BioOps: Business Opportunities and challenges for meat co-products

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BioOps – a DAFM-funded project

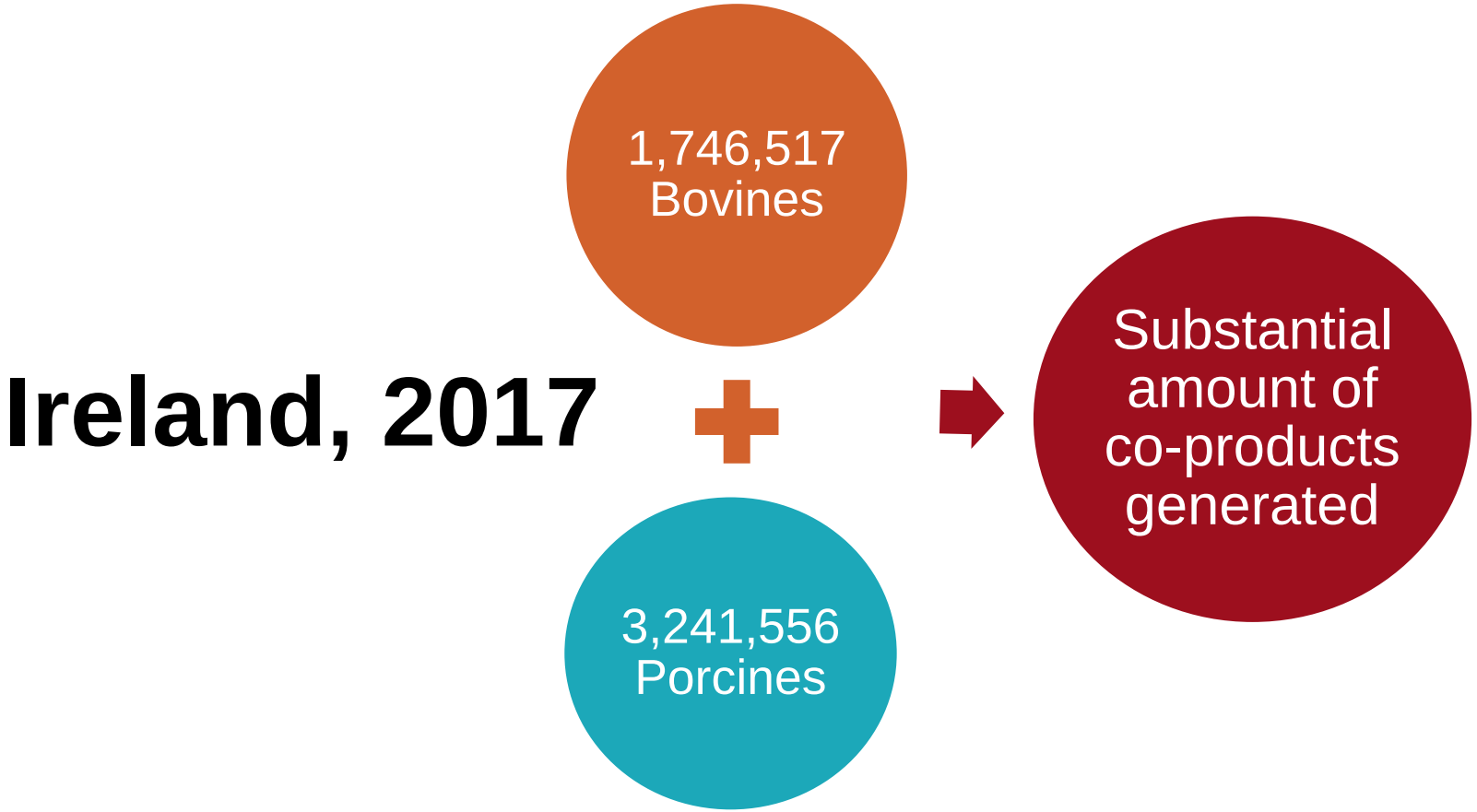
- DAFM-funded project that aims at commercially evaluating opportunities from low-value streams from the meat processing chain.

- The goal is to assess pathways to improve economical and environmental sustainability in the meat sector.

BioOps - Methodology

- Literature review – Scientific papers, market reports, legislation on animal by-products
- Industry meetings to get global insights from professionals. (Ireland, France, Spain, Denmark, Belgium, USA, Australia…)
- Selection of the most viable co-products.
- Cost-benefit analyses.
- Dissemination to decision makers through talks and reporting.

Introduction



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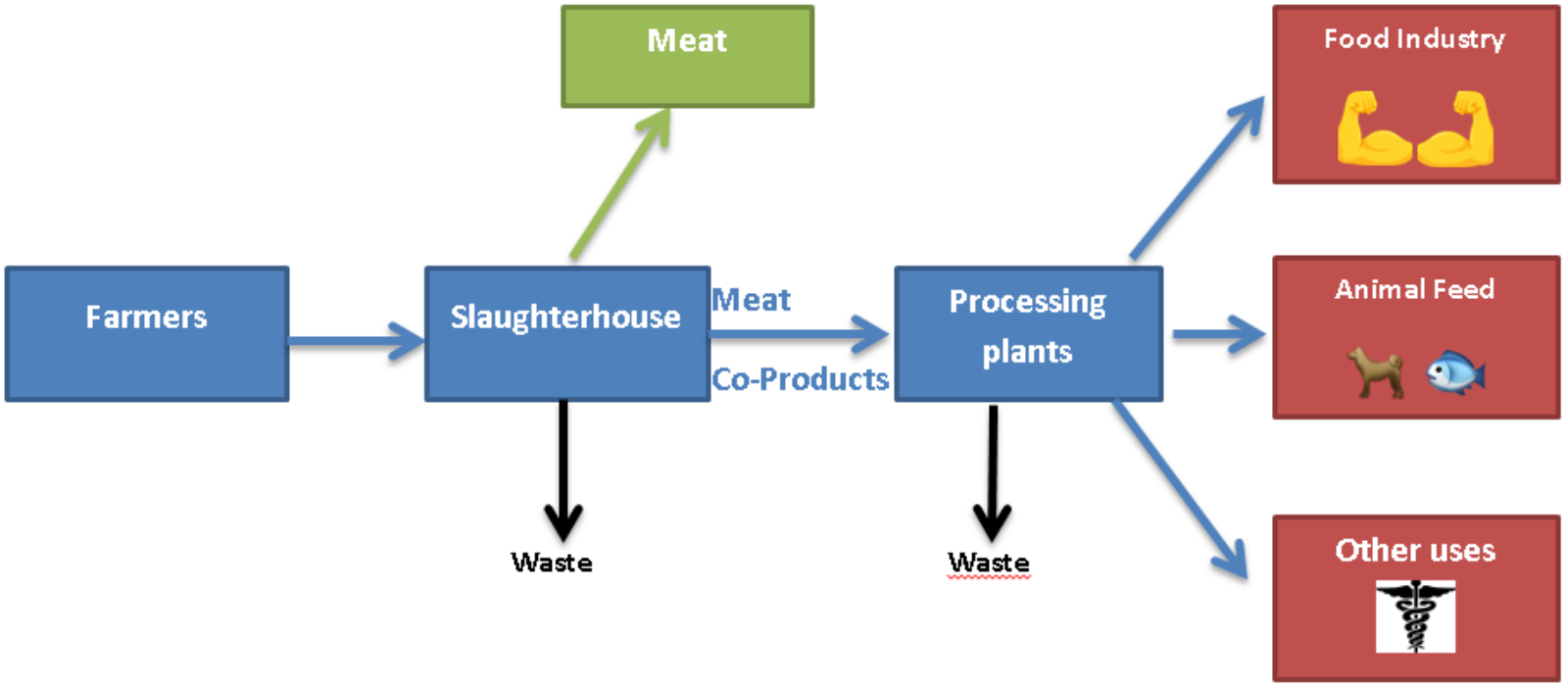
Introduction



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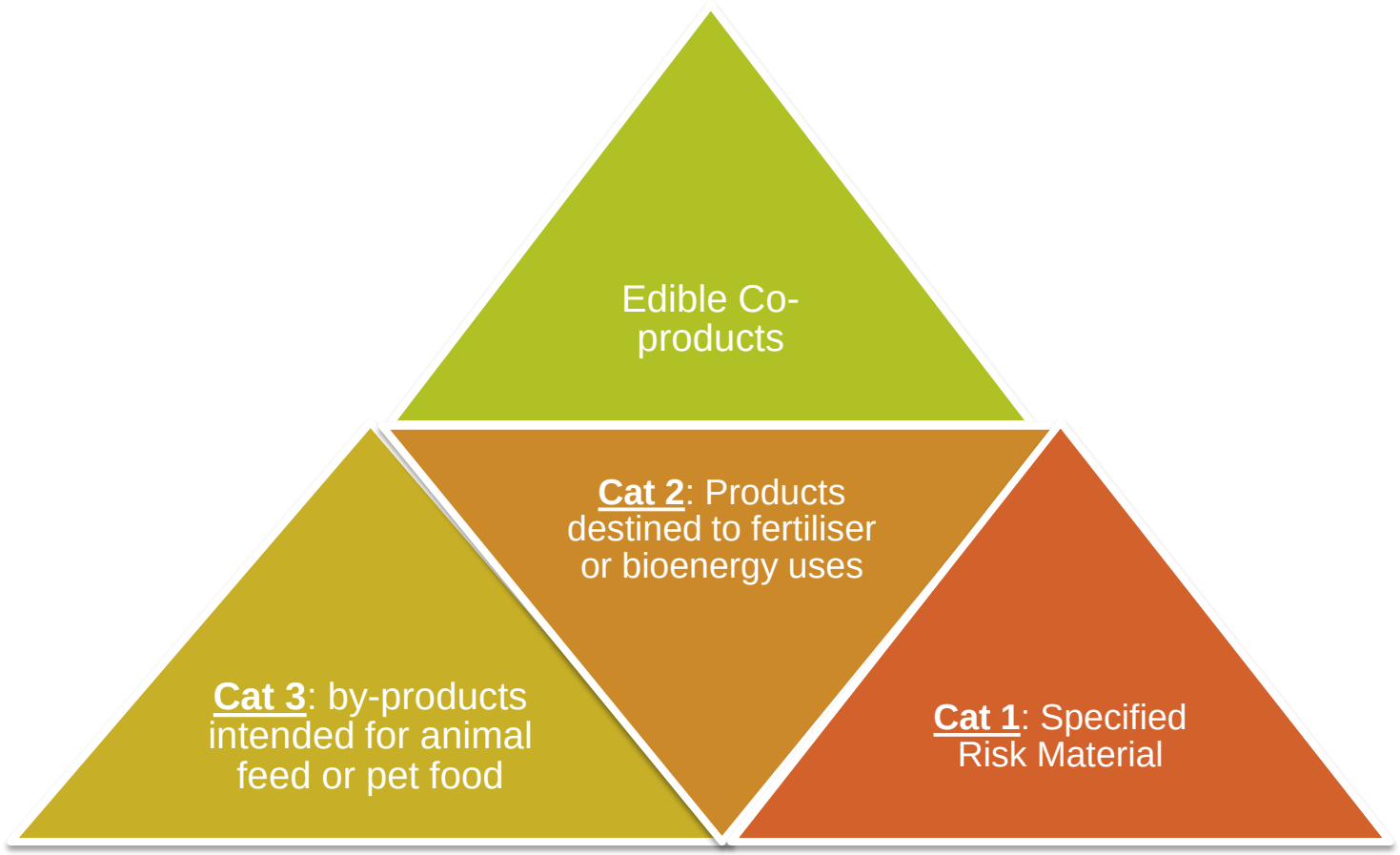

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Two main co-products chosen

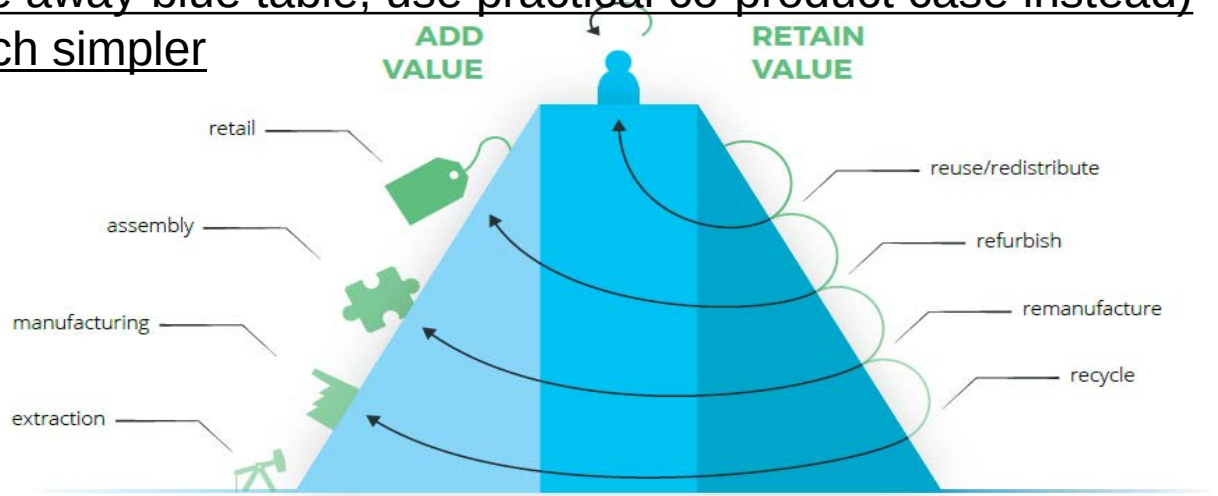
- Blood
- Lungs

WHY?

Three main factors

- Volume
- Applications
- Existing knowledge

The Value Hill Model (Achterberg, Hinfelaar and Bocken 2016) take away blue table, use practical co-product case instead) Much simpler



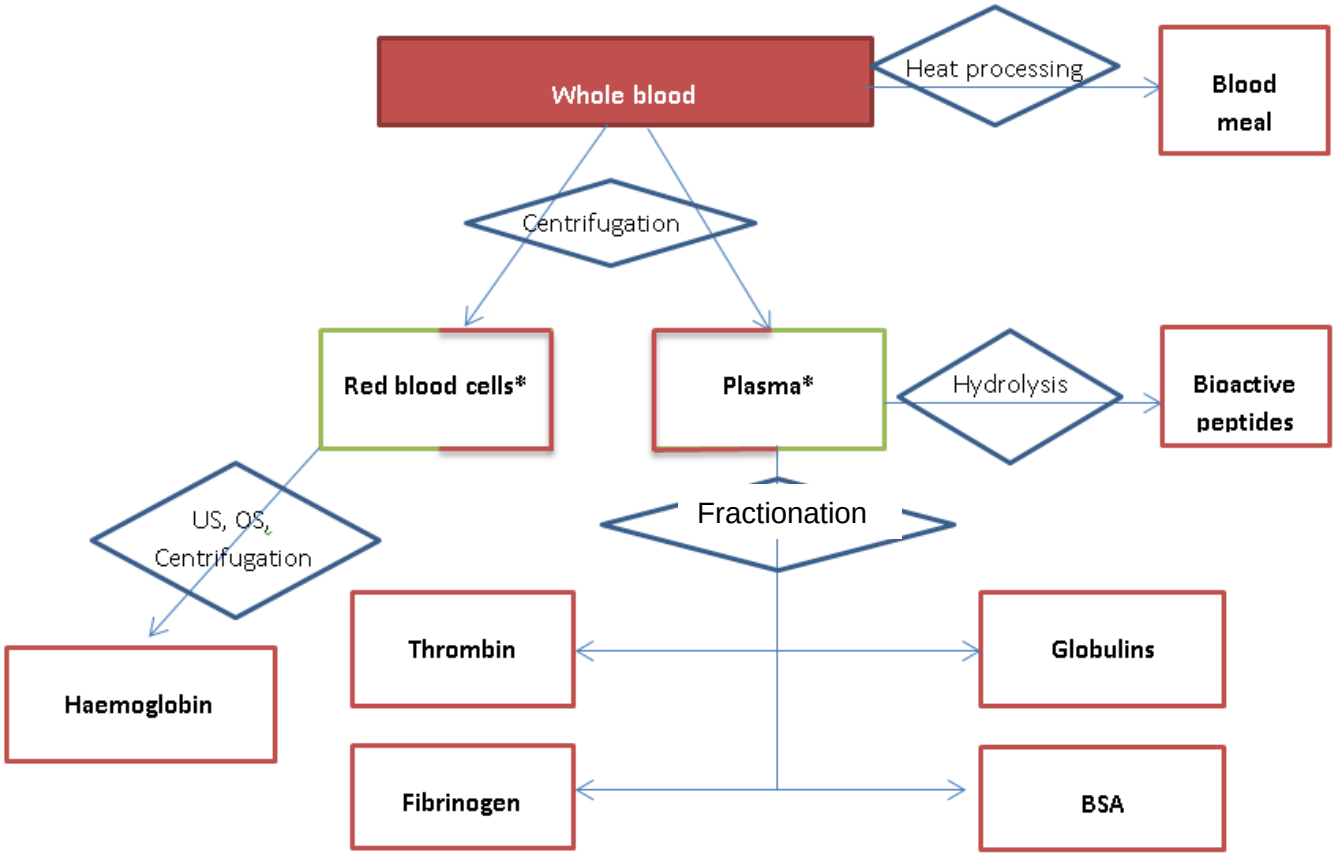
Circular design	Use of the product	Recovery of Value
Hygienic processes On entire chain	Slaughtering and harvesting of meat	Harvesting meat co-products and giving them new uses

Network Organisation

Blood

Species	Number of slaughter/year	Litres of blood per animal (unhygienic) (kgs)	Litres of blood per animal (hygienic) (kgs)	Total production (tonnes)
Porcine	3,241,556	4	3.2	10,372
Bovine	1,746,517	18.5	12	20,958

Blood processing



Blood Proteins Properties

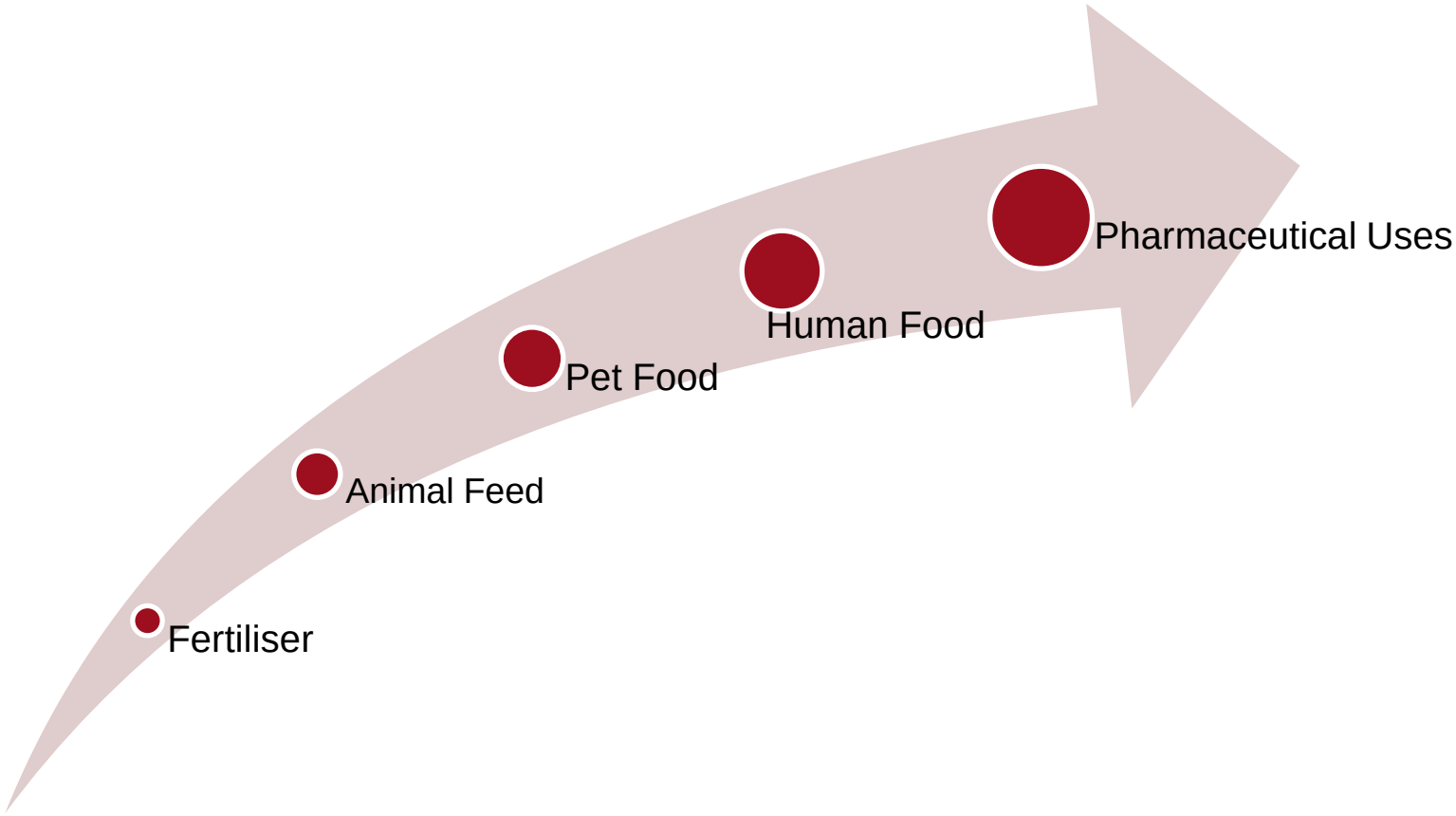
- Functional properties

Compound	Emulsifying	Solubility	Gelling (LHC)	WHC	OHC
Haemoglobin	Medium	High	10%	Nd	3.13±0.07
Blood plasma	Very high	High	6%	6.52±0.51	8.72±0.05

- Nutritional properties

Product	Leu	Ile	Lys	Met	Cys	Phe	Tyr	Trp	Thr	Val	His
Whole blood	13.2	0.9	9.7	2.4	n.d.	10.7	1.4	1.5	4.8	8.7	8.8
Plasma	9.34	3.35	7.47	0.86	1.68	5.16	4.78	1.18	6.60	6.73	4.18
RBC	13.92	n.d	10.37	0.36	n.d	8.19	2.39	n.d	5.11	8.5	6.38

Blood potential uses



Challenges → Opportunities

BSE Crisis

- There is still distrust in the market (bovines) → More stringent regulations.

Legislation

- Legislation is very strict → Use it as an advantage to prove your point.

Consumer acceptance

- Negative ideational factors→ Blood as a food ingredient to remove E-numbers.

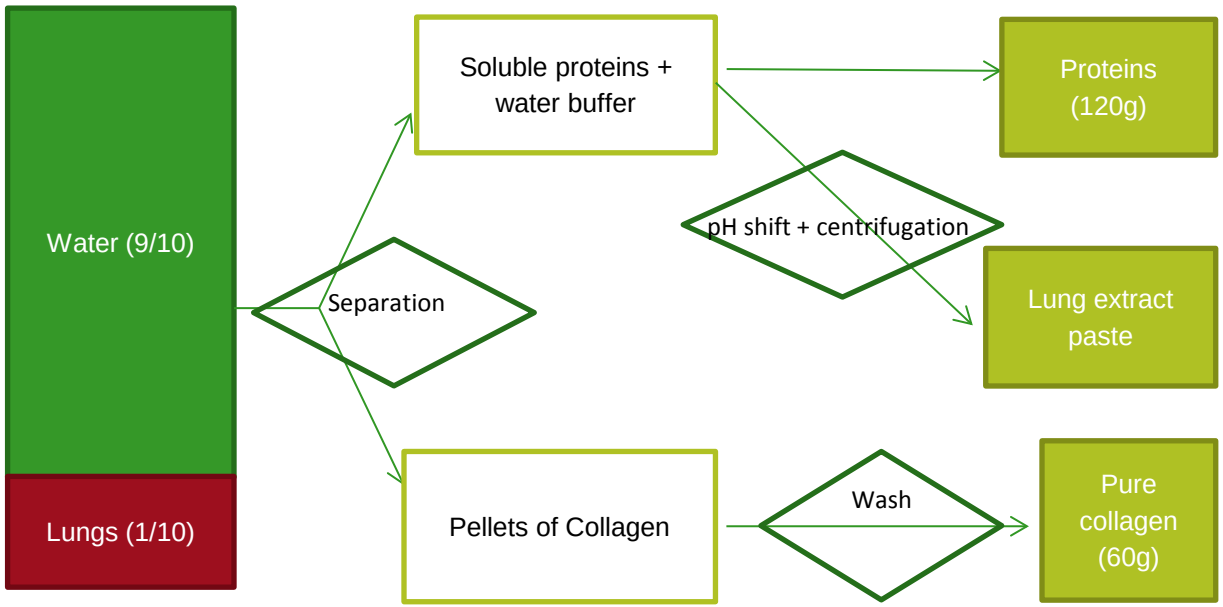
Replacers for pet food / animal feed

- What will be fed to animals if humans use these products → New protein sources.

Lungs

Species	Number of slaughter/year	Average weight of lungs per animal (kgs)	Total production (tonnes)
Porcine	3,241,556	1	3,241
Bovine	1,746,517	3.5	6,113

Lungs Processing



Lung Proteins Properties

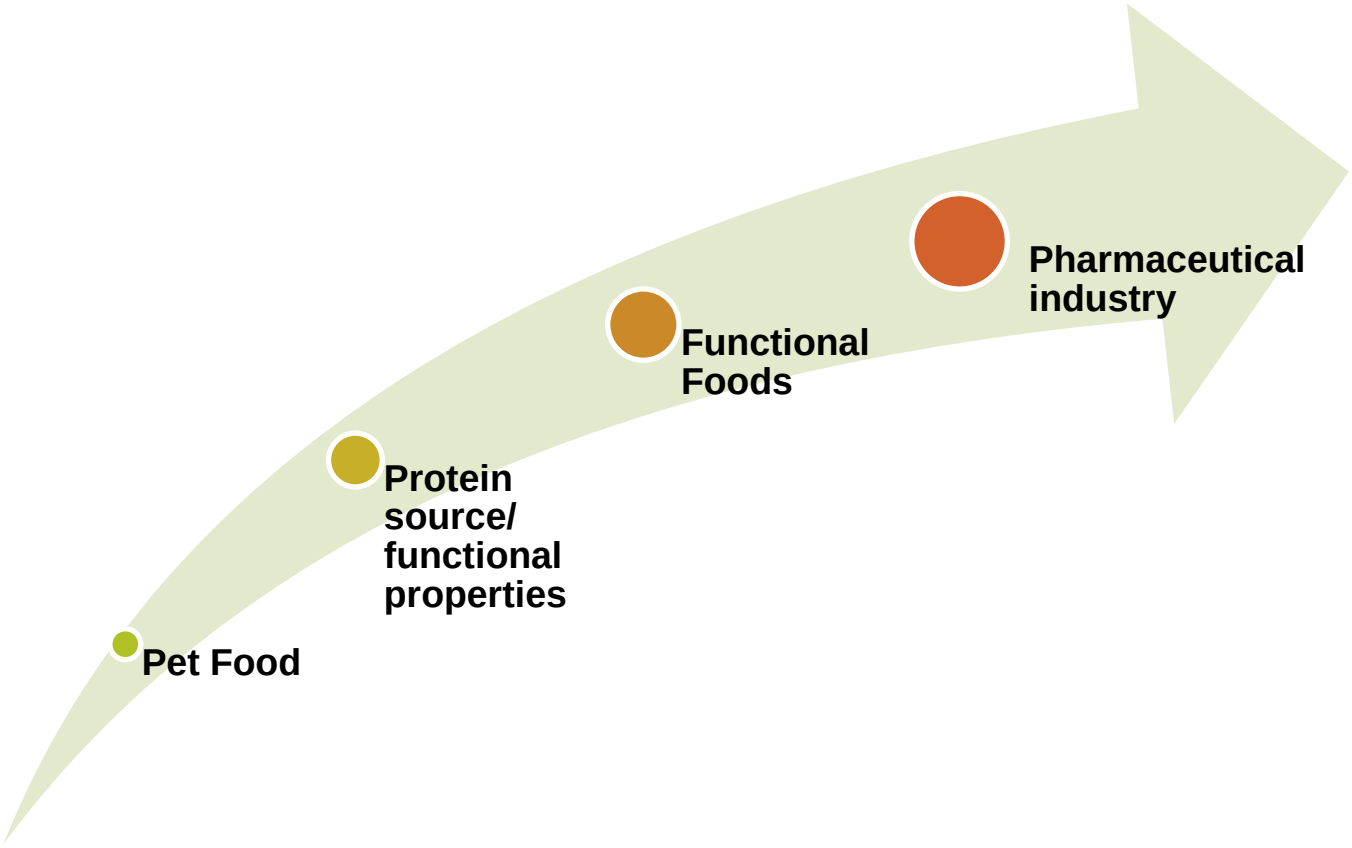
Functional properties from soluble fraction

Co-product	Emulsifying	Solubility	Gelling (LGC)	WHC	OHC
Lung	Very high	Medium-low at 4-6 pH, very high at 9-11 pH	10-16%	5.95±2.00	4.63±1.8

Nutritional properties

Leu	Ile	Lys	Met	Cys	Phe	Tyr	Trp	Thr	Val	His	%EAA
7.3	4.8	7.1	2.0	1.5	4.1	2.2	0.9	3.7	4.9	3.0	41.5

Lung proteins potential uses



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Cost Benefit Analysis

- 4 main variables for ROI:
  - » **Production volumes**: slaughter number, rejection rate, amount of final product.
  - » **Fixed assets**: Property, plant and equipments.
  - » **Operational costs**: Utilities (water, wastewater, labour, energy, steam…), Procurement (raw materials, additives)
  - » **Income**: Wholesale price of products.

Challenges → Opportunities

Negative sensory properties

- Lungs have an unappealing texture → Process to use it as a protein ingredient

Scale

- Need an efficient logistics system → Collaboration amongst stakeholders to oversee the modalities

Category 3 by-products

- Cat 3 by-products → Collection, inspection and storage systems have to abide by regulation.

Outcomes of the project

- Return on Investment depend on several variables: kill number, rejection rate, upfront investments in machinery, retail price…
- Recovery of proteins from alternative sources is inevitable in the future. Your products are valuable.
- Proteins from co-products can be used as protein enhancers, functional proteins, functional foods, pharma uses, pet food…
- Cross-sectoral vertical collaboration along the value chain is key to develop commercial applications.

Recommendations

- Personal recommendation: plenty of potential for coordinated Irish and European effort regarding recovery of value for co-products.
- There are new markets to explore and value to be recovered at many stages along the value chain.
- It is important to know your products potential applications, and to talk with your buyers about their uses.
- Try to find short-circuits applications before setting up complicated systems.
- Using co-products as protein ingredients for protein enriched foods, and as functional ingredients in recipes and food manufacturing, are viable markets to pursue.
- Carry on the research on functional foods.
- Work in a collective effort instead of individual actions.

Thank you for your attention