertiliser, increase soil fertility and have a low water requirement. Legume-based products therefore meet the needs of environmentally-conscious consumers who are willing to pay a higher price for food that is produced as sustainably as possible.

"Vegan, high-protein, low carb, clean label, free-from – pulses serve several major food trends at once. Moreover, with their low carbon footprint and excellent nutritional profile, they are the ideal raw material for a sustainable diet," says Uwe Walter, Managing Director at Müller's Mühle. "We are therefore convinced that ingredients based on these superfoods will become increasingly important for contemporary food concepts. From new product development to reformulation, with our new functional variants, we can support food manufacturers better than ever."

www.muellers-muehle.de

MEAT SUBSTITUTE PRODUCTS - HYPE, TREND OR THE FUTURE MARKET?

By Stefan Geisen and Andreas Seydelmann

Are meat replacement products made of vegetable proteins just hype or is it a trend? Neither nor - they are already part of everyday life!

According to forecasts, the market for plant proteins is expected to grow continuously and strongly (investment bank Barclays, 2019). The market for meat replacement products is very dynamic and therefore reacts very quickly to the criticism it receives. For example, the fats used - keywords being saturated and unsaturated fatty acids - and the calorie content of the products are being fine-tuned. The functional additives used are also increasingly being put to the test and replaced by less critically regarded ones.

One may ask oneself, where suddenly all the vegans and vegetarians come from. In fact, these diets are becoming increasingly popular and it can be assumed that about one billion people now eat exclusively meat-free - the majority of them for cultural or religious reasons. Strictly speaking, however, this population group does not even represent the consumers that meat replacement products are aimed at, because they usually do not attach importance to the fact that something looks like meat.

The Target Group

The target group primarily consists of the so-called flexitarians, who, according to current surveys, make up about twenty percent of the world's population (Euromonitor, 2019) - with a strong upward trend. This relatively new word creation is used to describe people who consciously want to do without meat from time to time - but without giving it up completely. For them it is often important that the meatless products are nevertheless as close as possible to meat. A meatless burger should taste and look like a burger, meatless sausage like sausage and meatless nuggets like nuggets - and it should also feel authentic in the mouth. The reasons for doing without are very different: they range from animal welfare to environmental and health consciousness.

In a bowl cutter, the complete production process of minced meat-like substitutes, such as burger patties, can be operated in one machine.

Another reinforcing factor of this trend is certainly the increasing desire to try new things and the growing demand for convenience food, i.e. ready-made food that can be prepared with little effort. The reasons for this are changing living conditions and the desire to eat healthy food without spending a lot of time (The Nielsen Company (US), LLC, 2018).

What's in it?

The ingredients of meat replacement products based on vegetable proteins can be divided into four groups - protein, water/ice, oil/fat and spices/additives for taste, binding, shelf life and color.

The challenges in production, apart from the right recipe to define the taste, also lie in the selection of the right raw materials to achieve the desired texture and mouthfeel.

The range of protein suppliers extends from soybeans and peas to potatoes, wheat or mushrooms. New sources of proteins are constantly coming onto the market. This is also experiencing strong growth and is moving very fast. There are essentially two categories, which are based on the desired texture of the end product, as well as the production method. Textured raw materials (TVP, Textured Vegetable Protein), obtained for example by extrusion and characterised by an existing fibre structure, and starting material in powder form (the so-called hydrolysates obtained by hydrolysis) can achieve a particularly high protein content of 80% - and are usually available in powder form.

Depending on the target product, different vegetable oils or fats are used. In the production of minced meat substitutes or burger patties, for example, a proportionate use of coconut fat is very common. This has the advantage of forming the white fat portions expected by the consumer at room temperature and especially in the refrigerator, melting during frying and thus producing a juicy bite typical of patties.

The products get their color from different substances. For example, in addition to beetroot and other colorants, a hemoprotein mixture, a type of meat juice produced by fermentation, is also used. In almost all products currently on the market, methyl cellulose is used as a thickening and binding agent. This additive, also known as E 461, has the aibility of binding a lot of water when cold and gelling when heated. This gel formation results in a juicy mouthfeel of the products.

The spices used are essentially no different from those also used in meat production - with one very decisive exception. The reason for this one difference lies in a fifth taste, which is different from salty, sweet, sour and bitter. It is described as hearty-intensive, spicy or meaty and is named with the word "umami", which comes from the Japanese. The trigger for this taste sensation is a protein building block colloquially known as glutamate. This occurs in its natural form in all living organisms, but has fallen into disrepute in the form of the artificially produced monosodium glutamate. Yeast extract or fried mushrooms are usually used as a source of glutamate in meat replacement products. Nori, a type of algae, or dried tomatoes are also conceivable - both have a high natural glutamate content.

The Production Process

First of all, a distinction can be made between two product groups: emulsion-based recipes for structure-free, emulsified products such as cold cuts and sausages, and textured TVP-based recipes for minced meat-like and chunky, coarser products.

Emulsion-Based Recipes (Structure-Free, Emulsified Products)

First, the basic mixture is produced - comparable to the production of a basic meat in sausage production. There is no way around the use of a cutter. Nothing has to be chopped but only the high knife speeds of a cutter can generate the shearing forces necessary for emulsification to produce a firm and cooked sausage-like mass with a clean cut. The use of a vacuum atmosphere significantly increases the emulsifying performance during the cutter process. It also ensures that the end product does not have any air bubbles in the cutting section, which has visual advantages and also increases the shelf life. Depending on the desired end product, the inlay is then mixed in during the mixing process or granulated at the slower knife speeds. The temperature control in the process is similar to sausage production by adding

The batter of emulsion - based vegan hydrolysate products is often very firm and sticky.

flake ice. For particularly tough mixtures, drives with a higher torque are optionally available. In order to shorten batch times even further and to enable fully automatic operation, dosing systems for liquid and solid ingredients can also be integrated. This has the additional advantage that the production areas remain dust-free. The product ejector ejects the very tough and sticky mass reliably and almost residue-free.

Formulations Based on Textured Proteins (TVP)

The production process takes place in three steps: Preparation of the binding emulsion, hydrogenation of the textured protein and mixing of these two components with the other recipe components. The challenges in the production process are especially the production of the binding emulsion and the hydrogenation of the dry TVP. In its initial state, the TVP has a moisture content of less than 15 percent and only through water absorption does the desired meat-like structure develop, which is required for the production of schnitzel and burger analogues.

Throughout the industry, cutters are used almost exclusively for the production of binding emulsion. High knife speeds and shear forces accelerate the emulsification of ice water and binding agent enormously and lead to high quality. Either mixers or cutters are used to hydrogenate the TVP. Under vacuum, the water is absorbed many times faster. Both machine types are also used for the final mixing of the two components and other additives. The advantages of using one cutter for all production steps are the smaller space requirement when using only one machine and especially discharging. The very tough and sticky mixture adheres strongly and must be discharged mostly manually when using a mixer - this costs a lot of time and significantly increases the risk of contamination. With the ejector of the bowl, a product yield of almost 100% is achieved without any further effort, as the product ejector of the bowl simultaneously scrapes the material of the bowl flush.

The exclusive processing in the cutter may seem strange at first sight - in the final production step it should only be mixed and not shredded. However, in the mixing process, the knives run backwards and thus without cutting action. The same applies to the hydrogenation of the TVP under vacuum. Depending on requirements, high knife speeds and shear forces in normal cutter operation can thus ensure fast and stable emulsification or pure mixing by reversing the knives. Optionally, the temperature can be controlled at any time by indirect or direct cooling (CO2/LN2) or heating and kept within the optimum range for the subsequent shaping of products such as hamburger patties, "meat" balls or similar products. In order to shorten the batch times even further and to enable fully automatic operation, dosing systems for liquid and solid ingredients can also be integrated.

Depending on the requirements, stable emulsification can be achieved in the cutter by high knife speeds and shear forces-intensive mixing and hydrogenation can be realized by backward rotating knives

Depending on the variety, difference and production quantity of the target products, it may be sensible to use the advantages of the cutter only for the production of the binding emulsion, then to produce the different end product batches in mixers and to set the target temperature for the further production steps, such as filling, forming or portioning.

Which Machine When?

Whether only cutters or a combination of cutters and mixers are used in production, ultimately depends on two variables: the desired product variety and the planned production quantity.

Who has exclusively emulsion-based products in the portfolio, can do nothing with a mixer and is best advised with the cutter - no matter which production quantities you aim at. If TVP-based products are to be produced too, this can also be realized in the cutter without any problems. If large quantities of TVP-based products are to be produced or if the production is exclusively focused on this, the additional use of a mixer is recommended in order to shorten the batch times and to fill larger batches than in the cutter.

Conclusion

Meat replacement products have arrived in everyday life, and the investment bank Barclays (Investment Bank Barclays, 2019)

recently published a forecast saying that a continued growth can be expected.

From an economic point of view, the products also currently offer an even higher margin than their real counterparts. Following the law of supply and demand, more and more vegetable protein suppliers are entering the market, which should lead to falling prices in this commodity market in the foreseeable future. This means that the margins on the end products will continue to rise, whereby they will become cheaper and thus more interesting for even more consumers.

The potential product diversity is far from exhausted. More and more start-ups are entering the market with increasingly sophisticated products - from steak substitutes and breakfast ham to vegan salami and pet food.

Seydelmann's food technologists will be happy to advise you on product development and technical implementation.

Excursus Glutamate

Glutamate has fallen into disrepute - wrongly? Glutamate is not a human invention, it is a natural product. It is the salts of glutamic acid, which are called with this collective term and this acid is an amino acid, basic building block for proteins, and thus contained in every living organism. Animals, plants and humans form it themselves. Body glutamate is called endogenous glutamate. Those that are taken in with food as a taste enhancer, as exogenous glutamate. Many manufacturers also use yeast extract instead of the controversial monosodium glutamate. This is popularly known as hidden glutamate, because yeast extract also contains a proportion of glutamate and thus enhances the umami taste profile of foods. However, according to the German Food Labelling Ordinance (LMKV), products that contain yeast extract can be labeled "without flavour enhancers", unlike products that contain monosodium glutamate.

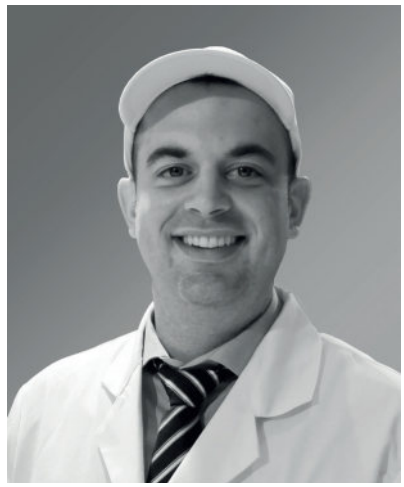
Excursus Methylcellulose

Known to many as the basis of wallpaper paste, methyl cellulose has long been used as a thickener and emulsifier in the food industry as a gelling, thickening or stabilizing agent in products such as ketchup or sauces. The mode of action in the human body is similar to that of dietary fibers. The white powder is produced from cotton by a chemical process. Just like these, it is not digestible, non-allergenic and non-toxic for humans. Therefore, it is considered harmless to health and may be used in foods according to the principle of "quantum satis".

Excursus TVP (Textured Vegetable Protein)

The textured vegetable protein is an industrially produced meat substitute made, for example, from defatted soybean flour, a by-product of soybean oil production. But peas or cereals are also used as a source of raw materials. The thermoplastic protein is extruded under high pressure at 150-200 degrees Celsius, where it is transformed into a fibrous and porous mass. The drop in pressure as it exits the extruder causes the material to expand - a very airy product is created, which is then dried. By absorbing water, the practitioner speaks of hydrolysis, the TVP produces an elastic fibrous structure, sensorially comparable to meat fibers of animal origin and thus the most important basis for analog burgers; analog schnitzel; and Co.

About the authors:



Stefan Geisen
(food technologist (B. Eng.)) has been a food technologist at Maschinenfabrik Seydelmann KG since 2012. He is significantly involved in the development of new production technologies and advises customers worldwide on product development and optimization of their production processes. Plant-based protein products are his specialization.

Andreas Seydelmann
(Dipl.-Kfm. technical) is managing partner of Maschinenfabrik Seydelmann KG. He is significantly involved in the development of the cutters, mixers, grinders and emulsifiers as well as the project planning of entire production lines.

ECONOMICAL SOLUTIONS FOR MEAT AND SAUSAGE PRODUCTS

Hydrosol offers solutions for the meat processing industry which can improve the quality of meat and sausage products, as well as boosting continuity and dependability in production, even with varying meat quality. For example, economical recipes for sausages and cooked cured meats are simple to produce using all-in systems from the HydroTOP CS range. These are suitable for many different sausage products, from scalded sausage to large-diameter cold cuts like mortadella to grill sausages and bratwursts. They can also be used for cooked cured products. The formulations can be individually adjusted depending on the meat component. Furthermore, these functional systems work regardless of the kind of meat. They reduce cooking loss and boost yield, while improving texture and bite.

Fast cycle times and good processability are important in the production of convenience foods, especially in the meat industry. This makes it important to ensure good binding in the process, even with cost-effective recipes. With ground meat products like burger patties and meatballs, or regional variants like cevapcici, the HydroTOP Perfect range gives the final product better binding and so provides for higher consumer acceptance. The fried meat is juicier and the natural fibre structure is retained. Especially with pre-fried breaded chicken products, low cooking loss and crispy, intact breading are very important. The HydroTOP Perfect systems meet these requirements and also feature simple use. They can be added during mixing, without pre-emulsion or complicated process adjustments. This saves time in production, reduces weight loss in pre-cooking, and gives the end product the perfect bite at eating temperature.

www.hydrosol.de/en

STEADY INCREASE IN PLANT-BASED FISH ALTERNATIVE CHOICES

Plant-based alternatives to fish and seafood are the future, not just in terms of nutrition, but also ecologically. One reason is that they appeal to younger consumers like Generation Z. According to Innova Market Insights, at 32 percent worldwide this is the largest population segment. It accordingly will have a major influence on consumer behaviour in the coming decades. For this target group, health and well-being are just as important as environmental and climate protection, animal welfare and social factors. Plant-based alternatives to fish and seafood thus not only offer new indulgence experiences for flexitarians, they also meet the demands of the rising generation. Environmental organisations already advise cutting back on consumption of ocean fish and seafood, due to overfishing. Microbiology is another factor.

Due to the thermal processes in their manufacture, plant-based alternatives to smoked fish and sushi are microbiologically much safer than traditional fish products.

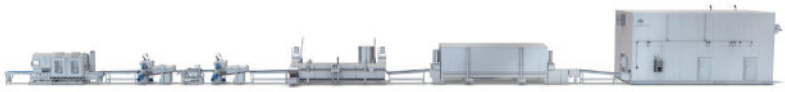
For this growth area, Planteneers has already developed various product ideas with which manufacturers can make alternatives to breaded fish, fish sticks, filets and more. For example, a plant-based alternative to salmon filet is in the pipeline. These plant-based solutions are based on a diverse range of protein texturates that give products a very fish-like, tender bite. Florian Bark, Product Manager Planteneers, explains: "The right choice of texturate is indispensable in order to get as close as possible to the animal product. Plant protein concentrates are also important in order to match the protein content of the final product to that of the original. In addition, we have a large portfolio of algae-based hydrocolloids that are perfect for making alternatives to fish and seafood."

Among the company's new products are fiildTex for alternatives to tuna pieces. With it, customers can use standard meat and fish production machinery to make alternative tuna that looks

and tastes like canned tunafish, and can be used in many ways. Another innovation is fiildFish for alternatives to sushi-style raw fish and smoked products like smoked salmon. These plant-based products impress with typical fish structure and texture. But what makes them special is the flexible recipe – different fish alternatives can be created by adjusting the specific flavour and colour. The end products can be readily sliced and are also freeze-thaw stable. This makes them very well suited for convenience products.

www.planteneers.com

FRESH SHOOTS OF GROWTH: WHY PLANT-BASED FOODS IS THE TREND TO WATCH FOR 2021



Plant-based protein alternatives is an industry that has grown in significance hugely over recent years, and will likely continue to do so. Here, JBT's Sales Director Sergio Rabadan Velazquez explains what is driving the trend and why all players in the industry need to pay close attention.

Ask what have been the key trends of the last 12 months and the answer for most people – with good reason – will be an obvious one. But away from the pandemic, another important trend has been making an impact and will continue to do so in the months and years ahead: the demand for plant-based meat substitutes across a wide swathe of products. At JBT, we have working closely with the processing industry to develop tailored solutions to fit individual product needs.

Of course the subject of plant-based foods at JBT is not a new one. We have been working for a number of years on applications that substitute animal protein for vegetable protein. But what has happened in more recent times? There has been a huge change with a focus on a reduction in the production and consumption of meat because of its impact on the environment and a growing interest in proteins generated by plants. There is also a perception among many consumers that vegetable protein is better for a healthy diet than animal protein.

How Significant is this Trend?

Well according to a study carried out by Euromonitor International, global sales of meat and milk alternatives reached US$36 billion in 2019 and are continuing to grow. Sales of meat substitutes rose by 9% between 2019-2020 compared with 4% over 2018-2019.

As these figures indicate, one of the most important segments within plant-based foods has been the growth in products based on plant proteins that seek to imitate traditional, meat-based products. This has led to an enormous boom in hamburgers, sausages and bacon based on vegetable proteins.

To meet this demand, we at JBT have designed new processes for our customers who are formulating new products based on the raw materials. We help customers develop these products, adapting to each of the individual processes, the kind of product being developed, and the best means of processing it, at our Food Technology Centers, including at our facility in Helsingborg, Sweden and Livingston, UK. We can assist customers in the development of the products, and following that we carry out practical testing in a factory setting.

Increased Demand

JBT's considerable experience in delivering solutions for the plant-based foods industry has proven invaluable given the huge increase in demand at a consumer-level, and the need for processors to develop products that effectively mimic the taste and appearance of meat-based foods, often at speed.

An increased awareness of environmental concerns is fueling a desire on the part of many consumers worldwide to consume less meat. if you have a product

that says it can effectively substitute meat in terms of taste, aroma, color to that which you have on your plate, and it comes not from animals, but from plants, people are willing to pay the same amount or more money for it. This has led to a demand especially for plant-based hamburgers, followed to a lesser extent by sausages and bacon substitutes.

However, substituting a meat-based product for a plant-based alternative that offers the same eating experience is far from easy. Taking plant proteins and developing a protein that imitates the text, color, taste and aroma of meats is very difficult to achieve. We at JBT have designed and developed processes and systems – from cooking to freezing – which do just that, but which furthermore are tailored to meet the needs of each individual processor, while also complying with stringent hygiene standards required when handling plant-based products. It seems likely plant-based meat

substitutes are here to stay, and we at JBT will make sure customers produce foods that deliver and optimum experience, from taste to texture, time and time again.

www.jbtc.com/foodtech

VEGAN BARBECUE PRODUCTS FROM RAPS

From Burger Patties and Bratwurst, to Barbecue Skewers and Meatballs – Pea Protein - Based Products Promise Flavoursome, Flame-Grilled Enjoyment

The Kulmbach-based spice expert RAPS, a partner of the meat industry and the butcher's trade for more than 95 years, is bringing even more variety to the market with its new veggie concepts: With recipes based on pea protein, RAPS offers functionality and flavour from a single supplier, and addresses the demands of manufacturers who want to expand their barbecue range with diverse, plant-based applications.

Meat-free products for vegans, vegetarians and flexitarians is one of the fastest-growing segments in the food industry. According to a recent report by the Smart Protein Project, sales of plant-based alternative products in Germany increased by 97 per cent between 2018 and 2020.1 With its savory seasonings and functional concepts for meat alternatives, RAPS proves that ditching meat does not mean sacrificing enjoyment. In addition to products based on soy or wheat, new concepts with pea protein have also been created. With the help of numerous recipe ideas, food producers can address a large target group and create products that convince both with typical bite and pleasant mouthfeel, as well as best taste thanks to RAPS' spice blends.

The diverse application possibilities include meat-free versions of barbecue classics such as burger patties, coarse and fine grilled sausages, meatballs (also with creamy fillings such as jalapeno cheese sauce), barbecue skewers and cevapcici. When it comes to sensory characteristics, the products are very similar to the originals, thus appealing to "die-hard" barbecue fans. Product-specific firmness and texture can be adjusted in the production process, and all recipes can be easily implemented with standard meat processing equipment. Thanks to excellent freezing and thawing stability, frozen products are possible too.

As consumer demands become more individual and diverse, such requirements must be reflected on supermarket shelves. "With new vegan recipes, we want to make barbecue enjoyment possible for everyone thanks to the versatility of pea protein," says Josefine Schneider, product

manager at RAPS. "In addition, we pay attention to short ingredient lists and a nutritionally valuable composition. Of course, this is also reflected in the labelling, which means we have been able to develop many recipes with Nutri Score A or B."

In addition to the grill range, RAPS offers other vegan and vegetarian product concepts – for example, for wieners, cold cuts, schnitzel, vegetable and fresh spreads, fish fingers, meat and tuna salads. Thanks to the manufacturer's comprehensive portfolio, the products can be further individualised and refined with specific seasonings, marinades or dipping sauces.

www.raps.com

AUTHENTIC MEAT ALTERNATIVE: WHEAT-BASED VEGAN BACON

Loryma Develops New Formula for Convincing Plant-Based Convenience and Foodservice Products

Loryma, an expert in functional wheat ingredients, has developed an innovative concept for vegan bacon that perfectly replicates the sensory characteristics of its meaty counterpart. The expected mouthfeel is achieved by the wheat-based binding component Lory® Bind, while a matching bacon spice blend guarantees authentic taste. Thanks to uncomplicated production and easy preparation, the concept is ideal for use in the convenience and gastronomy segments.

Consumer demand for authentic plant-based alternatives to popular meat products is growing steadily. As a result, there's a need for product innovations that are easy to process and prepare, and are convincing in terms of sensory properties. That's why Loryma has developed a perfectly balanced recipe for bacon based on wheat ingredients, which food manufacturers can use to expand their vegan product range.

As a component of a modular system, Lory® Bind offers optimal possibilities for the creation of ready-to-eat products with the desired and expected texture. The functional starch blends are odourless and neutral in taste, and are therefore ideally suited

to the production of vegetarian and vegan meat alternatives that can be individually seasoned according to requirements. To ensure that the bacon retains its structure during cooking, the binder provides an irreversible internal structure.

When prepared in a pan, the vegan bacon behaves like the original, becoming crispy on the outside while retaining a delicate, fibrous texture. A smoky seasoning brings the characteristic bacon flavour that consumers expect and enjoy. The plant-based alternative can be used in a variety of foodservice, catering or convenience applications, whether for a breakfast buffet, on a vegan burger, diced on tarte flambée, in casseroles or as a topping for salads.

Henrik Hetzer, Managing Director of Loryma, explains: "Our raw materials combine naturalness with maximum functionality. In addition to uncomplicated handling, they offer manufacturers the opportunity to create healthy and sure-fire products that perfectly meet the current consumer trend for meat-free convenience foods."

www.loryma.de/en

ACHIEVING POSITIVE RESULTS WITH UVC DISINFECTION

By Flurin Alexander-Urech and Philipp Bächi

Maurer Speck - a part of Migros Industrie - is the Swiss family business of Ernst H. Maurer and could be described as an inconspicuous site. You have to be let in to see the companies pride: Big maturing rooms filled with the sought after cured meat. It is in this moment, one realizes how popular their hand made speciality is. To be able to cope with such high demand, "Maurer Speck" has to manufacture respectable amounts of cured meat. Constantly looking for new ways to improve production process and product, the family manufactures their specialty in a traditional manner achieving the highest quality. No wonder the down-to-earth, modest patron owns more than 160 awards. Even the ceilings are covered with certificates; due to limited space the countless honors had to also be placed there. sterilAir is proud to be a part of such a success.

The Best Solution is the Only Solution

Ernst H. Maurer has been looking into UVC-technology for years. But in the early years of the new company it was too costly. Back in the day the air for the maturing rooms was just filtered using standalone filtration devices, one cubic meter in size fitted with cartridges. But the filtration units were poorly accessible and difficult to clean. The positive effect for the air was only short-lived and the situation worsened over time. Having decommissioned the filtration, Ernst H. Maurer started to work without filtration. Just working the settings of the climate control, he tried to optimize the climate and conditions of each room. Although being successful, doing so was challenging and demanded a great deal of time. There are cured meat products where mold is specifically wanted during maturation. Later, the mold is either brushed or washed away. Maurer Speck however is made with a totally different philosophy: No mold at all is wanted on the raw cured products. Just to name one challenge: During summer the air humidity is up to 70% higher than during winter, as the air during the winter months is much drier by nature.

Maurer Speck has to manufacture respectable amounts of cured meat. Constantly looking for new ways to improve processes and product, the family manufactures their specialty in a traditional manner achieving the best quality.

Maurer Speck owns more than 160 awards. Even the ceilings are covered with certificates; due to limited space the countless honors had to be placed there. sterilAir is proud to be a part of such a success.

Hygiene Concept as the Basis for Reliable UVC Disinfection

It was at the international exhibition IFFA in Frankfurt / Germany the Swiss specialist for "Speck" came across UVC technology again. After a thorough review of the premises, sterilAir provided a bespoke hygiene concept for the maturing rooms and started testing. The first trial using sterilAir recirculation devices with fans failed. The second attempt using sterilAir ceiling units brought the results looked for. A total of eight sterilAir DBM units were placed in the first maturing room. Mounted underneath the ceiling in positions defined by sterilAir and only working with the given natural air flow, the

sterilAir units decontaminate the air constantly and destroy even the problematic mould spores.

Without recirculating the air, the sterilAir ceiling units do not interfere with the delicate and well-adjusted airflow and climate in the maturing rooms. Since installing the ceiling units according to sterilAir calculations, the air quality is at an optimum all year. This allows Ernst H. Maurer to dedicate his attention to other areas. Simple to handle, efficient as well as long service cycles: The sterilAir UVC low-maintenance installation ticks all the boxes.

"What convinces us is the reliable advice and the obvious results. The hygiene experts from sterilAir first make a professional analysis before implementing UVC according to a precise concept. I like that in comparison with other suppliers", Ernst H. Maurer says. "sterilAir stands for a solution that is based on scientifically proven know-how. We worked out the concept together and had the experts from the Swiss hygiene specialists advise us. An assessment provided insights into temperature, circulating air, air supply, exhaust air, humidity and maturation cycles. After that, test equipment was used to determine which solution would be the best" the patron remembers.

More Time for "Important Things"

Thanks to the fact that the microbiological situation in the ripening rooms is constantly at an optimum level since the implementation of UVC devices, Ernst H. Maurer can confidently take care of other tasks. Of course, in addition to the qualitative improvement, the installations have also had a positive impact on costs, as there has been a reduction in the effort involved in managing the air conditioning.

A total of eight sterilAir DBM units were placed in the first maturing room. Hanging underneath the ceiling in positions named by sterilAir and only working with the given air flow, the units decontaminate the air constantly and destroy even the problematic mould spores.

Most important however: The product stays completely free of mould, proving the installation and decision of Maurer Speck right, as the company's philosophy is to offer raw cured specialties with no mould.

Since 2017 the UVC devices are in use 24/7 and are monitored electronically. The sterilAir devices are very robust, easy to care for and do not require much maintenance. Maintenance is mainly limited to a UVC emitter change, which has to be carried out after 12'000 operating hours, which corresponds to 16 months when in use 24/7.

Further Projects in Planning

The partners are in constant exchange and keep each other informed. In addition, another UVC installation is being planned: A UVC retrofit for three air coolers in areas where wet cleaning can be problematic. Air coolers with integrated UVC help maintaining good air quality by preventing bio fouling inside the air coolers and thereby making them more efficient. Over time cooling coils get covered with biofilm reducing the capability to chill the passing air. With UVC the build-up of biofilm is prevented or at least significantly slowed down. This in return prevents germs and spores - which are parts of the biofilm - being spread back into the production area by the passing air. Simultaneously down time for cleaning the air coolers is reduced. The greater efficiency in turn helps saving energy and thus money.

"The hygiene concept is the basis of our approach. Every project begins with an analysis of the current situation. All rooms climatic conditions must be analyzed and interpreted. All existing parameters can have an

„The best solution for our company was found through the influence and consideration of all the important contributions of the experts involved", the patron and world champion Ernst H. Maurer says.

influence on the products and the microbiological situation. Based on the acquired knowledge and analyses, an appropriate hygiene concept is created. This, the quality of sterilAir equipment and service as well as the scientific approach distinguish us from our competitors," says Flurin Alexander-Urech from sterilAir AG.

"I am very satisfied with the performance and service of sterilAir. A reliable team with high quality products. I am happy to be able to rely on both. Our company is a traditional family business that moves with the times and therefore also uses UVC. Traditional production and the implementation of modern technology complement each other perfectly. The exchange with sterilAir AG is always constructive and at eye level. The best solution for our company was found through the influence and consideration of all the important contributions of the experts involved", the patron and world champion Ernst H. Maurer says.

About the authors:

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IMAGINING THE FUTURE: CELLULAR AGRICULTURE

By Henk Hoogenkamp **Part 1**

When talking about meat consumption, something has to be done sooner rather than later. For example, let us look at China: In the 1960s, the average Chinese adult person consumed less than 5 kilos of meat annually. Fast forward, in 2020 that number increased to an astounding 63 kilos. In 2021, China will consumer some 28 percent of the world's meat, of which some 51 percent of all pork produced globally.

Another eye-opener: some 60 percent of soy across the world is shipped to China, mainly for animal feed usage.

It is estimated that the demand for crops like the soybean is expected to increase by 80 percent in 2050. About 98 percent of the soybeans are used for animal nutrition. Soy agriculture require large amounts of water and is increasingly associated with driving deforestation, leading to catastrophic environmental damage, including eradication of wildlife habitats.

Looking at these numbers, it is clear that transformative protein selections will become important. Plant meat and plant milk are one of the choices to reduce man-made greenhouse gases (GHG). Applying alternative protein sources from -preferably regional grown plants- as well as cellular agriculture, including molecular farming, will be crucial to meet the strict emission targets over the next decades. China's sign-off on carbon emissions will be essential for global emission reductions. If not, all other attempts will fail.

Bio-Engineering

The future of bio-organism engineering is software and hardware automation. In other words, biology by design will replace much of the legacy technology. This will occur by self-replicating and self-repairing renewable molecular structures that build cultured ingredients or products via fermentation with engineered or modulated yeasts or fungus support. Designer enzymes are an integral part of these bio-industrial applications, ranging from cheese-making to pharmaceuticals, or from textile fabrics to ecologically friendly cleaning agents.

Biotechnology is a uniquely powerful technology that can reduce or eliminate the need to grow and manufacture everything. Instead, DNA modification is the new platform which can create cells that use amino acids (the building blocks of protein).

For the food industry, biotechnology has the potential for reducing demand for cattle and meat-producing animals, even as the demand for dairy and meat rises. Cultured milk protein and cultured meat can probably be seen as one of the biggest technological leaps for humanity by using up to 90 percent less land, water, and greenhouse gas emissions rather than conventional dairy and meat production.

Relatively speaking, cellular biotechnology today is still at its very early stages of success. There are clear signs that proteins are poised to become sustainable next-generation ingredients with huge potential for humanity.

Source:
"Photo courtesy of Honest Burger Restaurant".

Reshape Food for Future Generations

Agricultural civilization came before the technology-driven era by several millennia, but technology-driven inventions have

since overpowered agricultural domination. Cellular agriculture has less negative ecological and environmental footprints or side effects compared to traditional farming and intensive animal production for human consumption. Cellular agriculture is a truly groundbreaking entrepreneurial field. However, it is still in its early conceptual phase and in need of additional funding.

Whether explicitly or implicitly, the United Nations Sustainable Developing Goals to turn around world's fortunes by the year 2030, have a strong relation to food. The collective food industry is grappling with the question of how to ensure sufficient nutritious and tasty food for the burgeoning global population, while at the same time reducing reliance on fossil fuels, maintain clean-water status, improve biodiversity and reduce greenhouse gas emissions.

At a closer look, one can say that the animal agriculture sector is the single largest anthropogenic user of land, contributing to reduction of fresh water supplies, soil degradation, and air pollution. To relentlessly increase food production, valuable rainforest is often forcefully converted into farmland and this form of deforestation leads to loss of biodiversity of the most precious natural resources. Yet, with the world population rapidly growing to about 10 billion by 2050, the current food production needs to increase by approximately 50 to 70 percent, while only some 5 percent extra agricultural land is available.

The environmental challenges facing the global agricultural industry are increasing. Alternative and smarter ways to produce foods for the dietary requirements will alleviate some of these pressures. However, as new cellular agriculture technologies continue to emerge and are nearing commercial introduction, a one-size-fits-all implementation and legislative approach may not work.

The world's future is the (r) evolution of society where animal products are animal-free. In a broader sense, biotechnology is the interface between biology and engineering. "Silicon Valley investors" are attracted to synthetic biotechnology and synthesizing whole genes or genomes, which are now becoming more like the disruptive value propositions that will define technology-driven business models in the future.

Creative Destruction

What the "Silicon Valley high-flying food upstarts" are doing right now is nothing less than creative destruction. Essentially, they are dismantling traditional thinking and rebuilding food science and technology implementations to lay the groundwork for a new sustainable future with affordable, healthy, and manageable food security for the global population. In addition, upcycled side streams are being increasingly used in "green biotechnology" and will be a natural step in the evolution of sustainable products.

Cellular biotechnology has the potential ability to engineer and create hybrid protein versions by using a specific yeast or fungus strain platform. For example, a potato protein isolate can be cultured without the need to separate all building blocks like the starch and fiber of a grown potato. These developments are within reach and will contribute to a strategy readjustment by both legacy and startup protein companies.

The real drivers of biosynthetic technology are the global market potential, and the plummeting cost of DNA synthesis. This has become much more sustainable,

precise and faster as it can be repeated in a much shorter time frame. Yeast is the true champion here because it can be seen as a eukaryotic cell –an organism whose cells contain a nucleus- just like the cells of livestock, companion pets, and even humans. Modified yeast strains show how DNA can successfully be manipulated and subsequently applied on a large scale. This is closing the gap between traditional technology and revolutionary disruptive technology.

Biosynthesized: Building Life from Scratch

Biotechnology and bioprocessing focus on the wide range of methods used for transformations like yeasts, enzymes, bacteria, as well as other fungi, plants, and plant cell cultures. These food and agricultural products are described as "green biotechnology".

Biosynthesized technologies will propel the development of sustainable protein cultured through microorganisms. Fungi-induced "brewing" or fermentation offers an excellent nutritional profile, including an amino acid composition similar to animal protein sources like meat, dairy, and eggs.

Moving forward, the possibility of producing proteins from local crops such as cassava, beets, and sugar cane is the main incentive to meet environmentally sustainable proteins that also reduce expensive protein imports in developing or poor countries. Finally, these countries can become self-reliant in their protein needs. Just think about the colossal currency savings if the production of animal-free milk proteins and cell-cultured meat can be done locally by developing countries.

Biosynthesized proteins are still in the experimental stage and expected to reach commercial use in 2022. A few biosynthesized proteins are already commercially available in the US and cleared by the FDA, though in the EU are still subject to regulatory approval such as EFSA Novel Food requirements.

Capital venture investors see DNA modification as the next programmable venture with massive opportunities for the collective food industry, medicine, and biopharmaceuticals, including potent painkillers and cancer medication. The speed of innovation is at times difficult to grasp, but it is evident that the accelerating transformation of the global food system is caused by truly innovative and scientifically driven technologies, combined with improved marketing that will create sustainable and nutritious foods.

Quite a few of these capital venture companies see biotechnology as a scalable innovation with a decent capital to growth ratio, not to mention that having cultured meat, medicine and food security is a good environment to be in.

The huge increase in anticipated food production cannot rely on the traditional or conventional farming practices alone. A fundamental shift in thinking will be needed. Primarily, with the acceptance of new protein sources such as those grown without using valuable land. Instead, they will be created from cellular biotechnology, including heterological protein expression and even single-cell organisms -specifically called hydrogenotrophs, that act like plants in converting carbon dioxide (CO_2) into food. Bacteria assimilate CO_2 directly as a carbon source and will be the first bacterial protein product meant for human consumption.

Carbon transformation technologies are not only suitable for food production. They are also ideal for the conversion of carbon-based materials into biodegradable polymers, as well as converting carbon from the air into bio-stimulants for depleted agricultural soil. In the meantime, more startup companies are developing unique

proprietary processes and are well on their way to enter these potentially lucrative market spaces. Regenerative agriculture will become one of the ways forward to capture the need for increased higher nutritional quality food.

Tissue Engineering: a Disruptive Force

The science of tissue engineering –like growing functional organs for people- is similar to growing or cell-culturing muscle meat or fish tissue. Perhaps the only difference is scale and magnitude of production. It certainly is no coincidence that medical professors and doctors started entrepreneurial cellular biotechnology food companies and now have become the poster child of cellular agriculture.

Tissue engineering is a relatively new science mostly generated from a chronic shortage of human donor organs or tissues for transplantation, a gap that may be filled using re-engineered organs such as skin, cartilage, and other soft tissues like muscle. These applications need to perform and maintain a biological function as they are used in a living person without being rejected.

The technology of regenerated biological material for medical applications is strikingly similar to the one used for the creation of, for example, cultured meat. Actually, the only difference is that synthesized cell-cultured meat needs to duplicate or simulate organoleptic quality such as color, taste, and texture, as well as be similar nutritionally. Examples are companies like Mosa Meat, Just Meat, and Upside Foods.

Cellular agriculture and post-animal cell culturing are emerging together with new technologies like 3D printing, regeneration of human tissue, artificial intelligence, QR (quick response) codes, augmented reality, virtual reality, and robotic interfaces. The use of 3D printing to create highly personalized nutrition is now within reach of commercial introduction. This technology can be applied to both the plant-based and cell-cultured meat sectors, providing nutrient-dense food options not only for those on special diets, but also throughout the entire food supply chain.

Meat in the form of muscle appearance is probably the most complex food product that exists. Not only in its raw form, but certainly also its transition during cooking, creating complex sensorial parameters delivering much-preferred eating experiences. As for cultured meat, it is far more difficult to create a perfect whole-muscle beef steak, than a simple finely ground hamburger. Crucial to creating a cultured steak is the use of multi-material 3D printing technology allowing multiple different meat and fat cells to be layered in one single simultaneous process. This technology uniquely allows to fully replicate appearance, texture and juiciness for cuts such as sirloin and rib-eye steaks. 3D printing is well on its way to become the choice for prototyping or a structured endeavor, enabling unprecedented fast development time at significantly less costs.

About the author:

Henk Hoogenkamp,
Proteins, Advisory, Boards, Author

RECLOSABLE, COMPLETELY RECYCLABLE MAP SOLUTION FOR SLICED MEAT

Swiss Manufacturer Bigler is Causing a Stir at Retail with FlatMap ®

After finalizing a successful project across European borders, Swiss meat manufacturer Bigler (www.bigler.ch) now relies on the brand-new, paper-based FlatMap® solution for its sliced meat. Packaging equipment manufacturer SEALPAC, together with packaging materials suppliers Buergofol and Van Genechten Packaging, found the right partner in Bigler to develop this new packaging concept, which has now been launched at Swiss retail. More resource-saving, more eye-catching and more user-friendly is what summarizes the result.

FlatMap® offers an entirely new level of reclosability for sliced meat packs

True Pioneer in Switzerland

The Swiss family company Bigler AG, with 700 employees and a total of six plants at three different locations, has its headquarters in Büren an der Aare and has been around for 75 years already. Under its motto „Ä Portion Tradition", Bigler supplies retailers and butchers in Switzerland under private label, as well as under its own Bigler brand. Always open for new ideas, the company became a pioneer in 2017 by launching skin packaging based on cardboard carriers, also known as FlatSkin®. As such, Bigler paved the way for paper-based skin solutions on the Swiss market, which have since become the new standard.

By introducing FlatMap® within its business unit Charcuterie, the company is now launching another true innovation. This reclosable, largely fibre-based, completely flat, and recyclable packaging system for sliced meat consists of an FSC-certified cardboard carrier that can be printed on both sides. The carrier has been coated with a thin plastic layer, on which the sliced meat can be served appetizingly. The product is sealed with a highly transparent top film, which can be removed from the cardboard carrier before consumption. Afterwards, the film is easily placed over the product again, where the edges are pressed against the carrier to provide excellent reclosability.

The tight-fitting top film allows for less oxygen to enter the inside of the pack compared to common MAP solutions. This prevents discolouration of the product whilst keeping it fresh and appetizing throughout the remaining storage time. After use, it is possible to completely separate the plastic and cardboard components, therefore allowing full recyclability of these materials.

A Joint Development

SEALPAC initially came up with the idea of FlatMap®. Under its motto Forming Innovations, also related to its "GO sustainable!" initiative, the family company and leader in tray-sealing and thermorming technology decided to develop the idea into a contemporary packaging solution. Several years ago, SEALPAC already entered the market with FlatSkin®, an innovative, paper-based skin packaging solution. From project discussions with customers, it became clear that similar solutions were also being sought for products packaged under MAP. Together with its proven partner Van Genechten Packaging, the basic idea for FlatMap was born®. Buergofol joined as a suitable film partner. The project was presented to Bigler AG

Markus Bigler,
Chief Executive Officer at Bigler AG

in Switzerland, which had already used a number of SEALPAC innovations before. Markus Bigler, CEO at Bigler AG, explains: "The idea of FlatMap® came at the exact right time. It became our joint goal to combine characteristics such as product protection, high barrier, recyclability, low packaging weight and reclosability in one of the most sustainable packaging solutions on the market."

Reliability in All Steps of the Process

In achieving that goal, the project partners had to overcome several challenges. When using a cardboard carrier with FSC certification, the challenge is to maintain the shape of the carrier holding the chilled products, as this material is particularly sensitive to moisture. Cardboard specialist Van Genechten Packaging was able to demonstrate its know-how, also obtained from the previous FlatSkin® project. For example, the material used for FlatMap® is characterized by stability and durability throughout the entire process chain. In order to rule out microbial risks, only virgin fibres are used.

Since an absolutely flat carrier is required for the packaging process, as well as for the presentation at retail, Van Genechten Packaging developed guidelines for its customers on how to optimally handle the cardboard carrier. The carrier can be printed in high-quality offset using low-migration printing inks and varnishes. This gives manufacturers like Bigler a lot of creative freedom for an attractive presentation, to highlight their product at retail.

After printing, the cardboard carrier is coated with a thin plastic layer, which provides a reliable barrier against moisture, fat, and oxygen. Film partner Buergofol was faced with the challenging task of developing a liner that adheres well to the cardboard on the one hand, but can still be easily separated later for recycling purposes. The company chose a polyolefin-based and therefore recyclable material. For meat manufacturer Bigler, a reliable reclose function of the packaging was an absolute must. The development work of film specialist Buergofol resulted in a top film that shows a consumer-friendly opening behaviour, but at the same time provides excellent reclosability. In addition, it had to be ensured that the liner of the cardboard carrier does not come off with the top film when the packaging is opened, but only when it is pulled off with the recycling tab. Last but not least, Buergofol made sure that the thickness of both liner and top film was reduced to a minimum.

At Bigler, the FlatMap® packs for sliced meat are produced on a SEALPAC A7 traysealer in double lane execution. In general, the new packaging system can be reliably produced on all SEALPAC traysealers with FlatMap® preparation, currently from the A6 up to the A10. This preparation implies the use of SEALPAC's patented transport system to allow for optimal handling of the flat carriers on the traysealer, as well as the use of a suitable vacuum and gas system for consistent modified atmosphere packaging. Combined with high-quality servomotors, which provide excellent drive coordination, these traysealers, such as the SEALPAC A7 used by Bigler, are energy-efficient and thus make a further contribution to greater sustainability in the manufacturing process.

SEALPAC A7 traysealer, reliably producing the FlatMap® packaging at Bigler AG

The various types of sliced meat in FlatMap® packaging are true eye-catchers at retail

Research Confirms Improved CO^2 Footprint

FlatMap® was developed to allow for full recyclability. The result is convincing: the plastic content of the packaging has been reduced by around 70% compared to conventional MAP solutions. The polyolefin-based liner is easily separated from the cardboard carrier after use. All packaging components are then disposed of separately in their appropriate waste collection. The plastics can be reliably filtered out in the recycling process by near-infrared technology. With these characteristics, FlatMap® already meets the EU requirements for 2030 with regard to the recyclability of packaging. Bigler had the improved ecological properties of the FlatMap® packaging confirmed in a professional study. Compared with the best competitor products available on the Swiss market, FlatMap® performed significantly better in terms of CO^2 footprint. Gérard Bigler, Head of the business unit Charcuterie, explains: "FlatMap® also makes a contribution to less food waste, thanks to its excellent reclosability, which keeps the contents of the packaging fresh down to the very last slice and protects the product against premature spoilage."

True Eye-Catcher at Retail

FlatMap® ensures a strong presence at retail due to its optimal branding possibilities. "FlatMap® offers us a lot of space for communication and branding, because the cardboard carrier can be attractively printed on both sides and be used for various types of information. Presented standing, hanging, or lying down, it is always a real eye-catcher thanks to its entirely new look and full visibility of the product", says Vittorio Ranaldo, Head of Marketing and Communications at Bigler AG. Since the packaging is extremely flat, it can also be placed in larger quantities on the retail shelves, thus ensuring efficient transport to and storage in the supermarkets. The consumer, on the other hand, benefits from improved functionality. The top film, which is removed from the cardboard carrier before consumption, can afterwards easily be pressed down again onto the completely flat carrier for a secure reclosure, so that the remaining content does not have to be repacked, but can be safely and conveniently stored in the refrigerator.

Vittorio Ranaldo, Head of Marketing and Communications at Bigler AG

Gérard Bigler, Head of the business unit Charcuterie at Bigler AG, presents FlatMap®

Meeting the Requirements of the EU Plastics Strategy

With FlatMap®, the project partners have been able to create a completely new MAP system for sliced products that already fully meets the requirements of the new EU plastics strategy for 2030. This sets new standards at retail. All parties involved are extremely satisfied with the result of the project, which is an excellent example of cross-border teamwork. As such, they were able to bring a future-oriented packaging solution to the market, which is a real innovation in terms of opening, reclosing, saving resources and presentation. The companies agree that the cooperation will continue and have already identified starting points for further development.

www.sealpacinternational.com

SEALED AIR DEVELOPS GAME CHANGING THERMOFORMING FILM

Sealed Air has created a new thermoforming packaging solution that defies the traditionally thick and heavy properties of THF materials.

Designed to help food processors improve efficiencies and sustainability, the new CRYOVAC® brand LID830R is thin, high abuse resistance, anti-fog top lid film that can reduce packaging weight by up to 50%, when compared to widely used laminates.

The new Sealed Air thermoforming film is 33 microns thick, whilst typically used laminates range from 60 to 100 microns in thickness.

Stephanie Poole, Senior BDM & Retail Manager, Food Packaging at Sealed Air, commented: "The new LID830R is a game changer for thermoforming applications. It provides food processors with the opportunity to significantly reduce packaging weight, while still achieving excellent levels of protection and a glossy top lid that perfectly presents food with complete clarity."

The thinner, lighter LID830R means that more material per square metre can be wound onto rolls. This helps to increase production uptime through fewer changeover of rolls and reduces packaging storage and transportation requirements.

The new LID830R is suitable for a wide range of thermoforming applications including fresh fish and seafood, fresh, processed and smoked meats, as well as cheese and ready meals.

www.sealedair.com

INNOVATION AND SUSTAINABILITY - ALL IN ONE

AMB TotalMono PET Totally Sustainable Top and Bottom Packaging System, Helping Retailers Meet Sustainable Demands

AMB Spa, company established over 50 years ago in north-east Italy, is one of the leading international suppliers of rigid and flexible films, uniquely offering an end-to-end process. In line with the company's strong commitment to sustainability, AMB has developed TotalMono PET: mono material solutions to help meet the demands and specifications of recyclability as set out by the EU. AMB's "all in one place" concept includes all aspects of the packaging process: design, tooling, product specification, film production, print design and application. As an integral part of AMB's portfolio, 100% mono PET solutions for both top and bottom films provide key benefits in terms of outstanding performance and solving sustainability challenges within packaging production.

AMB Spa, Amaro (Udine), Italy

Designing a Greener Future

As laid down by EU specifications, packaging needs to be fully recyclable in the EU by 2030. AMB has forged ahead to develop mono PET solutions that are compliant with these guidelines as of today. The company is not only fully committed to the circular economy but also to minimising the overall use of resources and the generation of waste. With its 100% TotalMono PET solutions, AMB has developed a series of films that optimise sustainable consumption by preserving food in a secure and safe manner throughout the food chain. For retailers and consumers alike this helps maintain a reduction in food waste.

Totally sustainable top and bottom system for thermoformed MAP packaging

TotalMono PET bottom films have lower thicknesses compared to multilayer products, therefore needing less plastic in its production. It is extremely light weight which in turn leads to less energy usage for its delivery: less space for transport, less trucks on the road, less fuel consumption. By taking into account all the factors that reduce a product's environmental footprint, AMB demonstrates its commitment to sustainability and supports customers in meeting the same high standards well ahead of EU deadlines.

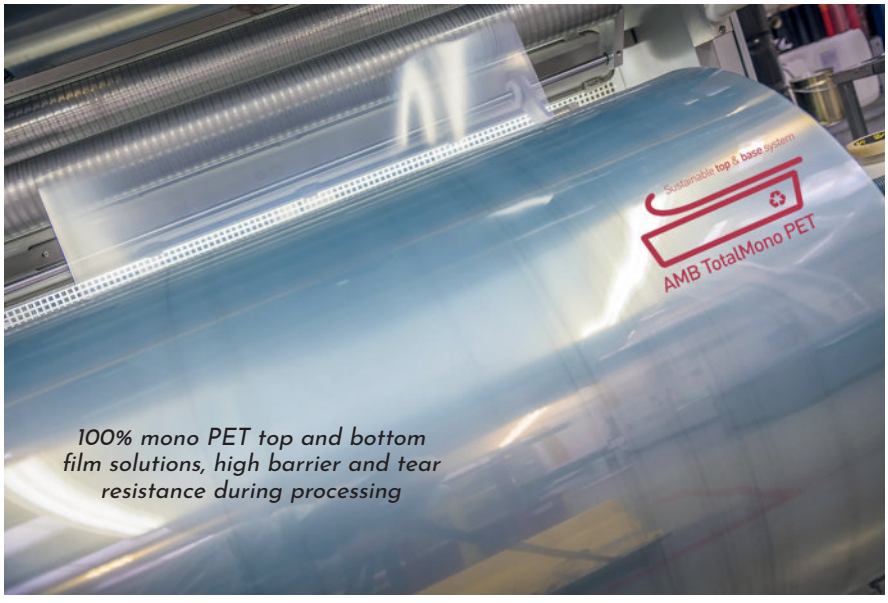
TotalMono PET films From The Sustainability Experts

AMB 100% mono PET top and bottom film solutions offer high barrier protection for sensitive foods. The downgauging of thicknesses leads to a wide range of possible gauges and a significant reduction in weight without compromising performance. The material offers outstanding product protection at thicknesses that are much lower than those of a multilayered structure. In addition, downgauging ensures that less plastic is used, and that more product can be manufactured with the same amount of material.

AMB base and rigid films are available at all standard gauges from 200my to 800my with a low or high barrier and including a possible downgauge from APET/PE. Lid films are available at gauges from 37my up to 60my also with a low or high barrier function. All barriers are non-EVOH as EVOH has a negative impact on PET recycling stream and is not in accordance with the main European recycling guideline.

TotalMono PET films are fully printable and offer ease of top and bottom printing without changing graphics. A further feature of these innovative films is their seal strength while at the same time offering a lower seal initiation temperature and the ability to adjust the sealing temperature compared to multilayer solutions. Sealing is provided by the lacquer which also acts as an antifog, thus doing away with the necessity of applying antifog lacquering. Despite downgauging, the material offers robust tear resistance during processing.

Meeting the requirements of European and international recycling codes is not only important when developing solutions but also when selecting the materials used to produce these solutions. One such example is AMB's BOPET lid film which is produced with a content of recycled PET post-consumer, variable from 37%-60%. For the bottom RPET uses from 50%-100% post-consumer materials depending on the needs of the customers. This shows how effectively the company minimises environmental impact and closes the loop of the circular economy.



100% mono PET top and bottom film solutions, high barrier and tear resistance during processing

Sustainable top & base system

AMB TotalMono PET

AMB Innovation and sustainability - All in one place

High-Performing Films for Sensitive Products

AMB TotalMono PET is an outstanding solution for fresh and processed meat, dairy and other food products that require high protection and eye-catching, fresh optics on supermarket shelves.

For retailers and brand owners it offers the possibility of optimising shelf optics by displaying products in high gloss, high transparency packaging, enabling the consumer to fully appreciate the quality of the products. Additionally, the medium to high barrier trays in combination with film solutions provide the security of extended shelf life, making products safer and even more attractive.

Growing consumer awareness of how purchasing power can help avert climate change is an increasingly important factor when shopping. Retailers can showcase their environmental credentials by offering fully recyclable product packaging. AMB is committed to continually implementing innovations that combine high performance with the necessity of environmental protection.

www.ambpackaging.com

NEW CASE PACKER EXPANDS PROSEAL'S FOOD PACKING SOLUTIONS

Tray sealing specialist Proseal has extended its product portfolio with the launch of a high-speed fully automatic case packing system.

The new patent pending Proseal CP3™ provides the ideal complement to Proseal's extensive range of tray sealing machines to offer customers a complete primary and transit packing solution. The case packer combines efficient power consumption and a compact footprint with the ability to fill cases at up to 120 packs per minute.

Key to the CP3's exceptional performance is Proseal's proven ProMotion tray infeed system. This maximises throughput by using following motion and intelligent buffering technology to effectively control the flow of trays, enabling them to feed continuously in the case packer without stopping.

The CP3 can handle a wide variety of pack formats, including trays, pots and sandwich packs, in materials such as A-PET, C-PET and board. Auto tool technology enables fast and easy format changes, while Quick Release (QR) conveyors allow swift removal and replacement to speed up and simplify cleaning and maintenance.

The new case packer features the same high levels of construction and durability as Proseal's market-leading tray sealers and incorporates many of their advanced features. These include the ProTect™ user login and audit trail security system, which provides different levels of authorisation access for individual personnel, and full compatibility with the ProVision™ OEE and downtime analyser that delivers a comprehensive real time view of machine performance. Set up and daily operation are simplified thanks to the user-friendly menu-driven control panel with step-by-step prompts, error and status displays, and batch pack counter.

Options include additional crate fill and increased length of buffering conveyor for higher speeds. Crate delivery and discharge conveyors can be bespoke designed to individual factory layouts and the CP3 can be fully integrated with complementary equipment such as case erectors, existing create delivery systems, labellers and coders.

"All the qualities that have made our tray sealing machines so successful have been maintained within our new Proseal CP3," comments Nick Severn, Control Systems Engineer, Proseal. "For food manufacturers it provides the perfect complement to help ensure fast and efficient onward delivery to meet the strict deadlines of the retail sector."

Founded in 1998, Proseal designs and manufactures high quality tray sealing machines, conveyor systems and sealing tools for food industry markets worldwide. Proseal is part of the JBT family, and together they remain committed to continually supporting customers' needs.

www.proseal.com
www.jbtc.com

KP ZAPORA™ THE REVOLUTIONARY NEW PADLESS PROTEIN TRAY

Klöckner Pentaplast (kp) launches kp Zapora™ the new innovative padless tray technology, uniquely designed and developed to remove the need for absorbent pads in plastic packaging for fresh protein.

It's the next big thing to happen to protein trays, the innovative technology captures liquid and retains it to keep the products fresh and hygienic without having to use an absorbent pad. The integrated design has a high liquid retention level and can be incorporated into trays using 100% recycled content to meet the highest sustainability goals, keeping carbon low by using recycled content and making recycling easy at the end of life. It dramatically improves the consumer experience with its crystal-clear presentation on shelf to its ease of recycling - just rinse, recycle and repeat!

kp Zapora™ was created with a vision to satisfy market demand for more sustainable packaging with a mono PET material for protein packers globally. It is targeted at a wide range of customers – retailers, brand owners and packer processors.

The goal was to make the experience of protein packaging a better one for the consumer who finds the pad unattractive and messy. It has also been designed to encourage far greater recycling by making it easier to simply rinse and recycle the pack, without a pad, and to create awareness that the whole pack can in fact be recycled at home and in local recycling facilities. It also had to be strong and provide first-class food protection.

The new kp Zapora™ technology appeals to the retailer on many levels – it looks great visually on shelf, it has high level performance as protection for protein and it also achieves sustainability goals with regards to manufacture, recycling and reuse by eliminating the secondary absorbent pad.

kp Zapora™ - which is the Polish word for a barrier or dam – outperforms the competition in every respect, combining liquid retention and pack strength. It also offers the ultimate in sustainability as a complete mono material solution and when combined with other kp technologies ensures a closed loop system with a wide range of packs and sizes. Competitive benchmarking shows that the design provides high liquid retention and retains pack strength. Even held upside down the liquid stays put until it's rinsed out.

Unlike absorbent pads, which can draw the natural moisture from the meat affecting its quality, this unique design keeps the meat above the liquid allowing any moisture to naturally drain away. It is made from up to 100% post-consumer recycled PET which can then be recycled again. It is the ultimate sustainable solution – just rinse, recycle and repeat – closing the loop on plastic packaging.

kp Zapora™ can also be combined with other leading market technologies like kp Tray2Tray™, kp's initiative which works with the supply chain to recover, recycle and process used food packaging back into flake and turns it back into more of the same. It is also available in a wide range of kp trays.

kp Zapora™ helps drive at home recycling and contributes to closing the loop on plastic packaging. kp is working with the entire value chain to generate and drive continued demand and ensure a constant supply of post-consumer recycled plastics for trays.

www.kpfilms.com

SPACE FOR WHOLE MUSCLE PIECES

The XP1 Vacuum Filling Machine Ensures Gentle Production of Cooked Ham

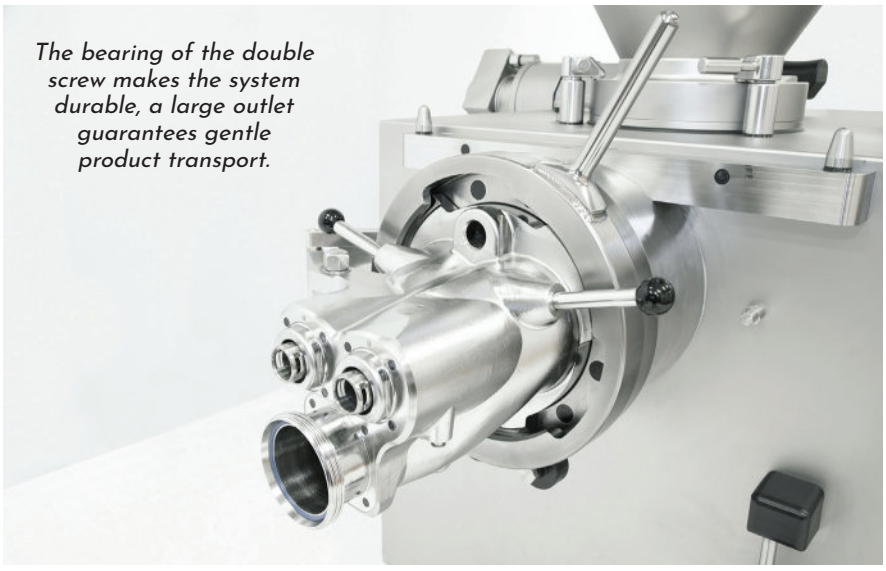
By Vitali Kemmer

Cooked ham is one of the most popular meat products among German consumers. Juicy, delicious, high in protein and low in calories, it is an all-rounder that can be used in many ways: as a topping on bread, in sauces, on pizza or with asparagus. In industrial production, the XP1 filling machine helps to gently fill the cured muscle pieces into casings or a deep-drawer before the thermal process.

The fat- and tendon-free meat for cooked ham traditionally comes from the four rear muscle parts of the pig: rump, nut, upper or lower shell. A brine is injected in preparation for ham production. The meat is then massaged in the tumbler. Thus, the brine is evenly distributed in the meat, the muscle structure is loosened, and the protein is activated, which improves the slice cohesion of the final product, enables a tender consistency and increases the weight yield. This process should take place under vacuum in order to avoid foaming caused by the protein that is already exuding. It would otherwise lead to an undesirable cut appearance between the pieces in the end product. Tumbling under vacuum also has a positive effect on curing colour formation and colour preservation as well as on yield and slice cohesion. The tumbling muscle pieces then have to be shaped and to undergo a cooking process at a core temperature of 67 to 68 °C. Heat denatures and coagulates the protein, the pieces of muscle pieces are bound together, and the ham gets a firm consistency. This is where the cooked ham obtains its appetising cured colour and the desired aroma.

The Filling Process Influences the Quality

In the butcher's shop, the pieces of muscle are traditionally placed in moulds, pressed and then cooked. In industrial production, a filling machine comes into play, which fills the cured muscle pieces into suitable casings or alternatively, into a deep-drawer before the thermal process. It is essential to maintain the muscle structure so that the valuable pieces of meat are preserved - this is the only way to produce a high-quality cooked ham. Voids that allow the sedimentation of jelly must be avoided to ensure optimal cohesion of the final product. The requirements for the gentle conveyance of whole muscle pieces are met by the XP1 vacuum filling machine, which was specially developed for the production of ham. The wear-free Vemag double screw, the heart of the filling machine, plays a decisive role here. It transports the filling material particularly gently from the infeed to the outlet of the machine. The size of the double screw sets new standards in ham production, as a single chamber offers enough space for whole muscle pieces to be conveyed. The machine's large infeed is adapted accordingly and offers just as much volume for complete pieces of ham. The machine gently transports the product at slow speed and yet with high output. Thanks to the "Duo Drive" with two separate drives for the double screw and feed, the feed can be individually and optimally adjusted to the filling material. The machine manufacturer thus ensures intensive forced feeding of the filling material into the conveying element.



The bearing of the double screw makes the system durable, a large outlet guarantees gentle product transport.

The "Intelligent Handling and Assembling System" offers a solution for the placement of all parts that can be removed and cleaned.

Wear-Free Thanks to New Technology

The double screw of the XP1 is mounted on bearings and does not touch the double screw housing, making it wear-free. Only the seals and bearing cartridges need to be replaced after a certain period of operation. The user can carry out this replacement himself, no support is required. The machine remains in place and does not need to be dismantled. The feed system does not need to be replaced either and lasts a machine's lifetime. This leads to high machine availability and low service costs.

With the "Intelligent Handling and Assembling System", Vemag additionally offers a solution in which all parts that can be removed and need to be cleaned - such as the double screw and double screw housing - find their place. There they can be deposited, cleaned and stored until reassembly. The machine design impresses with its flexibility: if, for example, the machine is to be operated with a different attachment due to a product change, this solution enables fast, hygienic (intermediate) cleaning and quick assembly of the parts. The proven box-in-box system protects the sensitive electronic components of the machine from moisture during the cleaning process.

Air-free filling with the Total Vacuum System

In order to extract even more oxygen from the raw material, the machine concept features two separate vacuum areas that are controlled independently of each other and can thus be optimally adapted to the product to be filled. In addition to the standard vacuum system on the conveying element, the machine manufacturer offers the optional Total Vacuum System TVS149. It has a vacuum hopper instead of an open hopper. The hopper is connected to a supply container from which the material is sucked in via a pipe connection. Due to the closed hopper of the filling machine, the raw material can now be kept under vacuum for longer during the filling process. This additional time under vacuum intensifies the deaerating effect considerably and guarantees an outstanding quality of the final product. The TVS149 is offered as an option which is a unique selling point of the Vemag solution. If the user does not have sufficient space in his production rooms, he can also carry out the ham production with the XP1 in conjunction with the open hopper of the filling machine.

Touch Control and Machine Analysis

All settings on the system are made via the intuitive operation of icons on the display of the filling machine. This control is individually programmable, assigns complete filling programmes to all settings and stores the setting values. Thus, they are immediately available the next time the saved programme is started, ensuring

The "Total Vacuum Principle" is based on a vacuum filling machine with vacuum and hopper and ensures optimum evacuation.

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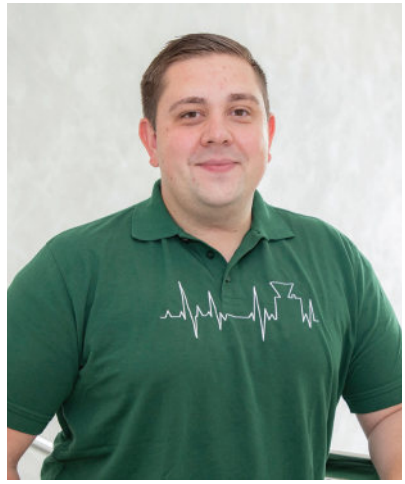
consistent quality thanks to unchanged filling parameters. To avoid error messages, instructions are displayed using pictograms that the operator can easily implement. The new control system can also be networked with the in-house Smart Link 4.0 system to make operating processes more transparent and increase machine availability. Smart Link 4.0 is an operating and product data acquisition system for Vemag production lines, with the help of which the user can precisely evaluate his production data. The machine data collection bundles the internal machine parameters and documents the production so that you can see at a glance what is happening: power consumption, pressure curve and other information can be read out, compared and evaluated. Any weak points or deviations can be detected, and optimisation potential can be identified. The advantages for the user are obvious: give-away is avoided, resources are better utilised and means of production are used more efficiently, which in total reduces production costs. All filling data is read out and saved in the machine on request. The data of all networked machines with Smart Link 4.0 can be displayed at a central point, for example in the plant management: Filling weights of the products, quantities achieved, production volumes, machine running times and other data are effectively and quickly evaluated and visualised in a comprehensible way, so that the plant management knows what is happening at which line and when at all times. The production data is also automatically documented so that all processes in the plant are transparent and traceable. This increases the planning quality, but also the accuracy of the production cost calculation. The user benefits from increased production reliability and consistent quality through optimal machine settings. First-class product quality by preserving the natural muscle structure, market-leading performance and minimal service costs make the XP1 a pro in industrial ham production. Maximum productivity is achieved through the flexible use for other products made from smaller pieces of material, also the double screw and the double screw housing last a whole machine life without wear.

About the author:



Vitali Kemmer studied food technology, specialising in meat, and initially worked in development at Vemag. The master butcher then moved to the Filling Machines division as a technical advisor and afterwards to the Forming and Grinding division. He is now Product Manager Sales for filling machines and clip applications.

MEET RESINO: THE GLOBAL LEADER IN PRINTING INKS FOR MEAT CASINGS

Resino Printing Inks offers a wide range of high-quality inks which can fulfill special requirements. The ink company's global success is based on its ability to provide custom-made inks, deliver excellent on press technical support, friendly service and ensure thorough regulatory compliance.

High Quality Inks

Resino delivers high quality fine print decoration on all types of meat casings. The ink company offers two-component inks that are respectively water-based and solvent-based inks as well as UV curing inks, which have great adhesion, low migration risk as well as boiling and sterilization resistance properties. The inks are designed to resist traditional meat processing for instance shirring, ringing processes etc. Resino delivers products worldwide and has local sales & technical support personnel available to serve customers anywhere. Resino's mother plant is in Denmark and the company has warehousing facilities in USA and Malaysia to cover the areas of respectively North and Central America and Asia Pacific.

Custom-Made Inks

Resino is focusing on creating value for our customers. One way

of creating value is to offer custom-made inks, which requires a close partnership with customers. The multitude of casings substrates, many different printing presses

utilized and different printing environments throughout the world makes it impossible to have one ink which fits all conditions & purposes. We take pride in perseverant activity until our customer has a satisfactory solution.

It is equally important to provide solutions, which leads to increased value for the customers of our customers. Therefore, Resino support covers the entire process, from supplies, through printing and converting and support towards the brand owner. Technical assistance comes natural to the ink company, which would like the customers to think of Resino as an integrated part of their technical solutions.

The Importance of Innovation

Innovation is a core value of Resino and thus, 20 % of the company's talented employees work within product development. Resino continuously runs innovation projects in close cooperation with customers. Partnership projects work very well for us because valuable input from our customers provides us detailed understanding of the conditions and requirements and as a result, Resino can assure developments fit exactly to the market demands. Some projects also provide our customers with understanding of what may be done to the casings to improve printability, which in turn may lead to improved quality or enhance design possibilities.

We are happy to engage in all challenges thrown at us – Welcome.

Highly Regulated Market

The market of meat casings is influenced by high regulatory standards which makes regulatory compliance key to Resino. To assure credibility of the information, Resino works with independent institutes which validate the data to always ensure that regulations are met.

Food safety is a high priority. All established procedures are bearing that in mind and certified by ISO 9001 for quality and ISO 22000 for food safety.

Resino is also very conscious about the environment and to prove environmental compliance, and thus we qualify to ISO 14001 certification.

www.resino.dk

ABLINGER INCREASES SLICING PERFORMANCE WITH THE FORMAX® SX330 FROM PROVISUR

Ablinger headquarters in Oberndorf, near Salzburg

Since the company was founded in 1932, Ablinger has been a family-owned business with a love of craftsmanship. With 250 employees, more than 300 recipes are handcrafted at the Oberndorf site, near Salzburg, in over 1,500 packaging variations. In addition to the most popular products, such as Frankfurter, Munich white sausage, bacon and various types of ham, Ablinger attaches great importance to the preservation of traditional specialties, such as the Mettenwürstel or the motif roulades and pâtés at Christmas time. While partnering with almost all of Austria's retail chains, Ablinger has also been a reliable partner to the catering industry throughout Austria for many decades.

Partnership with Provisur

After many years of using the same equipment, Ablinger began the search for a new slicer for their processing line. They connected with Provisur Technologies, who could provide them with a solution that will help them to automate their process, resulting in timing-savings, better product presentation and ultimately, higher yields.

"The Formax SX330 Automatic slicer is the first slicer from Provisur that we have put into operation for our bacon production at Ablinger. After many years of cooperation with another slicer manufacturer, we were convinced by the technology and the slicing pattern of the SX330 Automatic. The automated feeding of the products results in significant time-savings and the slicing presentation is much better due to the involute blade. Due to technical innovations, such as the aforementioned automated feeding, it was also possible to increase the slicing capacity here." Franz Ablinger Jr.

Franz Ablinger Jr. added: "We are very satisfied with the partnership with Provisur. The setup of the slicer in our production room and the follow up service has been very positive so far. We are happy with the decision to switch to the Formax SX330 Automatic slicer and look forward to further cooperation with Provisur."

Automatic feeding saves time

Formax Slicer SX330

Provisur sets new standards with the Formax SX330 Slicer: high throughput, with a small footprint, flexible configuration for a wide range of products, user-friendly design and optional on-site expansion potential. At 330

Franz Ablinger Jr.,owner, Production manager

Formax SX330 in action at Ablinger

x 160 mm, it also has the largest cutting throat in its class. The innovative slicing system, with the involute blade, also ensures top performance with a cutting capacity of 1000 or 1500 cuts/minute, which is unrivalled for this size of slicer.

Provisur Technologies

Provisur Technologies is an innovative supplier of industrial food processing machinery and integrated production systems for processing a wide range of food products. Since the group was founded in 2009, Provisur has steadily expanded its portfolio with well-known brands: AM2C, Beehive, Cashin, Formax, Hoegger, Lutetia, Multitec, and Weiler.

That is what's behind the formula for success: Provisur employs an innovative team of well-trained professionals, engineers and technologists. These specialists not only have a great deal of know-how regarding customers' processing operations, but they have also worked directly on processing equipment themselves.

Bacon packed for gastronomy

In addition, they now combine their practical experience with modern software tools to design even better systems.

Provisur maintains factories, offices and customer service centers in the USA, the Netherlands, Germany, France, Brazil, China, Thailand and Switzerland. In addition, Provisur is present with sales and service partners in almost every market worldwide.

www.provisur.com

IoT IN WEIGHING AND LABELING

How Digitization in the Field of Weighing and Labeling Technology is Changing Day-to-Day Meat Production

By Nadina Krauss

In the past, classic performance parameters of machines, such as the speed of a machine, were the measure of all things in production. Nowadays, the highest performance parameters are assumed to be a must criterion when choosing a machine. Instead, in the course of digitization, the focus is being placed on the online capability and interconnectivity of machines. The aim is to make production processes more efficient than ever and to minimize downtimes in everyday production. Particularly in the end-of-line area of production, i.e., where products are packaged, weighed and labeled, a large amount of product data and machine data come together that can be used with an added value for machine status and performance control via digitization. But where do we currently stand in the everyday production of the meat industry with regard to digitization and which technologies will already accompany our everyday production in the near future?

Automated Product Weighing and Product Labeling Made Easy Thanks to Digital Connection to Enterprise Resource Planning Systems (ERP)

For the end consumer, it is a matter of course that he receives all relevant product information via the label when buying a meat product. Both, weight-price information or best-before dates as well as nutritional value and allergen information are displayed via the label. For the barbecue season, product-specific preparation recommendations are even printed on the label, depending on the weight of the product. All of this and many more individual information have to be printed in the daily production on a product via the label.

But how does this information get onto the label and how can the variety of product information to be printed be managed in everyday production?

Online connections of machines, such as weighing and labeling systems, are becoming more important than ever. As the variety of products increases, so does the variety of information. In the meantime, new product assortments with a wide variety of information are created in meat production plants every day, which must be visibly declared on the product for the end consumer. This takes place within the last production steps of meat production. Immediately after packaging and weighing, individual product labeling takes place.

All product-relevant information is created and maintained in ERP Systems or production databases. Every new product that is added to the range is recorded in full. This includes, for example, the article number, article description, product texts, daily updated price information, shelf-life information, allergen information, shelf-life information or barcode information for scanning at the supermarket checkout.

How Does the Information Get on the Label?

Via an online interface, the data is transmitted online from the ERP System to the corresponding labeling machines in real time. Each product has a unique article number. If this is started on the machine side as part of an order, the interface pulls all the information belonging to this article number from the database and passes it on to the machine in real time for printing the data on the label. Sequential processing of orders is possible. But also chaotic order processing up to batch size 1 can be implemented without loss of time.

In order to be able to guarantee the desired production speeds, which is sometimes as high as 140 packs per minute, even during the labeling process, it is important for the machine to have a so-called preselection memory for order processing. Orders are already preloaded on the machine and will then be processed in the desired sequence. This means that there is no online waiting time when changing jobs. This significantly reduces downtimes. Especially for companies that process small batches.

The real-time connection of machines to ERP Systems guarantees that the latest product information is always included on the label. It is now even possible to report production data from the labeling machines back to the ERP System. This enables the automated creation of delivery documents. Thus, after each completed order, the labeling system automatically reports back digitally the produced quantity together with weight and price information to the ERP System for the creation of delivery documents.

In the course of digital production processes, a large proportion of meat producers now choose the path of online data transmission to labeling systems. A large proportion of producers even do this in real time, so that the transmission of up-to-date product data is guaranteed. The classic USB stick for transmitting product data has long since been superseded in the meat industry. It is important to ensure that the online connection interface to the ERP System is completely system-independent and manufacturer-independent. This gives maximum flexibility and independence.

Smart Machine Functions Reduce Unplanned Downtime and Increase Production Efficiency - Digitization Makes it Possible.

However, digitization is more than just the online connection of machines to databases. Another major step, thanks to digital technologies, is the generation and evaluation of machine data to improve the performance of production processes. New technologies, such as sensors and actuators, enable the collection of real-time machine data. For example, simple temperature sensors can detect a possible system overheating at an early stage and avoid an unplanned shutdown of a system or even an entire production line by quickly initiating measures. But more complex machine analyses are also possible. For example, the wear of motors is recorded in real-time so that maintenance or service measures can be carried out in a planned manner and spontaneous, unplanned downtimes can be avoided.

In the area of labeling freshly packaged meat products, digital solutions are an absolute revolution, for example in the area of the thermal head of printing units. The thermal head ensures that the product information is printed on a label and is still a machine component today that regularly leads to unplanned downtimes in production due to its unpredictable wear. For the first time, digitization makes it possible to determine the real-time wear of the thermal head and to provide the machine operator or the maintenance team with early feedback on the measured remaining lifetime of a thermal head and when it needs to be replaced before the system comes to an unplanned standstill caused by worse printing quality.

Thanks to such smart functions, service and maintenance measures can be better planned in advance. Under the term PREDICITIVE MAINTENANCE, they are

increasingly finding their way into everyday production. For production operations, such smart functions can be easily integrated into the daily work routine. No additional IT infrastructure is required. New machine generations are equipped with the corresponding smart functions and provide early notification of upcoming maintenance measures via the machine terminal or optionally via any terminal such as tablets, PCs or smartphones.

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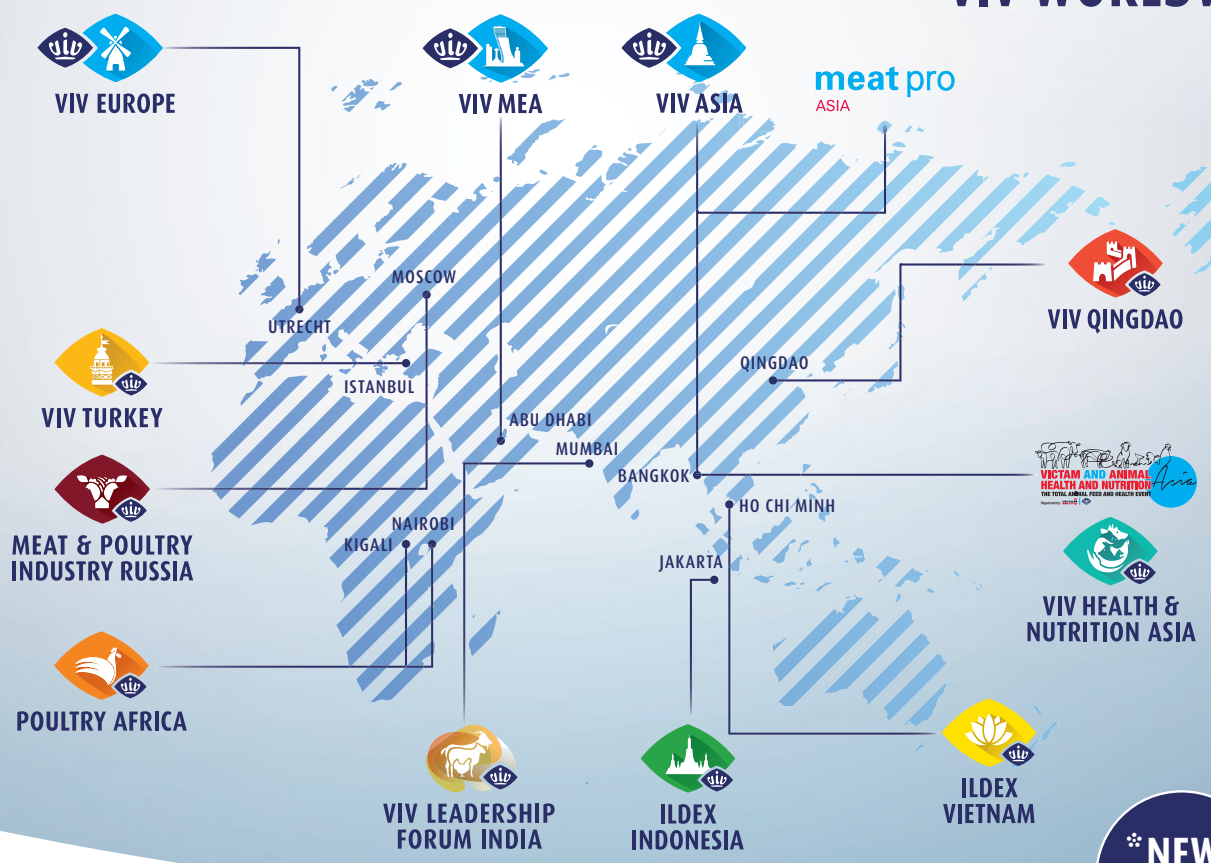

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