THE OTHER 50 PERCENT.

Why using the by-products from meat production not only makes sense economically, but is also environmentally responsible – as explained by **Dr. Martin Alm**.

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GREATER APPRECIATION OF ANIMAL BY-PRODUCTS.

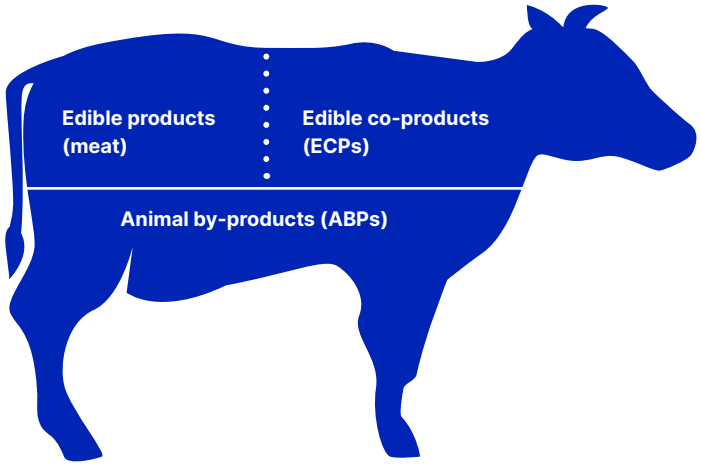
The expert:
Dr. Martin Alm in the GEA white paper

One person who knows this field better than any other is Dr. Martin Alm. Career highlights include a doctorate in biochemistry, his many years of work in research and development at Saria Bio-Industries, the role of technical director at EFPRA (European Fat Processors and Renderers Association) since 2009, and the office of President of the World Renderers Organization (WRO) from 2019 to 2021. International crises, changing legislation, various realignment measures – he has witnessed a great deal on the journey to his current roles, all the while remaining closely involved in industrial practice. In this white paper, he shares his views on animal by-products.

“The other 50 percent” is probably the most underestimated half – everything that doesn’t directly end up on our plates in the course of meat production. The fact that almost every part of the animal can now be rendered thanks to modern process technology makes “the other 50 percent” an important resource for proteins, fats and biofuels.

Animal by-products – an industry positioned between invisibility and increasing importance

When it comes to animal-based products, we frequently only consider the half that we directly use – the edible parts that are sold in supermarkets and seen in advertising campaigns. What becomes of the by-products, which account for up to 50 percent of the animal on average, usually remains hidden. It is important to know that a distinction is made between animal by-products (ABPs) – the parts that are not suitable for human consumption – and edible co-products (ECPs), which are intended for human consumption but must firstly be processed. Dr. Martin Alm has this to say about the “hidden” work: “This is now changing because we are on the way to becoming a more sustainable economy. The best approach to using resources is the one where virtually nothing is left over. And one where everything that is recycled is combined with creating the highest possible value. Our ancestors were well aware of this: They were always keen to use as much of an animal as possible, not just for economic reasons, but also to save resources. If I make the decision to keep and rear animals for the purpose of producing food, I cannot simply throw half of everything away just because I cannot directly use it. Besides, there are valuable resources in the by-products.”



What is considered an animal by-product?
"We have stringent regulations in Europe: Everything that is derived from animals and no longer intended for human consumption is classified as an ABP and that is irreversible," stresses Martin Alm. "Animals that die on the farm, or parts of slaughtered animals that we cannot or are not allowed to eat, automatically receive this declaration. But it should be remembered that carcasses are portioned in slaughterhouses and bones are separated from the meat. If the bone remains on the meat – as in the case of the T-bone steak, for example – then both remain meat. The bones that are removed, however, can be used in different ways. It is then up to the business owner to decide whether they are used as edible co-products (ECPs) or as ABPs. If, for instance, the bones are used for the production of gelatin, then they are a co-product rather than an animal by-product, because they are still approved for consumption."

The honeybee example
A different area, but a helpful explanation: "If you washed your hair with honey shampoo this morning, this honey from the apiary has been designated for use outside the human food chain. In other words, it has been downgraded from a foodstuff to an animal by-product."

The scale of the task in Europe alone

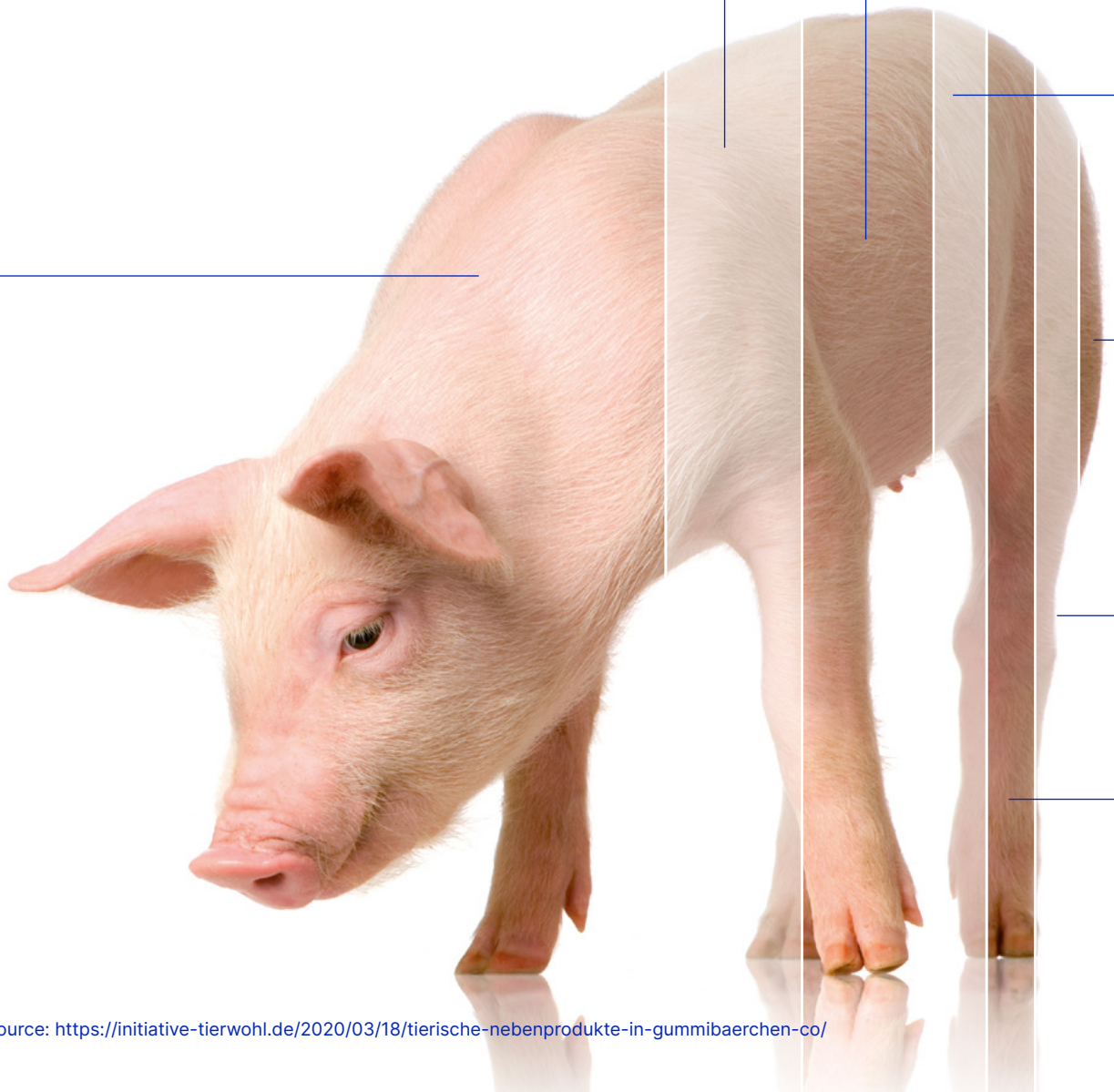
17
million metric tons
of animal by-products
are processed

6
million metric tons
of valuable substances
are recovered

186
thousand metric tons
of edible fats
are produced

Source: EFPRA, July 2023

THE POTENTIAL OF RENDERING TODAY.



15%
Paper, cork, fabric softener

14%
Pet food, drumheads, heart valves (surgery)

6%
Food, pet food, animal feed

52%

3%
Collagen (cosmetic surgery), chewing gum, brushes

5%
Biodiesel, soap, colored crayons

5%
Cigarette filters, fish food, toothpaste

The biggest selling pig by-products are:
- Heads
- Organs
- Intestines

The by-products are used to make more than 180 different products. Some examples are listed on the right.

A pig that weighs 119 kg has a carcass weight of 95 kg
- Meat 62 kg
- Bones 17 kg
- Organs 16 kg
- Ears, snout, tail 8 kg
- Blood 6 kg
- Fat 6 kg
- Skin and hair 4 kg

Source: https://initiative-tierwohl.de/2020/03/18/tierische-nebenprodukte-in-gummibaerchen-co/

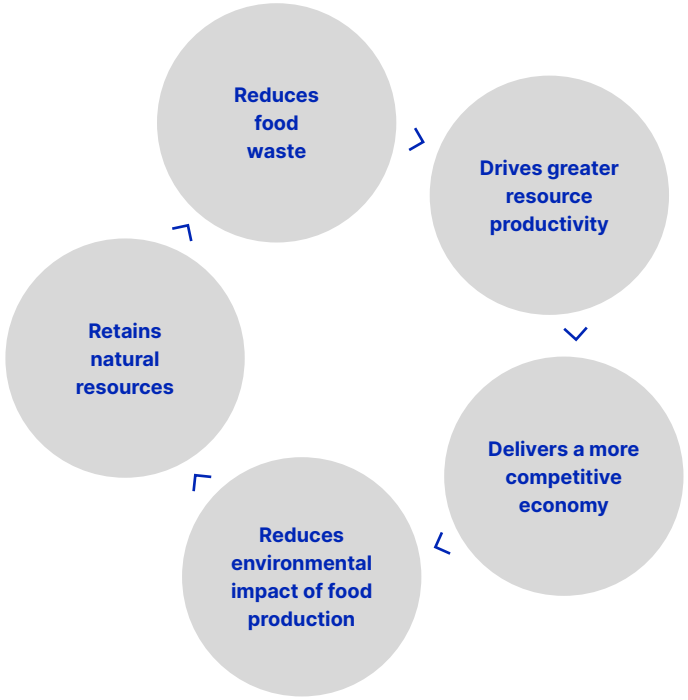
IT MAKES SENSE, MEETS DEMAND, AND CLOSES THE VALUE CHAIN.

Whether on the plate, in the trough or in the tank – the rendering options are diverse

The processing plants work with a very wide range of rendering processes. Martin Alm provides an overview: “From a chemical perspective, we have complex molecular structures in the starting product. We use this high molecular weight for clothing – as in the case of leather. The subcutaneous tissue along with the bones or skin are also used for gelatin – here we still have functional properties based on high-molecular structures. The same goes for blood plasma, which partly promotes the health of weakened animals through immunoglobulins, while also being able to naturally bind meat due to the fibrinogen it contains. The target products here are functional proteins. In the stage below – when rendering the material for pet food, for example – it is then sterilized, separated, dried, and stabilized. The low-molecular-weight components such as fatty acids or amino acids can be essential in feed. Another stage lower we find fertilizers, where the plants primarily benefit from the nutrients nitrogen and phosphorus, i.e. inorganic atoms The organic residue is used to form humus. We then come to the final rendering level, which is solely about the amount of energy contained. This is either obtained when used as fuel or may even be lost in the waste incineration process.”

The deal with fat

Martin Alm would also like to focus particular attention on the food fat rendering plants: “Pork fat in the human diet is an important source of vitamin D, although white and refined food fats are also in high demand in calf feeding. In Europe, the feed sector remains the area where the most feed-grade fats are used. A large proportion of this is also used in the biofuel and oleochemical sectors. Right now, it will also be exciting to see how the production of sustainable aviation fuel (SAF) will develop. Kerosene is currently many times more expensive than car diesel, and if progress were to be made in producing it from animal fats, there would be considerable market dynamics. European legislation has already paved the way for it. Let’s look at the other side of the pond: The USA has recently become an importer of animal fats – it was previously always an export-oriented country. This means that biofuels are a big deal there. In addition to corn and wheat for bioethanol, animal and vegetable fats are being used to produce bio- or renewable diesel as well as bio-kerosene (SAF).”



Sustainability Charter
From EFPRA’s Sustainability Charter – promoting safety and sustainability in the European food supply chain.

The background to EFPRA:
EFPRA represents the European animal by-product industry. Its aim is to continuously improve the safety, health, and sustainability of food production through efficient processing of animal fats and other by-products.

A focus on animal by-products (ABPs):
In the EU, they are subdivided into three categories.

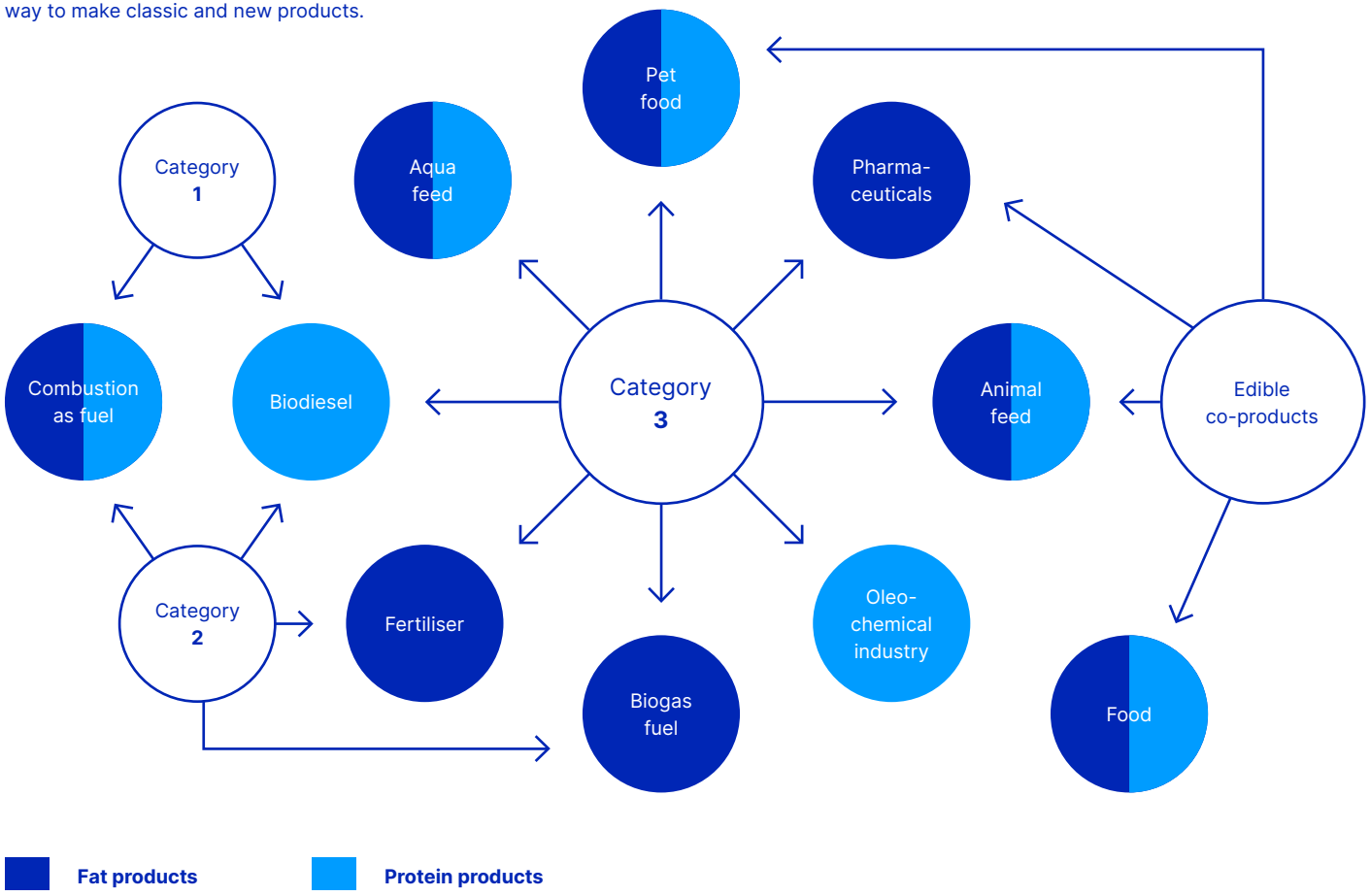
1 = Highest risk
Specified risk material related to nonclassical diseases such as BSE and scrapie (e.g. spinal cord + brain of cattle) / fallen stock (ruminants)

2 = Medium risk
Material not suitable for human consumption
Fallen stock (nonruminants/calves)

3 = Lowest risk
Food-grade or low-risk by-products of healthy slaughtered animals / Animal products with no specific disease risk such as eggs, mussels, feathers, bristles, and horns / Former food and catering waste

Source: EFPRA, July 2023

ECPs and ABPs
Using ECPs and ABPs is a highly efficient way to make classic and new products.



Circular bioeconomy at a new level

Anyone who is seeking solutions for greater sustainability has come to the right place: Alongside the lumber industry, rendering is one of the oldest circular bioeconomies. It goes without saying, however, that this circular economy for the value chain of food of animal origin is much safer, more efficient, and more diverse these days – not least thanks to modern process technology. "We are essentially the beating heart of the European meat industry because we make sure that whatever cannot be used directly is still usefully processed," stresses Martin Alm. "In the past, the by-products were often processed into animal feed, but today we place completely different demands on proteins. And when it comes to pet food, the hygiene standards are very similar to those in the food sector. Incidentally, since processed animal fats are usually produced regionally, it also helps to improve sustainability, making these by-products unbeatable compared to palm oil – the carbon footprints of our Category 3 products are a testament to this."

The better the structures, the less disposal effort involved

"The slaughter and production structures that we have in Europe are of course also owing to the fact that we have industrialized countries here with very high population densities – among animals too – and this means we can also ensure that by-products are processed regionally and quickly," Martin Alm points out. "Consequently, we only have disposal fees in Categories 1 and 2. This could even change with new markets such as SAF. There are always interesting questions for us to address: How are the market prices developing? What regions are currently making the transformation to modern by-product processing? And where can expertise and modern plants make new cycles for biogenic raw materials attractive and profitable?"

THE SOLUTIONS ARE THERE, AS ARE MANY GOOD REASONS FOR THE DECISION-MAKERS.

The industry needs solutions and tangible benefits
Process technology plays a key role in being able to secure real tangible benefits from the production of animal fats, proteins, and other products. What expectations does the industry have in terms of usability, innovation, and use of resources? "Europe is already at the cutting edge, especially in terms of energy, recycling, and the timeline. For the pet food sector, for example, this is highly interesting – the better I get from a process technology perspective, the more profitable the business becomes. It is also about the balance, how much energy and how much machinery I need to use to generate a certain number of tangible benefits. As an experienced technology partner, GEA is already a forerunner on account of its many projects worldwide," says Martin Alm.

Playing the leading role for bulk business and customer-specific solutions
Modern separators and decanters play a key role in the processing of by-products. There are technically advanced and future-proof solutions for performing the wide range of tasks – whether it specifically involves efficiently separating fat from water and greaves or reliably removing hemoglobin from blood plasma. Martin Alm has this to say: "At the outset, you need to consider whether you want standard solutions for bulk business or something customer-specific because you are launching a new trend product. I think GEA – and this is the strength of an interconnected company – is positioned in a way that enables it to master both options." And it is also the knowledge transfer from businesses across various industries – such as dairies, pharmaceutical and chemical firms, and companies specializing in vegetable proteins, biofuels, and environmental technology – that is fueling the search for solutions in process technology and the separation stage.

Animal by-products – today and tomorrow
Martin Alm gives his assessment: "We are always the secondary market and closely linked to developments in the meat market. Global demand, resource availability, and new energy and environmental regulations – these are all parameters that are also constantly changing our business. There have been surprises and there will be more of them – like biofuels. This was a market that came out of nowhere and has seen the strongest growth in the last decade and a half. The largest single market is currently pet food and animal feed – here we also hope that the laws governing the use of animal proteins will be relaxed. It goes without saying that the industry is also watching developments in the field of fat rendering with keen interest: The demand for fats in the SAF sector and possibly also in maritime transport in the future is likely to open up new perspectives."

"As soon as the efficiency and profitability of modern by-product processing is recognized, it will take off – all over the world."

GEA says:
Thank you to Dr. Martin Alm for the latest information, assessments, and sentiments from the world of by-products!

THESE TRENDS ARE BRINGING EVEN MORE DYNAMIC TO THE MARKET.

By-product – and then? When discussing trends and promising application areas, decision-makers should be focusing on these three subjects: pet food, collagen, and HVO. The third trend – HVO and the purchase of animal fats – is a very big issue, especially in the US markets.

The quality of products for pets is constantly improving

A great deal is happening not just with dog baskets, cat trees, and animal accessories, but particularly with food production for pets. Since hygienic requirements for processing by-products have been increasing for some time, there are already hardly any differences in food production in terms of the hygienic design of the process and the demands placed on the raw material. What's more, there is an increasing focus on animal health – with intensive developments and efforts to make pet food more consumable. The use of enzymes is just one way of optimizing it – by splitting larger protein complexes, the food can be digested better.

Collagen is growing in importance for a number of applications

This structural protein – which, at 30%, is also the most abundant protein in the human body – is growing in importance as an animal by-product. It is obtained from the skin of poultry, pigs, or cattle, for example. Due to its elastic and supportive properties, collagen has a wide range of uses – whether as a component of gelatin, as an anti-aging product in cosmetics, or as a material for hard or soft capsules in the pharmaceutical sector. Even in the specialized field of skin tissue engineering for severe burn injuries, there is still potential for collagen as a culture medium.

Animal fats are taking off with HVO

The greatest potential for animal fats, which are produced in the course of meat production anyway, lies in their use as a raw material for hydrotreated vegetable oil (HVO). The same goes for used cooking oil (UCO), which also serves as a natural raw material. Hydrotreated vegetable oil is of considerable interest to the aviation industry, which can use sustainable aviation fuel (SAF) to make its fuel supply more sustainable. Crude oil refineries also sense the opportunity to reduce their GHG (greenhouse gas) emissions and cut their costs with HVO. For this purpose, however, HVO must be specially treated and purified so as not to damage the refinery's catalysts – but there are already solutions for this as well.

We take you to the next level when rendering ECPs and ABPs.

Our specialists will be happy to show you the current GEA process lines and explain your options in detail. Why not also benefit from the strengths of process automation and a worldwide service network, including SLAs for the maintenance of the plants and their components.

The who's who of by-product process lines

Safe and fast processes, high yields, and outstanding product quality – separation technology from GEA, from separators for the production of blood plasma and blood meal, decanter centrifuges for rendering fat to complete process lines, is impressive in so many different ways.

Discover more at gea.com