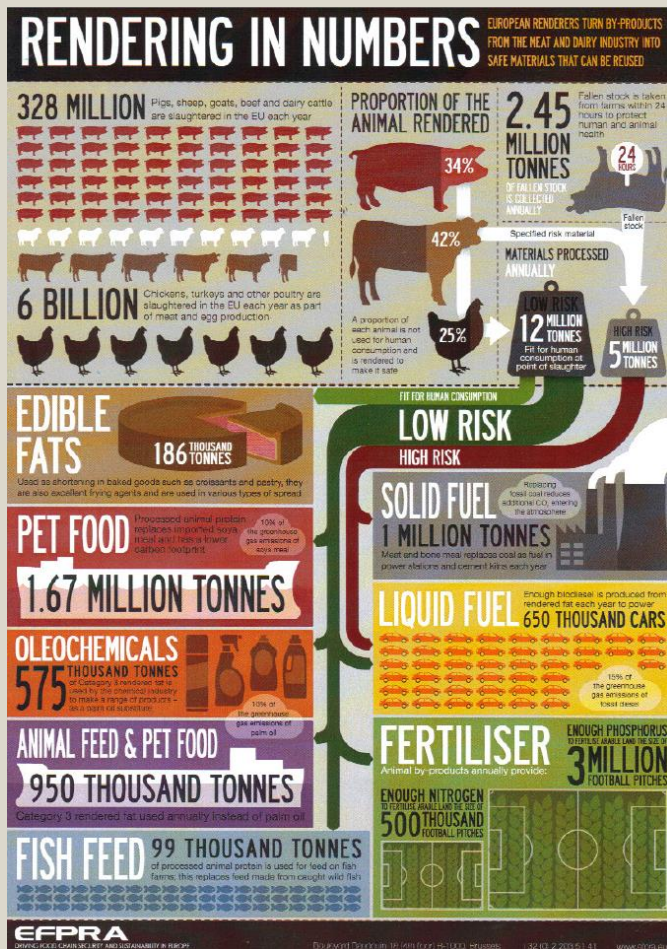


Necessary approaches for intended use of by-products in animal nutrition

ECVCN Residency Class, September 13th-14th 2016, Berlin, Germany

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Institute for Animal Nutrition, University of Veterinary Medicine Hannover, Foundation, Hanover, Germany



Content

- Traditional by-products
- Needs and potentials
- Animal by-products
- Restrictions
- Chances



<http://www.deutsche-apothekerzeitung.de...>

Traditionally used by-products



<http://www.getreide.org>

Cereal production

- straw as by-product



<http://www.grain.club.de>

Oil mill

- extraction meal
- further feedstuffs



<http://www.pflanzenforschung.de>

Sugar beet cultivation

- sugar beet pulp
- molasses



<http://www.wir-leben-genossenschaft.de>

Dairy processing

- skimmed milk
- whey etc.



<http://www.brauerei-falkenstein.de>

Brewery/Distillery

- brewer's grains
- stillage



<http://de.schede.com>

Meat/Fish processing

- animal by-products
- by-catches etc.



<http://www.lebensmittellexikon.de>

Corn mill

- bran



<http://sauewind-shop.de>

Corn mill

- pig/dog nutrition
- rabbit nutrition

adapted from Kamphues 2015

Reasons for the use of by-products

- Energy
- Protein
- Macro minerals
- Trace minerals
- Vitamins
- Undigestible (lignified substances)



Evaluation of by-products



Availability	Geographical	„User“	Monogastrics, ruminants
	Seasonal		Small/large stocks
Costs of disposal	Ecological damage	Effects on food	Used in specified species
	Payers		Kind of food
Chemical composition	DM, crude ash; OM	Effects for rations	Single feed
	Special ingredients		Only in mixed feeds
Spoilage	Microbiological quality	Financial costs	For the product as feed
	Growth conditions		For feeding (incl. technology)
Need for/costs of conditioning	Remove undesirable ingredients	Alternative ways of usage	Fats for technical purposes
	Measures of conservation		Organic material - biogas

adapted from Kamphues 2015

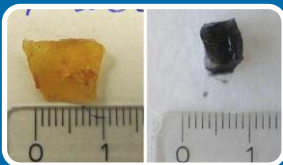
Principle risks of usage



<http://www.ritzefeld-gymnasium.de>

Adverse constituents/contaminants

- Salt content in bakery waste/chips
- Aldehydes in deep fat fryer fat



<http://lgl.bayern.de>

Contamination in production/storage/preparation

- *Salmonella* in animal by-products, epizootic pathogens
- „Foreign body“ in kitchen waste



Spoilage before sampling/feeding

- Microbial spoilage/toxins/mycotoxins
- Chemical processes – autoxidation of fats, vitamin loss



Species-typical restrictions/limitations

- Fat and sugar in ruminants
- Lactose in adult mammals/birds

adapted from Kamphues 2015

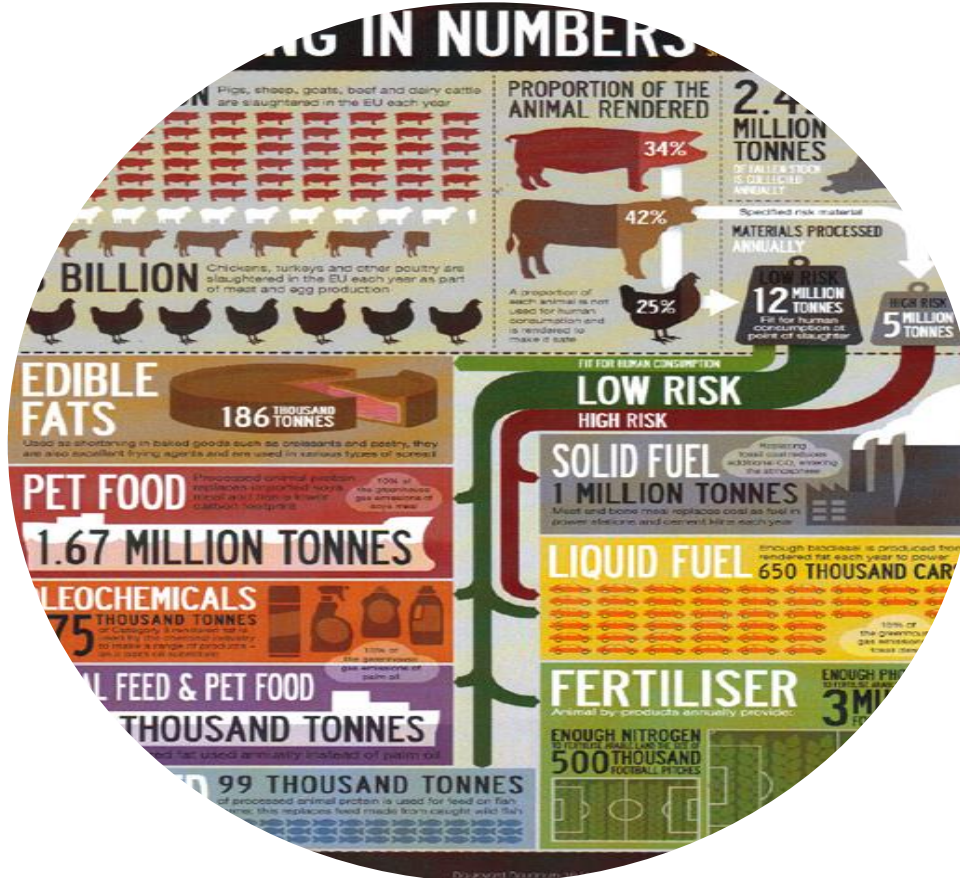
Examples for new by-products



- By-products from rapeseed oil processing, glycerine from biodiesel production
- Residues from “industrial plants” – linseed dodder residuals
- Wastes from the vegetable processing, potato peelings waste, vegetable cleaning waste
- Pressed juice from the sauerkraut production - lactic acid + org. acids
- DDGS – bioethanol production
- Insects

adapted from Kamphues 2015

Necessary approaches for intended use of by-products in animal nutrition



Animal by-products: Current situation and rebirth of certain areas of application

By-products - definition

Animal by-products



What are animal by-products?

Animal by-products (ABPs) are materials of animal origin that people do not consume. ABPs include among others:

- Animal feed - e.g. based on fishmeal and processed animal protein
- Organic fertilisers and soil improvers - e.g. manure, guano, processed OF/SI on the base of processed animal protein
- Technical products - e.g. pet food, hides and skins for leather, wool, blood for producing diagnostic tools

In the EU, over 20 million tons of ABPs emerge annually from slaughterhouses, plants producing food for human consumption, dairies and as fallen stock from farms.

ABPs can spread animal diseases (e.g. BSE) or chemical contaminants (e.g. dioxins) and can be dangerous to animal and human health if not properly disposed of. EU rules regulate their movement, processing and disposal.

ABPs are categorised according to their risk using the basic principles in [Regulation \(EC\) 1069/2009](#).

http://ec.europa.eu/food/safety/animal-by-products/index_en.htm

By-products - definition

EU Rules



Regulation (EC) 1069/2009 and **Commission Regulation (EU) 142/2011** replaced the old one (Regulation (EC) 1774/2002) consolidating several related acts into one. "Consolidated" means that the basic EU legislation, its amendments and corrections figure in a single document. As an informal document, the Commission assumes no responsibility for its content.

The current legislation allows for:

- Clear requirements based on ABPs' technical standards
- Enforcement measures for the new risk-proportionate approach
- End point in the manufacturing chain for processed and packaged pet food, biodiesel, tanned hides and skins and other products
- Less red tape for producers of medicines and diagnostics from ABPs
- Smoother official controls of laboratories of processing and biogas plants handling ABPs
- Better traceability from food production
- Risk-proportionate solutions for transport, processing, use and imports

http://ec.europa.eu/food/safety/animal-by-products/eu-rules/index_en.htm

By-products - definition



Whereas:

- (1) Regulation (EC) No 1069/2009 lays down animal and public health rules for animal by-products and products derived thereof. That Regulation determines the circumstances under which animal by-products are to be disposed of, in order to prevent the spreading of risks for public and animal health. In addition, that Regulation specifies under which conditions animal by-products may be used for applications in animal feed and for various purposes, such as in cosmetics, medicinal products and technical applications. It also lays down obligations for operators to handle animal by-products within establishments and plants which are subject to official controls.

By-products - definition



COMMISSION REGULATION (EU) No 142/2011 of 25 February 2011

implementing Regulation (EC) No 1069/2009 of the European Parliament and of the Council laying down health rules as regards animal by-products and derived products not intended for human consumption and implementing Council Directive 97/78/EC as regards certain samples and items exempt from veterinary checks at the border under that Directive

(Text with EEA relevance)

(OJ L 54, 26.2.2011, p. 1)

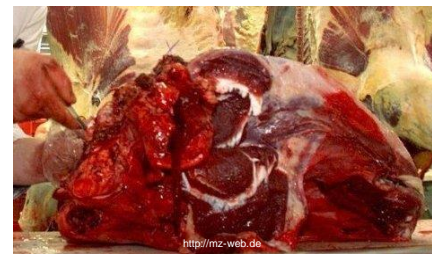
<http://www.efpra.eu/Objects/3/Files/Factsaboutrenderingv08WebPDF.pdf>

By-products - definition

Animal by-products are divided into three risk categories according to the degree of the risk to the health of humans and animals (1069/2009)



Category 1 (highest risk)	Specified risk material linked to non-classical diseases like BSE & scrapie, this includes the bovine spinal cord and brain Fallen stock (ruminants) Anything handled with Category 1
Category 2	Material not fit for human consumption Fallen stock (non-ruminants)
Category 3 (lowest risk)	Fit for human consumption at the point of slaughter Animal products without a specified disease risk like egg shells, feathers, bristles and horns Former foodstuffs and catering waste



<http://www.efpra.eu/Objects/3/Files/Factsaboutrenderingv08WebPDF.pdf>

Necessary approaches for intended use of by-products in animal nutrition



By-products - sources



If not managed properly, animal carcasses would present a serious health and environmental risk to livestock and humans. Renderers handle by-products from slaughterhouses and fallen stock – animals that died on farm. Rendering makes the material safe and suitable for reuse in a number of applications.

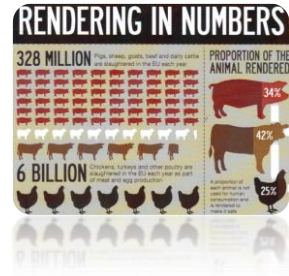
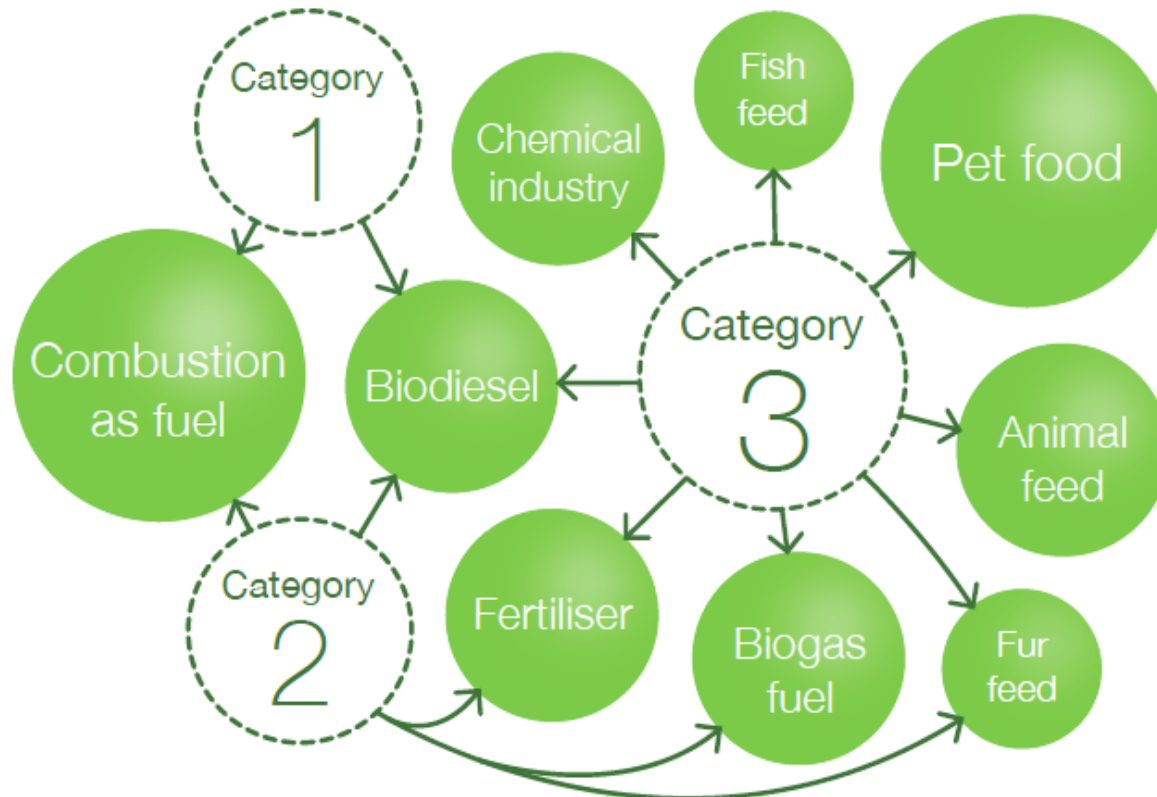
In addition, renderers deal with catering waste and unsold animal products that also have the potential to become a health risk.

<http://www.efpra.eu/Objects/3/Files/Factsaboutrenderingv08WebPDF.pdf>

Necessary approaches for intended use of by-products in animal nutrition

The products of rendering

Rendering produces two main products, fat (known as tallow) and protein, how this material is further used depends on the risk category:

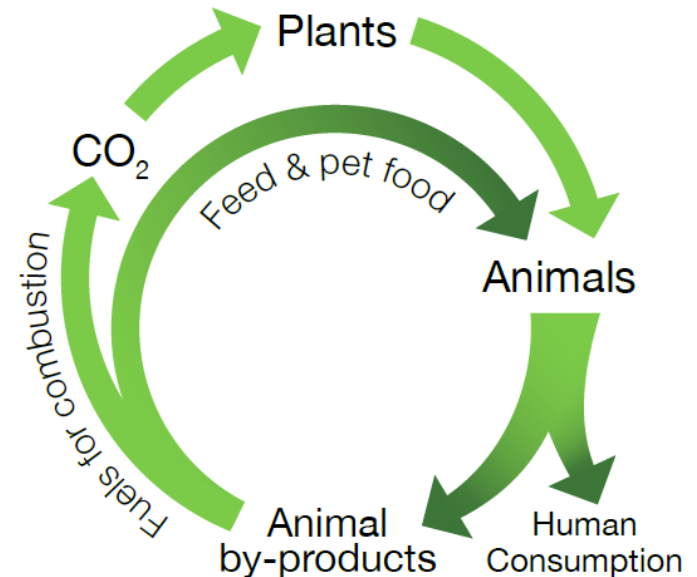


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The benefits

Rendered materials can be used in place of products that would have to be produced by other means, including fossil resources like coal, oil and natural gas for fuel and nitrogen and phosphorus for fertiliser.

When rendered materials are combusted for fuel, they are carbon neutral because the carbon is part of a short carbon cycle:

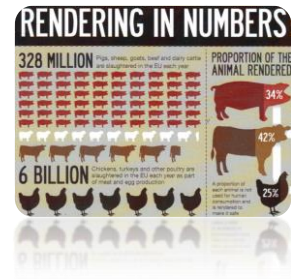


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The process

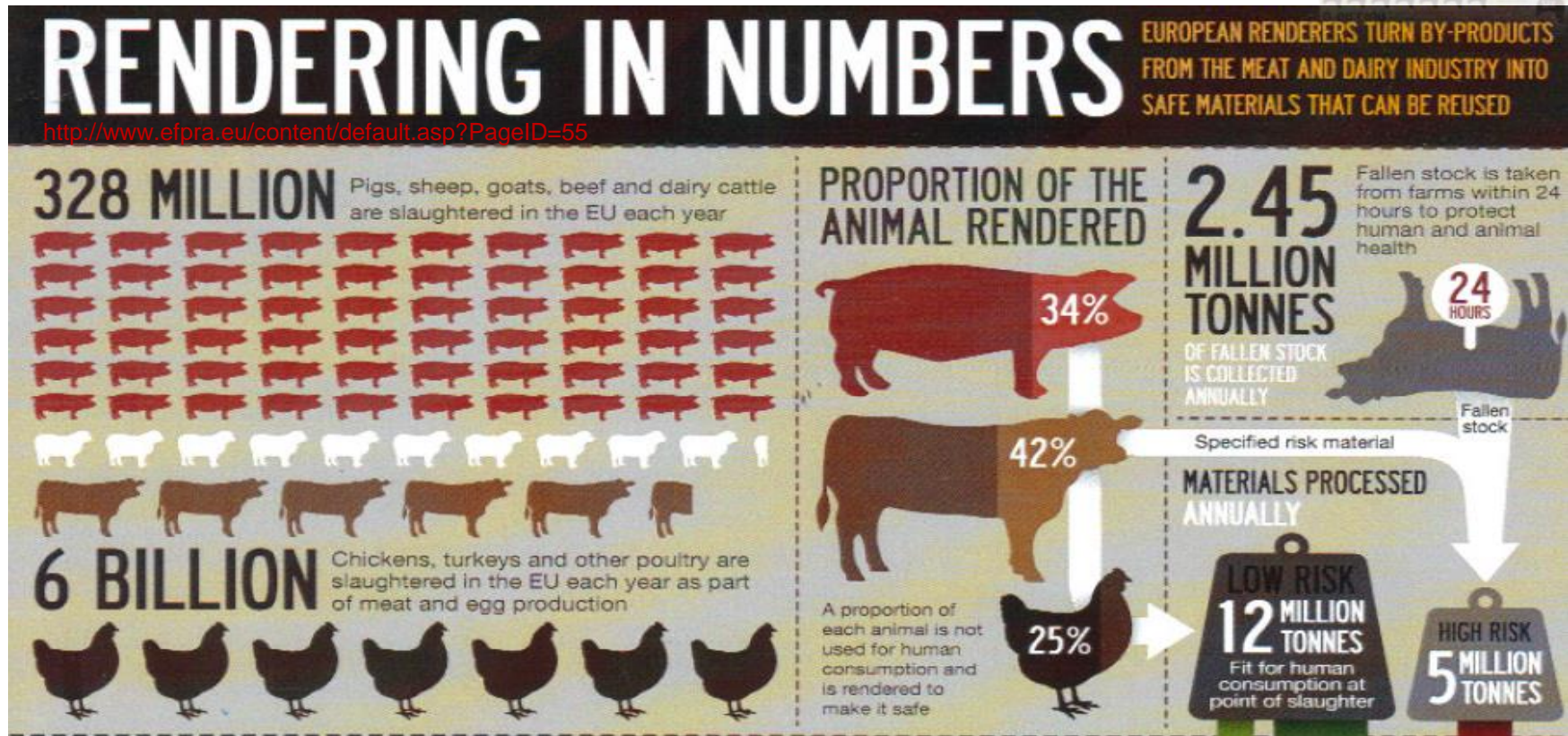
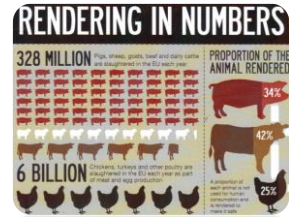
Rendering uses heat and pressure to sterilise and stabilise animal material. Sterilisation kills harmful microorganisms thus eliminating disease risk. Stabilisation removes water to prevent any further decomposition of by-products and makes them suitable for storage and reprocessing for other uses.

The removed water is the single largest output of the process – 65% by weight – it is treated for safe return into the environment. Each year, EFPRA members take in 17 million tonnes of material and produce 6 million tonnes of rendered products as well as water.

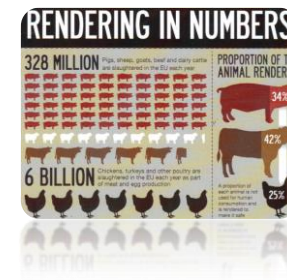
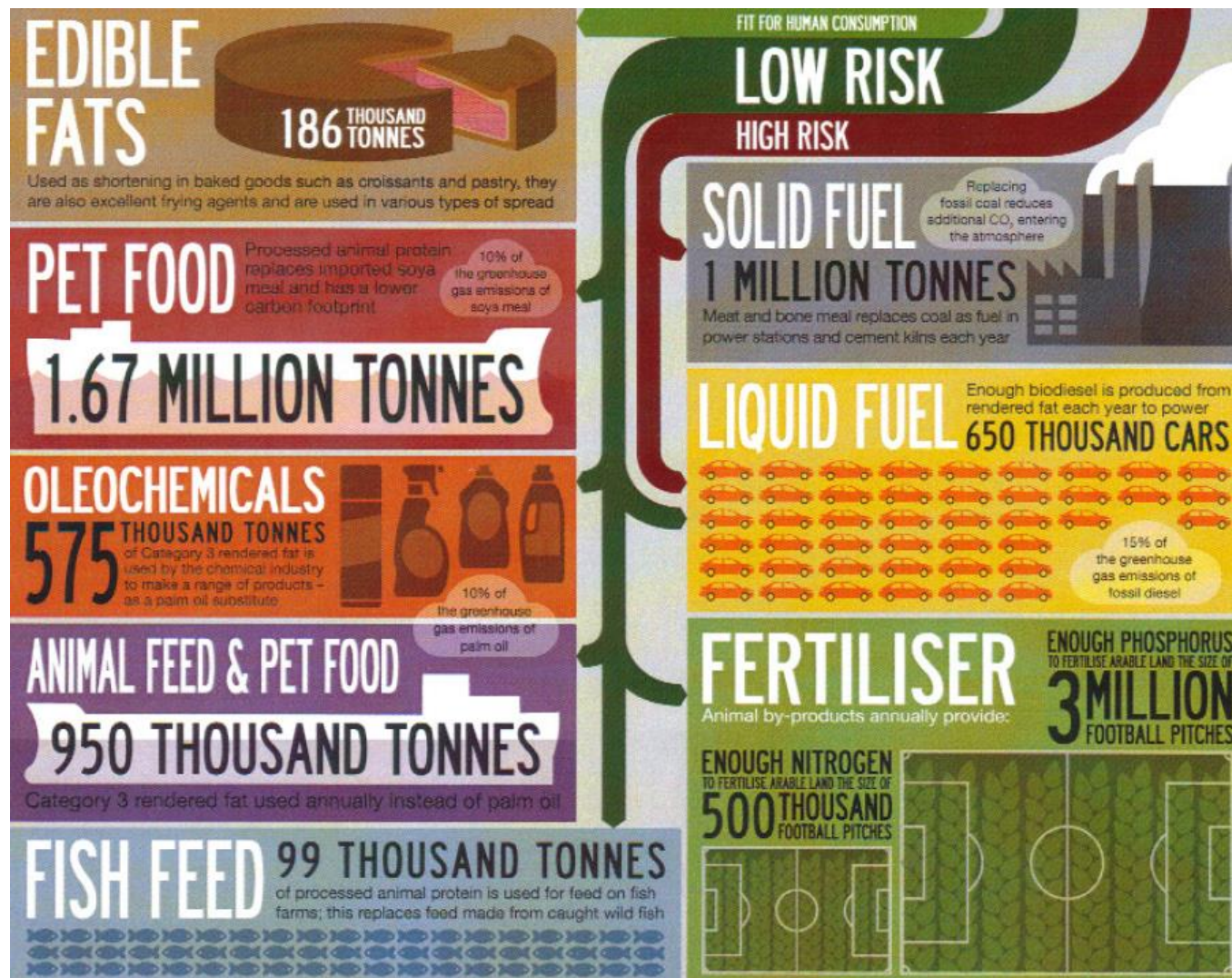


<http://www.efpra.eu/Objects/3/Files/Factsaboutrenderingv08WebPDF.pdf>

By-products - sources



Necessary approaches for intended use of by-products in animal nutrition



<http://www.efpra.eu/content/default.asp?PageID=55>

Usage animal by-products



Option for usage	Cat. I	Cat. II	Cat. III
Incineration (waste)			
Co-incineration (further thermal utilization)			
Disposal site			
Biogas (biomass)			
Composting			
Technical fats/fat derivatives			
Biodiesel			
Fertilizers (not pastures)			
Feed proteins (for animals)			
Feed proteins (pet food)			
Feed proteins (aquaculture)			
Fat for feeds (livestock except ruminants)			



Adapted from Niemann 2015

www.iff.freaunhofer.de

Feeding restrictions



VO (EG) no. 999/2001, Annex IV, chapter I and II	Ruminants	Non-Ruminants	Aquacultur
Processed animal protein			
Processed animal protein from non-ruminants collagen and gelatine			
Collagen and gelatine from ruminants			
Blood products from ruminants			
Blood products from non-ruminants			
Hydrolyzed proteins of animal origin			
Di- and tricalcium phosphate of animal origin			
Milk, milk products, colostrum, eggs, egg products			
Collagen and gelatine from non-ruminants			
Hydrolyzed proteins from non-ruminants and hides and skins from ruminants			
Fishmeal (to ruminants only until weaning in milk replacer)			
Tubers and root crops with traces of bone fragments from approved animals			
Intra species recycling (Regulation (EC) no. 1069/2009) "Cannibalism-ban"			

Conditions for use of by-products

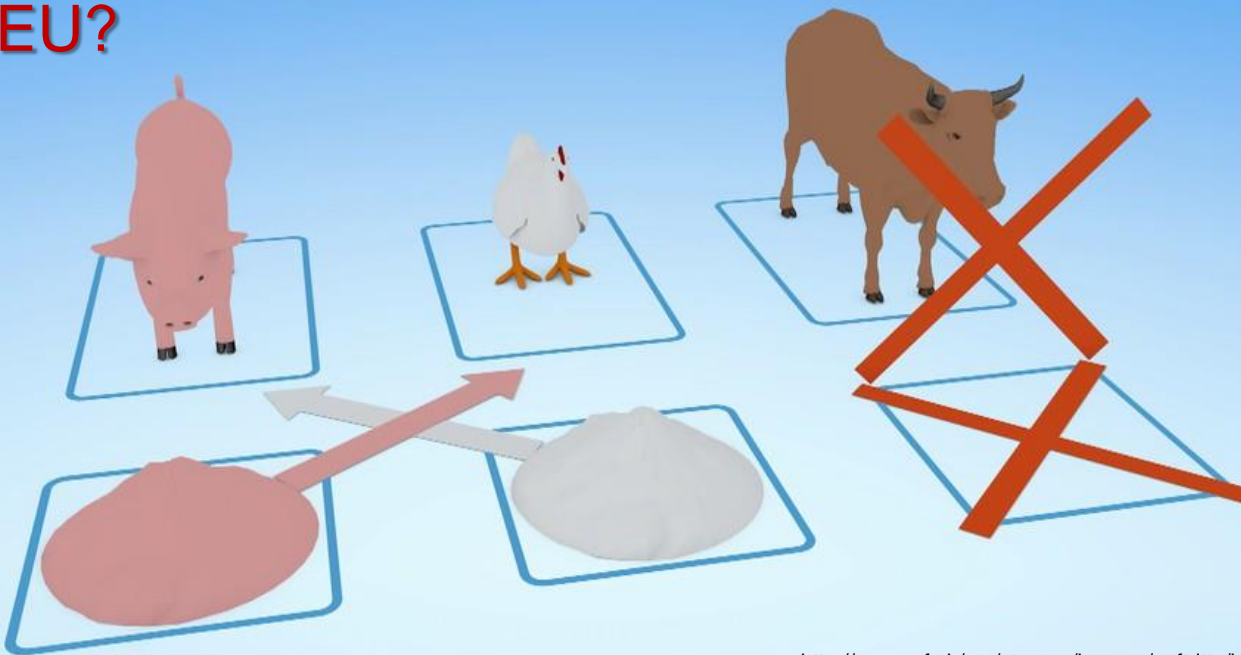


- Feed and food must be safe and have no negative impact on material quality of feed and quality of food of animal origin
- Acceptance of the use in farmers and consumers is important
- Recycling strategy - resource conservation – circular economy
- Appropriate to species in the use of animal by-products
- Trust
- Costs

Repeal of parts of the feed ban:



In EU?



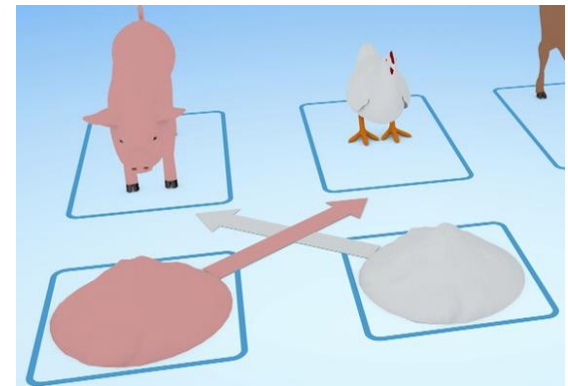
http://www.srf.ch/var/storage/images/auftritte/konsum/bilder/2014/03/04/grafik_wiedereinfuehrung_tiermehl/61026954-2-ger-DE/grafik_wiedereinfuehrung_tiermehl_span12.jpg

Repeal of parts of the feed ban:



Political discussion

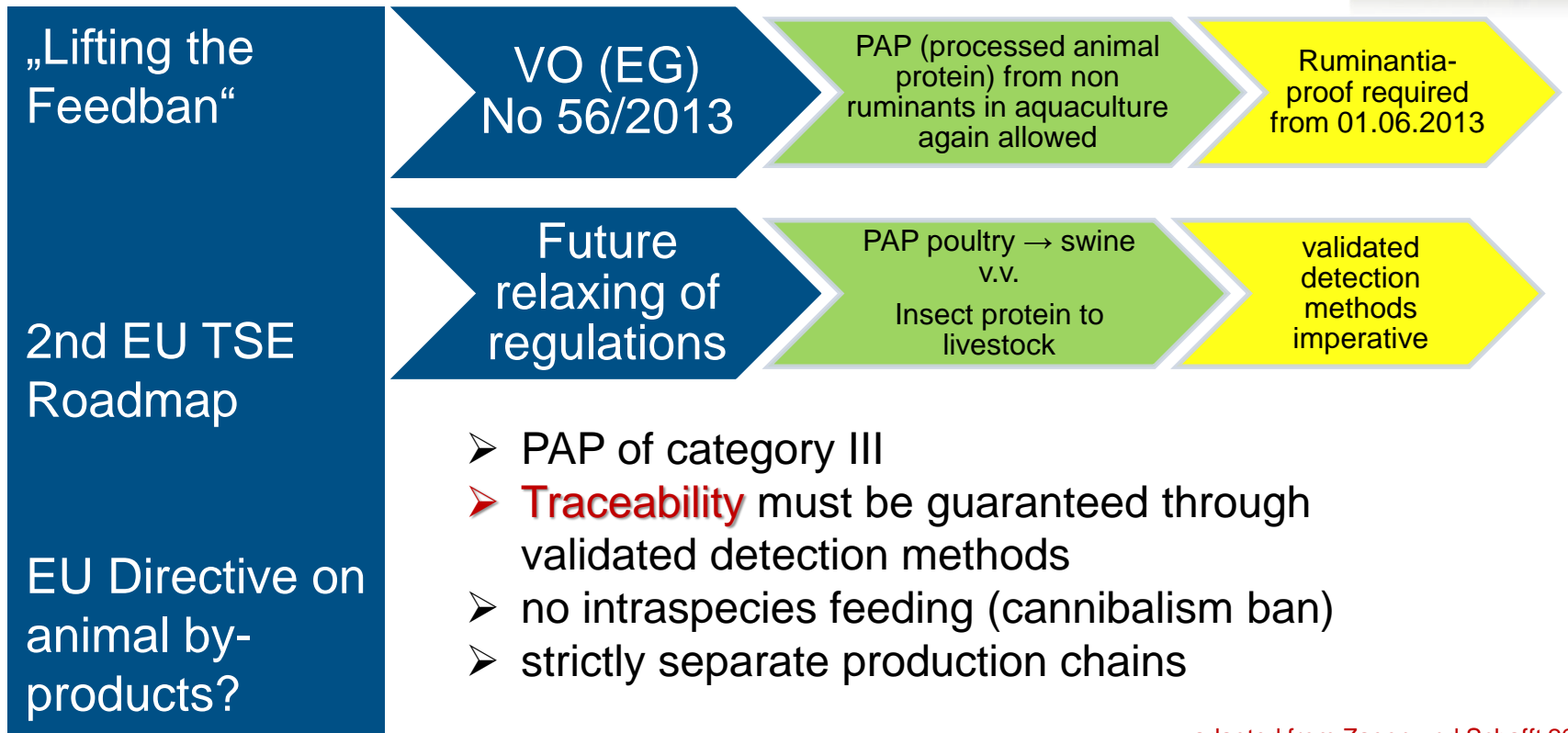
- First discussion at EU level very constructive
- Some Member States are in favor. Others are hesitant: "Very pretty. But first we need to validate the methods."
- Volume estimation
- Species identification: Microscopy + PCR
- Europ. Reference Lab. provides solutions
- The policy sees problems



http://www.srf.ch/var/storage/images/auftritte/konsum/bilder/2014/03/04/grafik_wiedereinfuehrung_tiermehl_span12.jpg

Adapted from Niemann 2015

Outlook “Lifting the Feedban”



adapted from Zagon und Schafft 2014

Advantages and limitations



Advantages	Limitations
Congruence to the desired shape of circular economy	Hygiene risks, possibly concentration of undesirable substances / technical additives
Ecologically favorable form of exploitation, reduction of by-product quantities	Varying energy and nutrient content (and therefore necessary control efforts), especially in humid / liquid byproducts
Economically most favorable form of use from nutrient	Species typical claims
Value for money, economic benefits through lower disposal costs	Image loss of animal production (Livestock as "handler of waste")
No competition for food for humans	Acceptance of the food obtained in the consumer (emotional reservations)
resource preservation	Costs of transport, processing, use and control costs

adapted from Kamphues 2015

Challenging products now + further



DDGS – H_2SO_4

<http://www.tradefina.com>



Corngluten – S

<http://www.tradekorea.com>



old bread – packaging material

<http://www.swr.de>



Marine algae – iodine

<http://syanimamea...>

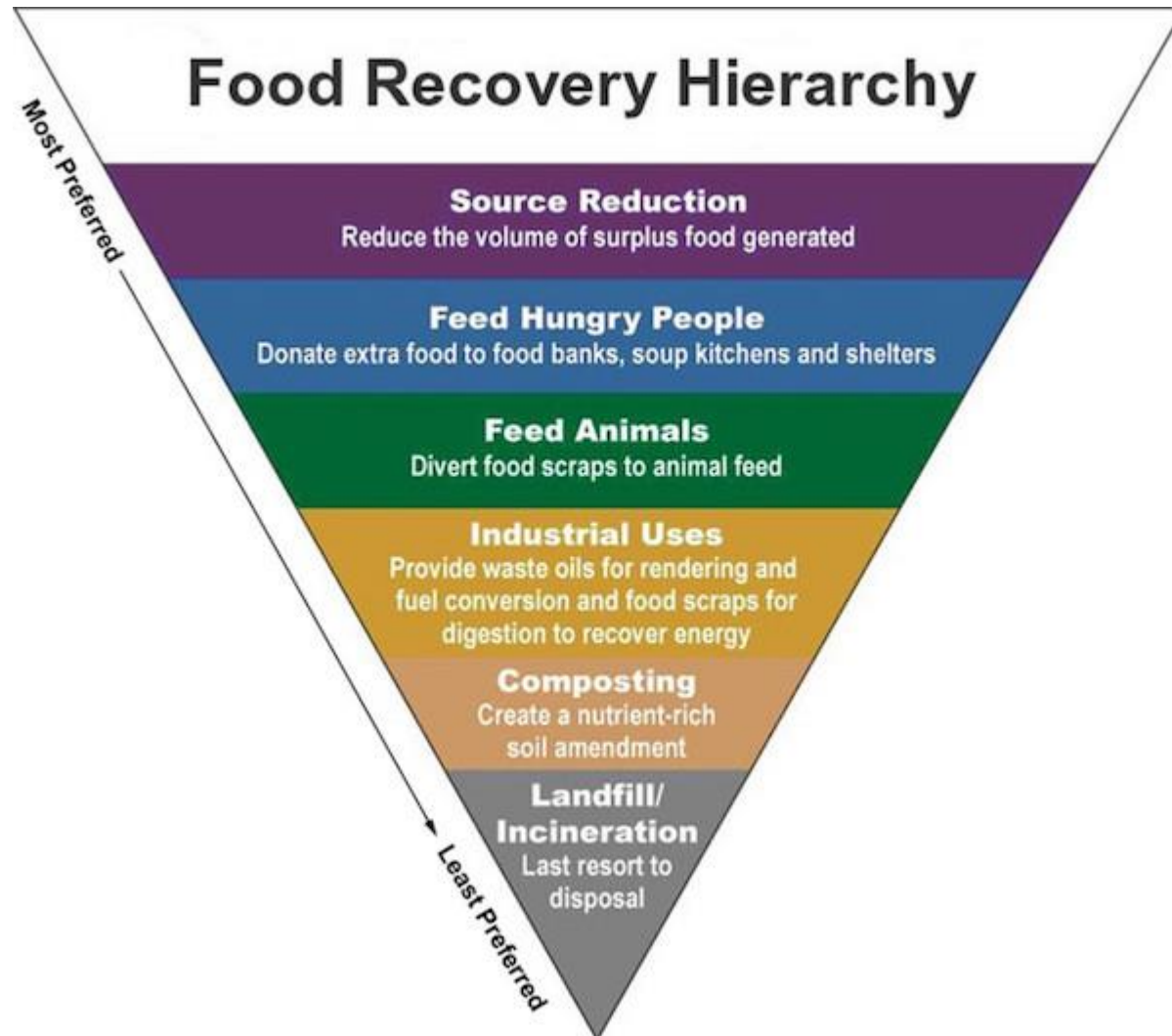


Insects – hygienic status feedstuffs

<http://futter-und-tierbedarf.de>

adapted from Kamphues 2016

Necessary approaches for intended use of by-products in animal nutrition



<https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>

Questions?

