

GLOBAL PACKAGING RESEARCH

The international packaging research and education newsletter

Upping post-harvest performance

The role of packaging in minimising food losses in mature markets has attracted increasing attention, but one of the keynote speakers opening IAPRI's May Symposium in Lausanne, Switzerland, focused specifically on the huge contribution that post-harvest packaging improvements can make in developing economies.



Rosa Rolle

Rosa Rolle, senior enterprise development officer at the Food and Agriculture Organisation (FAO), highlighted the fact that the world's population is forecast to rise from around 7.1bn now to 9.2bn by 2050, straining our ability to meet our own food needs.

Three years ago, FAO estimated that some developing countries will need to increase food production by 77% before 2050 in order to feed their growing populations.

Given the limited scope for expanding capacity and the negative effects of climate change and water scarcity, a heavier emphasis is falling on preventing post-harvest food losses. FAO projects have found

that post-harvest losses in South Asia account for up to 46% of the tomato crop and 52% of cauliflowers and snap beans.

The choice of packaging has a significant impact on these losses. In

Bangladesh, taking produce such as tomatoes to market in 50kg nets led to a 32% loss in saleable volumes over three days. These losses were minimised when traders moved to 25kg plastics crates

"We are currently working on business models to manage, maintain and sanitise plastics crates," she said.

She was sure about one thing: "The work of packaging experts is pivotal in helping with the problem of stemming food losses."

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Lifetime Achievement nominations

Nominations are invited for IAPRI's Lifetime Achievement Award, which recognises an individual's contribution over many years to the IAPRI packaging research community, both in terms of scientific work and service, and their help in advancing its growth and reputation.

The Award will be presented at the 2018 IAPRI Conference in Zhuhai, China (19-22 June 2018), and nominations should be sent to the Secretary General by 1 February 2018.

Those currently serving as Board Members are not eligible for the Award. Nominations will then be considered by a sub-committee of the Board. The Award will cover the recipient's airfare and Conference registration up to a sum of £1,000.

Previous recipients have included Anders Soras, Bruce Harte and Luis Madi.

More details at: www.iapri.org/about-us/lifetime-achievement-award/

Comment

Swiss peaks

Appropriately enough for an event staged in Switzerland, there were many highpoints to the May IAPRI Symposium in Lausanne.

Thanks are due to our hosts at the spectacular Olympic Museum, HEIG-VD and Nestlé Research Center, for the intricately-planned and well-organised programme. The hard work of Eric Martine, Yves Wyser and their teams produced impressive results, not least in the memorable social events. Likewise, the application of the Scientific Committee showed in the range and calibre of the presentations.

One of the 'peaks' that stands out was the magic-filled official dinner, made all the more enjoyable thanks to the presence of former IAPRI President Thomas Goedecke. Of course, this was also Marie Rushton's last dinner as Secretary General (see story on this page). As I witnessed this moment of leadership transition, I felt confident that new President Jay Singh and incoming Secretary General Ed Church would bring IAPRI to the next milestone, just as Thomas and Marie did over the past few years.

We were also treated to some excellent keynote presentations, a reminder from Niels Brouwers about the continuing value of the IAPRI Student Exchange Scholarship and well-deserved prizes for the best presentations.

If all that were not enough, we will always have the breathtaking views across Lac Lemman and, in the Museum buffets, the frisson of never quite knowing what quirky delicacy would emerge from the kitchen next.

Changfeng Ge,
Rochester Institute of Technology

Change of Secretary General

In January 2018, Marie Rushton will be leaving the position of IAPRI Secretary General that she has held for 16 years, at which point Ed Church will step into the role.

"From general members to Board Members, we have all been inspired by Marie's ability to combine impressive organisational skills with unassailable warmth, charm and diplomacy," says IAPRI President Jay Singh.

At the official dinner at the Lausanne Symposium in May, IAPRI President Jay Singh presented Marie Rushton and former IAPRI President Thomas Goedecke with plaques in grateful appreciation of the contribution they have both made over the years to the growth and success of IAPRI.



Marie Rushton

Nominated for the post by the Board, Ed Church (formerly president of the International Safe Transit Association – ISTA) was subsequently elected as incoming Secretary General by the IAPRI General Meeting. There will be a transition period between the outgoing and incoming Secretary General from October 2017 to January 2018.

News in Brief

IIT Roorkee, India, is seeking to recruit up to three new faculty members in the role of assistant professor for its Flexible Packaging Technology Program. Applicants of Indian and overseas origin are welcome to submit a CV to head of department Prof Yuvraj Singh Negi (yuvrajnegi@gmail.com). Terms and conditions will be decided with interested candidates for an initial contract period of five years.

The University of Monterrey (UEM), Mexico, is launching a new Master's degree in Product and Packaging Design (MDPE), with an emphasis on integrating design across these two areas. The course will last two years, or six quarters, and include 13 online classes. "We are offering an online master's as a way of targeting the wider Latin American market," says Cristina Guzman. "Some 70% of professors on the course are international and around 30% in-house." Contact cristina.guzman@udem.edu or visit www.udem.edu.mx/mdpe

Organisers of the **2018 IAPRI Conference** in Zhuhai, China (19-22 June 2018) remind potential contributors that the deadline for submitting both full papers for the peer-review stream and abstracts for all other presentations is 15 December 2017. www.2018iapriconference.org

Søren Østergaard of the Danish Technological Institute was one of four recipients of the World Packaging Organisation's (WPO's) prestigious Lifetime Achievement in Packaging award, presented during the WorldStar ceremony in May this year.

Cal Poly University, California, has appointed US industry veteran Brent Moore as administrative director of its new Center for the Packaging Value Chain. Moore's 20-year career in packaging R&D and supply chain management included key positions at Mars Inc. Next year, Cal Poly will launch a new online MSc degree on the Packaging Value Chain.

Working Groups meet ahead of Lausanne Symposium

As on previous occasions, the IAPRI Working Groups (WGs) met the day before the start of the May Symposium in Lausanne, Switzerland.

The current, active WGs which met were: Sustainable Packaging; Distribution Packaging; Packaging and the Consumer and the new Packaging Materials group.

In the Sustainable Packaging WG meeting, chair Carlos Diaz, led off with an important question that many are asking: "Is the 'Circular Economy' a new frontier for packaging, or simply a repackaging of old sustainability concepts?"

The debate was lively, well-informed and wide-ranging, taking in the Ellen MacArthur Foundation's recent reports on the 'New Plastics Economy' and the role (and potential role) of returnable packaging, biodegradable/compostable packaging and energy recovery. Other themes included zero-waste and ways of deriving value from packaging waste. Rafael Auras provided an update on the Packaging Saves Food research group.

Points were also raised regarding packaging being just one relatively small part of a much bigger waste (and litter) problem, and regarding the contrasting challenges in various parts of the world, such as Europe and Latin America, which perhaps require different interpretations of the 'circular economy' concept.

The new Materials group, which incorporates the pre-existing Flexible Packaging group, was chaired by Maria José Galotto. Again, the discussion touched on a huge range of topics, each of which could have fuelled a full-scale debate in its own right. Themes included: polyethylene furanoate (PEF), the biobased replacement for polyethylene terephthalate (PET); sustainable and recyclable barrier materials; the recycling of multilayer barrier materials; (again) biodegradables, and how they are regarded in different regions; the risks around 'oxodegradable' additives.



(L to R) Laszlo Horvath, Jay Singh and Lansmont's Eric Joneson at the prize ceremony

Among other concerns discussed were: the availability and scalability of new-generation materials such as 'drop-in' biobased polymers and PEF; the challenges of using nano-composites in food-contact applications; likely benefits and possible applications of graphene in a polymer matrix.

Galotto raised the question of why it took so long for antimicrobial and antioxidant active solutions to generate commercial applications. Doubts about uncertain market impacts, potential legal liabilities and – not least – cost were cited as explanations. Mention was also made of the need for customised, product-specific solutions, as opposed to universal systems.

The main topic of discussion in the Distribution Packaging WG was how the group could keep in touch, and progress discussions throughout the year (rather than relying on a single annual meeting).

The EU's Circular Economy package and its influence on EU packaging development, dominated discussions in the Packaging and the Consumer WG, just as it did in the Sustainability WG. Chair Virpi Korhonen explained: "It is a huge driver for the whole industry, developing packaging to help reduce food waste and increase recycling rates of packaging materials up to 80% by 2030."

Prize-winners

Singling out IAPRI Prize winners for the best Symposium presentations is never an easy task, given the high standards all round, and the Lausanne Symposium was no exception to this rule.

The judging panel chose Laszlo Horvath of Virginia Tech's Center for Packaging and Unit Load Design as the winner of the prize for Most Promising Scientific Work, generously sponsored by Lansmont Corporation. This was for Horvath's paper: 'Application of Beam on Elastic Foundation to the Interaction between a Corrugated Box and Pallet Deckboard'.

The prize for overall Best Oral Presentation went to Euihark Lee of Rutgers University for his paper 'An Origami-Inspired Deployable Cushioning Structure Design'.

Winner of the Best Poster prize was Péter Csavajda of Széchenyi Istvan University in Győr, Hungary. The title of the winning poster presentation was: 'Climate Environment in Packaging Testing versus Field-Measured Data'.

Each winner receives the sum of 500 euros as a prize.

Packaging design metrics: masterstroke or mirage?

With many stakeholders to satisfy, pack development projects are too often mismanaged. How can management of the process be improved and design impacts measured before launch?

When the UK's Design Business Association introduced its Design Effectiveness Awards in 1989, it signalled a dramatic shift for the industry. Design was no longer just about who could shout loudest, or already had the most clout as a brand; success in the awards was scrupulously linked to quantifiable impacts in terms of sales and other key metrics.

Today, brand-owners and packaging designers would love to be able to turn this around: to measure and quantify success in a similar way – but before launch, not retrospectively. This may seem a long way off, but given that new product launches are notoriously fraught with risk, it is hardly surprising that designers and researchers are looking hard at making pack design less of an art and more of a science.

As well as being a professor in the Packaging Design department of Twente University in the Netherlands, Roland ten Klooster is a partner in private design company Plato Product Consultants.

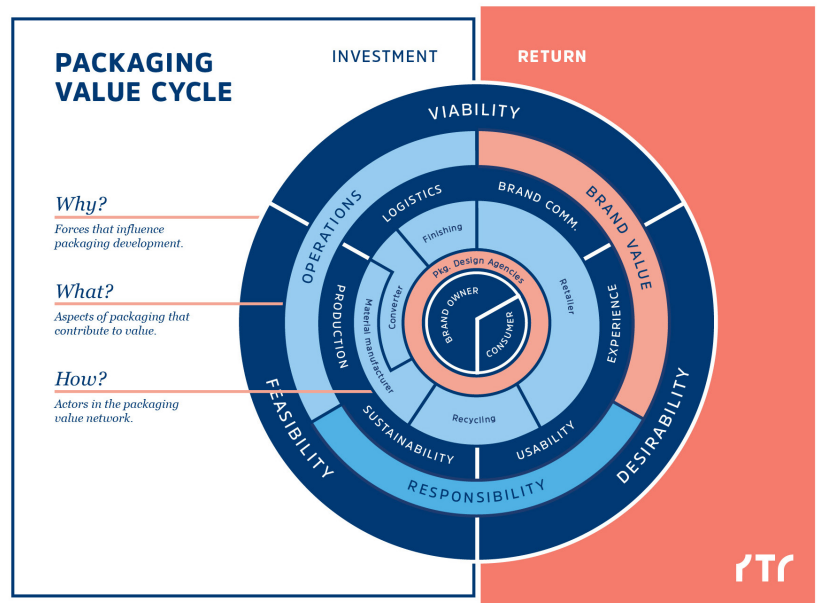
In his presentation at the IAPRI Symposium in Lausanne in May, he talked about generating a “collection of packaging material key figures,” in the sense of minimum and maximum material amounts, dependent on function. As he pointed out: “When it comes to packaging prevention, somewhere there is an unwritten rule that whatever the market accepts can be taken to market.”

He added: “A lot of companies don't do their own testing on the specific pack they develop and produce. As a result, you see a lot of leaking packages on the shelves.”

As well as physical testing, finite element methods should also be undertaken as a standard part of the design process, he argued.

In most cases, it was difficult to justify a complete change of material and pack format, Klooster claimed. “If you move your product out of a can and into a pouch, for instance, it can take up to six months to recover the same production efficiencies. It generally makes sense to stay within the existing pack concept, but while trying to optimise it.”

His team's research collated and analysed data on packaging



weights on the micro-level (packs used for the same product), the meso-level, where items such as tomatoes or different fruits are packed and marketed in quite different ways, and the macro-level. Macro refers to overall per capita consumption of packaging.

The findings showed that key figures for packaging weight can be established at the micro-level, so long as the comparison is between product-and-pack combinations with similar shelf-lives and similar functions.

“Benchmarking at the micro-level should be the starting point for design,” he explained. “At the meso-level, it is about assigning certain amounts of material to given features.”

As Klooster pointed out, benchmarking is used in other areas such as energy use for appliances, fuel economy for cars and energy efficiency for buildings. Such figures could, with further research, provide a useful tool for packaging designers, he said.

A correlation between weight and function is only one of the ways in which designs can be assessed pre-emptively. Also at the Lausanne Symposium, Satu Jokinen and Virpi Korhonen, both of Package Testing & Research (PTR), Finland, separately presented two design-related concepts which arose out of the Valuepack

research consortium, which PTR co-ordinated between 2014 and '16.

Explaining the Packaging Value Cycle (PVC) Framework, Jokinen said: "Our team tried to translate consumer value into business value, in the sense that, if brands invest more, this provides better return on investment (ROI)." The "desired outcome" outlined in her Lausanne paper was "a first draft of an estimation tool". Even at the concept stage, she emphasised, the likely outcome was only ever imagined as "a ballpark figure".

The challenge, as in so many areas, came with attempts to quantify ROI. As she explained, the "vastness of the subject matter" led to the aim being modified. "I know that marketing carries out some ROI calculations," she said. "But how that would work within packaging, and how you would distinguish investment and return in one area and another is more difficult to determine."

PTR's starting point was, clearly, that well-designed consumer research has real value within packaging design. But Jokinen asked: "A client might commission eye-tracking trials or focus groups. But how well does a focus group, for example, measure key metrics such as willingness to pay?"

In many ways, the paradox at the heart of this attempt to quantify ROI on consumer research is that much of the most valuable research is of its very nature qualitative.

During the project, the focus of the PVC shifted more towards an understanding of the dynamics behind investment and ROI in a packaging context – and the ways in which those dynamics can be communicated.

'The evolution of pack designs should involve the consumer. Typically today, it doesn't'

"Above all, we try to convince clients to carry out consumer research at the beginning of a project," said Jokinen. "This means that, by the middle of a process, there are likely to be different concepts under consideration, and the entire project develops differently."

Designing and managing that consumer research can be challenging – and getting it wrong can have far-reaching effects. Coca-Cola recently posted a blog recounting key stages in the development process for its 'spiral' Fanta bottle. A long way into



Fanta's new spiral bottle

the process, the new structural design failed to outperform the existing pack in consumer eye-tracking trials. Months later, it was only the initiative of a regional manager which saved the design from probable oblivion, as a result of that one 'failed' test, speeding it instead towards an international future.

In her own presentation in Lausanne, MD of PTR Virpi Korhonen outlined progress with the Package Value Toolkit (PVT). "This aims to measure the benefits and the costs of packaging," she said, explaining that it factored in drawbacks such as difficulties with recycling or problems with opening.

Like Jokinen, she was understandably keen to talk up the role of the consumer in the development process. "The evolution of pack designs should involve the consumer," she said. "Typically today, it doesn't. What's more, testing should imply interaction between the consumer and the package."

By the time of the Symposium, PTR had run around 80 pack concepts through the toolkit. PTR started off with over 350 unique attributes to describe packaging, but has since cut the number down dramatically. The company is currently developing a second version of its digital toolkit software.

In his Symposium presentation, Klooster at Twente highlighted demand in the product and packaging design industry for university-educated entrants. In particular, he explained, this demand reflects the growing complexity and the balancing of different technical elements required by today's packaging design.

Like Jokinen at PTR, he underlined the huge number of issues needing to be taken into account in packaging design. "There is a general lack of management in the design process. How do you manage all of these issues?" he asked.

One of the challenges, said Klooster, was the complex network of stakeholders, each with their own requirements and perspectives with regard to a single pack.

For her part, Jokinen said that, of course, brand-owners were aware of these different considerations, but they tended to be addressed discretely in 'silos'.

Even if these and other new strategies in relation to packaging design allow the creation of few, if any, best-practice metrics, progress towards improved standards of design project co-ordination and management would be another significant mark of success.

ptr.fi
utwente.nl

Lappeenranta University of Technology: Finnish fibre-based research

Packaging technology research only began in its own right at the Lappeenranta University of Technology (LUT), Finland, around 15 years ago. But research in the overlapping areas of Pulp & Paper and Production Engineering had gone on for decades before then. "These two areas still act in synergy and form the foundation of our packaging research," explains project manager in the Packaging Technology research group Ville Leminen.

The university itself was founded in 1969.

The research group operates as a part of the Production Engineering laboratory, which in turn is part of the Mechanical Engineering department. Leminen says: "We currently have around 15 people working in packaging research, of which two are professors (Juha Varis and Kaj Backfolk) and five are post-doctoral researchers. Those researchers, of whom Leminen is one, have a background in either mechanical engineering or pulp & paper technology.

LUT offers courses in packaging technology for many of its Master's Degree programmes. There is also a minor in packaging technology which is often selected by mechanical engineering students. "On average, one person per year graduates as a doctor in a field related to packaging technology," says Leminen.

'We have facilities for converting fibre-based materials, especially three-dimensional forming, MAP and quality evaluation of formed packages'

The packaging research group has two main laboratories: the packaging technology lab and the fibre and paper technology lab. "We have excellent facilities for converting fibre-based materials, especially three-dimensional forming, modified atmosphere packaging (MAP) and quality evaluation of formed packages," he explains.

The labs also boast a wide range of equipment for measuring the mechanical properties of materials. "We aim to invest in laboratory equipment on a regular basis, and from the beginning of next year, we will be moving to renovated laboratory facilities," Leminen adds. "Currently, we are also investing in a new oxygen transmission rate (OTR) measurement device."

Given the nature and heritage of Finland's economy, it comes as little surprise that fibre-based materials, and research into their



Pressed fibre packaging

convertability, form the main focus for the Packaging Technology group. "Our work includes process, tooling and machinery development, as well as prototype manufacturing for novel converting solutions," he says. "Coating research, such as bio-based coatings, is also of great interest."

One current project, 'Packer 2020', involves the development of a system for press-forming paperboard packaging. The project, carried out in co-operation with VTT and Åbo Akademi University, aims to produce a system suitable for small and medium-sized manufacturers.

Co-operation with industry constitutes another important plank of LUT's research, especially in the fields of material and machinery development. As Leminen explains, universities and industry generally work together on both public projects and contract research. "An example of a public project where LUT participates and has close industry co-operation is ACel (Advanced Cellulose to Novel Products), which has a large group of industrial partners from different parts of the value chain."

Different Finnish universities tend to each have their own research focus, says Leminen, and this benefits co-operative projects. But LUT is equally alive to the opportunities offered by international research. "IAPRI offers excellent possibilities for creating networks for research co-operation. New international partners are very welcome to contact us with suggestions."

More broadly, LUT's strategy is to focus on the circular economy and renewable resources. "We hope to continue working at a high scientific level in our selected strategic focus areas, such as fibre-based materials development and converting research," he says.

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IAPRI was established in 1971 as an international membership association to promote packaging research. It is a unique global network which allows organisations to communicate and develop ideas, exchange experiences and in many cases reduce duplication of effort. For more information please contact: IAPRI Secretary General, Marie Rushton e: marierushtoniapri@gmail.com
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