

A Guide to Commercialising Technologies arising from Meat Research Projects



Ashtown Food Research Centre

Teagasc

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INTRODUCTION

The purpose of this guide is to assist meat researchers in understanding the commercialisation process, and to ensure that outputs from their work are appropriately managed and exploited. Research relating specifically to the Irish meat sector is conducted in a number of Universities, Institutes of Technology and Teagasc and these research establishments for the most part have their own policies and processes already in place. This document is not intended as an alternative to these procedures but to ensure that they are properly accessed and used by researchers.

The traditional focus in Irish research organisations is on producing the highest quality scientific research and advice. Without wanting to compromise this scientific role, the Irish Government is keen to encourage researchers to cooperate with the private sector and commercialise the outputs of publicly funded research to stimulate economic benefits. All research organisations and third level institutes in Ireland have some scope for commercialisation, the extent of which is dependent on a number of factors.

- The nature of the research conducted and the potential market demand within the relevant industry sector can have a significant influence on the level of commercial outputs.
- The capabilities of the research establishment is another important factor. Taking a technology concept arising from research to commercial reality is a complex process and as such requires a wide range of skills and management.
- The necessary expertise and resources must be available either in-house or through collaboration and external assistance.
- Whilst agencies such as Enterprise Ireland can assist in the financing of the commercialisation process, it is necessary for research establishments to have necessary funds available to assist those actively attempting to exploit their research results.
- A culture that is supportive of commercial activity is also needed. Encouraging researchers to engage actively in commercialisation is vital to ensuring success and can be achieved through training measures, incentive schemes, financial and promotional rewards.

The benefits of successful commercialisation are copious for researchers, their employers and the meat industry alike. The practical application of research outputs fosters the recognition of an individual scientists' or research centres work programme. Researchers can benefit financially from incentive schemes or equity ownership in spin-out companies. From the point of view of a research establishment, the commercialisation process can help enhance the research environment and strengthen industry relationships whilst generating valuable revenue. As well as delivering innovation benefits to the meat industry, the partnerships developed during the process can provide industry with a useful source of knowledge and assistance in terms of process or product development.

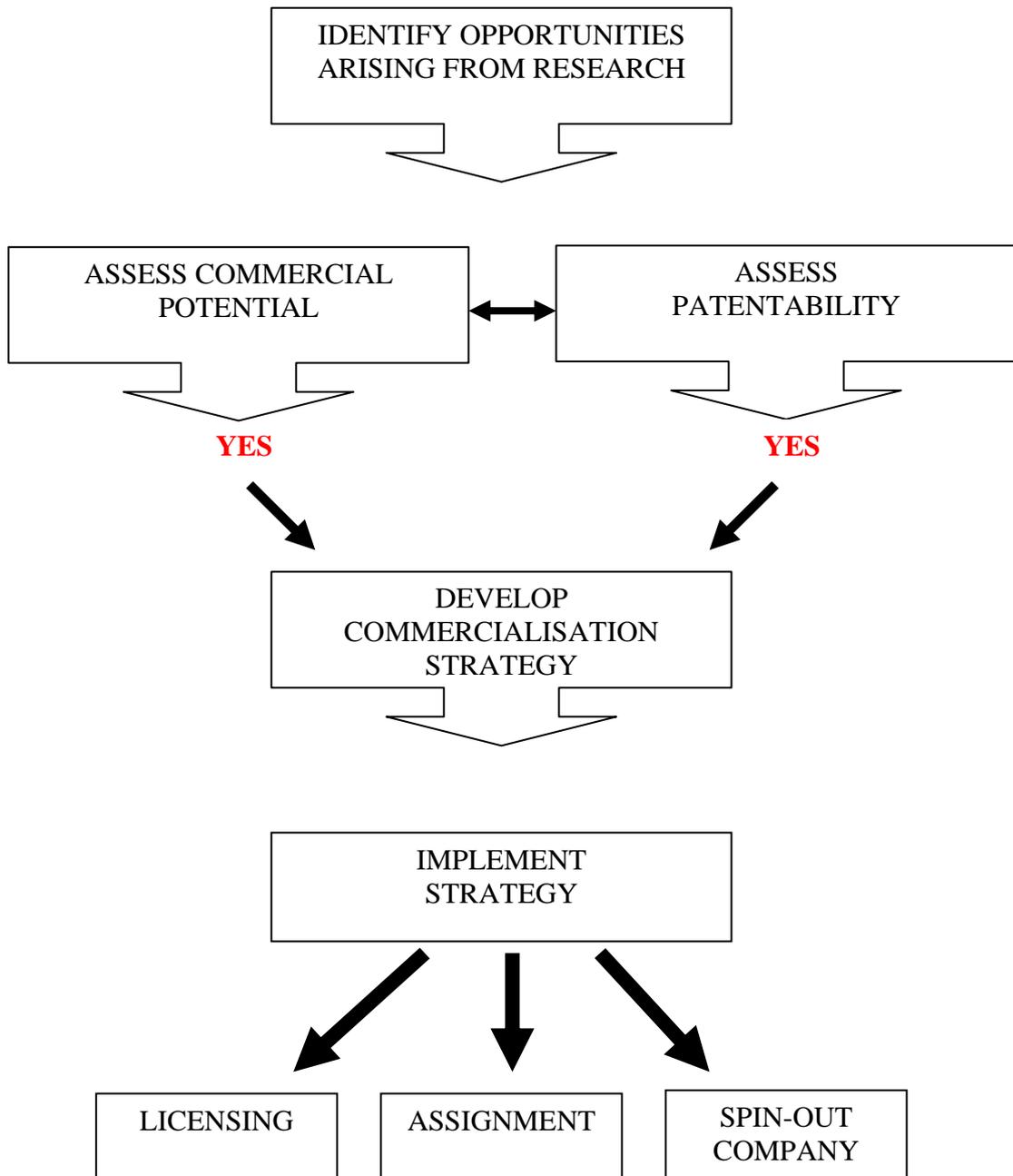
The commercialisation process consists of four main stages:

1. Identifying opportunities arising from research
2. Determining the commercial potential of the technology
3. Assessing the patentability of the technology
4. Developing and implementing a commercialisation strategy

The process starts with the researcher identifying a new invention or technology created during the course of their research. Following the discovery an initial opportunity/market assessment based on potential commercial applications for the technology is conducted. If the researcher feels they have an idea or technology that may warrant Intellectual Property (IP) protection the issue of patenting is addressed at this point. The next stage is to decide on a commercialisation strategy or plan to exploit the technology in the most effective way. Options such as licensing, assignment or the creation of a spin-out company are considered and once the most suitable form of commercialisation is determined the strategy is implemented.

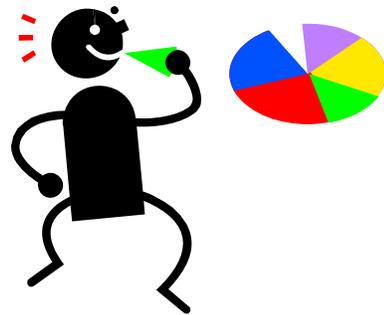
This guide will provide further information on each of these stages, introducing the basic concepts and issues involved in commercialising a technology. It will act as a reference document to meet researchers providing an overview of the fundamental issues they should understand and will outline the commercialisation routes commonly available to them.

THE COMMERCIALISATION PROCESS



STAGE 1: IDENTIFYING COMMERCIAL OPPORTUNITIES ARISING FROM MEAT RESEARCH RESULTS

The commercialisation process generally begins with the researcher, identifying a possible technology or invention arising from their work that may be of interest to the meat sector. For this to occur, meat researchers must have a basic understanding of the importance of their work as a potential commercial asset. Establishing awareness amongst staff is essential in any research establishment for early identification and commercialisation of important innovations. Education and training is an important element of this awareness and researchers should be knowledgeable in practicalities such as how to identify potential opportunities, record keeping requirements, intellectual property, the importance of confidentiality, the organisation's reporting process and the commercialisation supports available to them. A major stumbling block at this stage of the process is that potentially commercialisable new technologies may not be recognised by the researcher(s) involved. It is also important that researchers are involved in and share in the successful commercial development of inventions or technologies. Recognition for the part they play in the process, through financial rewards or promotional opportunities, provides an impetus to actively seek out opportunities and take appropriate actions.



An approach to extracting ideas from meat research has been documented by staff at Ashtown Food Research Centre and includes a template (Appendix 2) that can assist researchers in making an initial opportunity/market assessment based on potential applications for the technology. The questions addressed in the template can help form a decision on whether to proceed to the next stage of the commercialisation process.

Once the researcher has identified and documented the relevance of the technology it is important to notify or disclose the information to the relevant authorities within their research organisation or third level institute. In Ireland, most universities and third level institutes engaged in meat research have technology transfer offices (TTOs) on campus (Appendix 1) and staff there are trained and practised in the commercialisation process. The other major research group focused on the meat sector is based at Ashtown Food Research Centre, Teagasc and the organisation's IP officer is the person to which any commercialisable technologies should be disclosed. The technology transfer offices are a major conduit through which developed technologies are transferred to industry. The usual method of informing the TT Office or IP Officer

is by means of an Invention Disclosure Form. These forms will vary from one organisation or institute to another and examples are available on the TTO websites listed in Appendix 1. Researchers will generally be required to provide information on:

- The nature of the invention or technology and its technical significance
- Persons contributing to the development
- Date and place of invention and documentary and material evidence to corroborate this
- Source of funding for the research
- Any publications or disclosures of information made or planned
- Any existing project or collaborative agreements which involve sharing materials or information.

Following disclosure of the technology, the commercial potential and any intellectual property protection requirements will be assessed by technology transfer staff in consultation with the relevant researcher.

STAGE 2: DETERMINING THE COMMERCIAL POTENTIAL OF TECHNOLOGIES ARISING FROM MEAT RESEARCH

The commercial relevance and value of the technology is now assessed to determine whether it is worth pursuing. Considerations include the cost, efficacy, regulatory, environmental and competitive nature of the technology. The assessment is generally conducted by technology transfer staff with strategic assistance from the researchers and activities will include the following:

- **Identifying Technology Applications**

This involves identifying the full range of applications that the technology could be used for, in both the meat and any other relevant sectors. Research staff can provide valuable insight into the aims and focus of the work, and the intended applications.

- **Identifying End-users**

Once the technology applications have been defined, the potential user groups can be easily identified. Technology transfer staff will then interview individuals representative of the users, developers and manufacturers in order to determine the difficulties and potential of the technology. These detailed discussions will cover matters including technical performance, price

and competition and will provide independent evidence as to how the technology is likely to be received by end-users.

- **Conducting Market Analysis**

This involves determining the potential market size and demand for the technology. Technology transfer staff will examine market trends, pace and volatilities and estimate the health and future of industries that constitute the market. Information is commonly sourced through government statistics, trade press, reports by meat industry associations and study groups, and analyses prepared by professional market research firms. Interviews with market experts and meat industry insiders can provide an astute overview of the market as well offering insight into the level of interest in the technology, expected performance characteristics and existing technology solutions.

- **Defining Benefit/Added Value**

In order to determine the benefit and value of the technology, staff from the technology transfer Office will ascertain the current state of art and assess how technically advanced the technology is compared to any alternatives that may be under development or currently available in the marketplace. With the assistance of the researcher(s) involved and based on questions posed in meat industry interviews, comparisons can be made to determine what benefits the technology provides in terms of technical performance and cost advantages.

- **Researching Competitors**

The intention is to assess the extent and nature of the competition which may be anticipated in the target markets. This is done through competitor analysis and interviews with potential end-users and specialist consultants. Technology transfer staff will establish the strengths and weaknesses of competitors by identifying and profiling any current or potential companies operating or targeting the same markets. Profiles should give an in-depth description of the competitor's background, finances, products, markets, facilities, personnel, and marketing strategies. The characteristics of competitor technologies and the price and mechanisms used to deliver the technologies will be documented. The ultimate aim is to ensure that the technology in question can capture a significant market share.

- **Calculating the Potential Return on Investment**

Based on the resources and finances required, technology transfer staff will estimate the potential ratio of gain to effort required to successfully commercialise the technology and whether it is

achievable in an acceptable time frame. To evaluate this technology transfer staff will need a clear indication of the stage of development and the investment required to bring the technology to production.

▪ **Testing Academic Commitment**

Whilst technology transfer staff have the skills and know-how to help progress a new technology along the commercialisation path, a high level of commitment is required by the researcher(s) involved in its discovery. Commercialisation is time-consuming and not all researchers are interested in the benefits the process can deliver. An important determinant of successful commercialisation is the team involved and technology transfer staff will assess that the necessary skills and commitment are in place before proceeding further.

▪ **Determining Regulatory and Liability Issues**

Any regulatory or legislative requirements for the technology under evaluation will need to be determined. Compliance may result in extra costs and time delays that will have to be assessed in terms of the return of commercialisation of the technology. It is also important for technology transfer staff and researchers to be aware of any potential liabilities or ethical issues that could be associated with the technology or that may arise during application.

▪ **Identifying Infringement Potential**

The possibility of infringement will be examined by technology transfer staff and the existence of any patents or patent applications which relate to the technology under evaluation will be established. In the event that a patent search identifies existing patents or patent applications which would definitely be infringed by the technology, any plans for commercial application will be abandoned.

The information gathered in the course of the assessment will be documented by technology transfer staff and following due diligence a decision will be made on whether the technology has commercial potential. Many potential technologies fail at this stage because they are more costly or less effective than existing industry solutions, or because there are attendant issues of safety, user friendliness or manufacturability which would make them unlikely to succeed. However if the outcome is positive, the next step will be to assess the patentability of the technology and protect any intellectual property arising. Simultaneously the researcher(s) will attempt to source further funding, if required, and progress the development of the technology. Ashtown Food Research Centre has produced 'A Guide to Technology Development for Meat Researchers' that provides useful information to researchers engaging in this process.

STAGE 3: ASSESSING PATENTABILITY OF TECHNOLOGIES ARISING FROM MEAT RESEARCH

Once the commercial potential of the technology has been established the next step in the process is to protect and patent the idea. In some cases a patent application may be submitted before a full commercial assessment has been completed. This will usually be on the advice of technology transfer staff or the intellectual property officer.

A patent is a legal document conferring ownership of the invention to the patent holder for a period of time. These ownership rights may be licensed or sold on to others until such time as the patent has lapsed. When the patent expires the technical information falls into the public domain and can be freely used by anybody. Patentability refers to the conditions that must be met for a patent to be held valid. As patent laws differ from country to country, the patentability criteria also vary. In general, the common elements that a technology must meet in order to be patentable are novelty, utility, non-obviousness and non-exclusion by law. Patenting is an expensive activity in terms of time and financial resources for any research organisation or third level institute. It is therefore important to assess the patentability of the technology, before proceeding with a patent application.

A preliminary assessment can be conducted by researchers and this should involve scanning existing or expired patents along with any patent submissions to determine that the technology is within the scope of patentable subject matter i.e. useful, novel, unobvious and lawful. In order to search patent applications and granted patents, some national or regional patent offices provide free-of charge electronic databases via Internet. A list of web-based databases is available in Appendix 3. The World Intellectual Property Organization (WIPO) also provides access to a comprehensive electronic database on published international patent applications (<http://www.wipo.int/patentscope/en/>). Wherever web-based databases are not available, patent information may be consulted on paper, on microfilms or CD-ROMs, at the national or regional patent offices. Whilst patent searches are a comprehensive method of determining novelty it is also necessary for researchers to ensure the concept behind their technology has not already been disclosed in another format. The internet or library databases can be used to search relevant publications, conference proceedings and press archives to determine if the concept is already publicly known.

The technology transfer office or IP officer will then conduct a more detailed assessment to determine the technology's patentability as follows:

Step 1: Novelty Assessment

The technology must be new and must not have been disclosed previously. Disclosure not only includes conventional publication in a journal or conference proceedings, but also refers to speeches, lectures, exhibitions of scientific posters, emails, discussions or any communication medium that can be read, spoken and/or viewed by the general public. If a patent application is not filed for before a technology is disclosed to the public, it cannot be patented (except in Canada or the United States where a one-year grace exists after public disclosure). Many patent opportunities are lost because researchers choose to publish their work before patent submission or inadvertently disclose the information without any confidentiality arrangements in place.

Step 2: Inventiveness assessment

There must be an identifiable inventive step for the technology to be patentable. It is also necessary to determine that a person of average intelligence and skill in the area of the technology could not have made the discovery. This can be done by examining any previously disclosed information and outlining the differences between this prior art and the technology currently under assessment. A lot of patents are granted for incremental improvements to existing technologies which are not obvious routine developments. However changes in size, portability, materials or the substitution by an equivalent part are not considered inventive enough to merit a patent.

Step 3: Industrial Applicability Assessment

To patent a technology, it must be proven to have an industrial application and identifiable commercial use. The technology must be capable of being made or used in some kind of industry and not just limited to intellectual or aesthetic activity.

Step 4: Non-exclusion assessment

The invention must not be of a type excluded by law. Exclusion categories differ between countries and regions. In many countries, scientific theories, mathematical methods, plant or animal varieties, discoveries of natural substances, commercial methods, or methods for medical treatment are generally not patentable. In terms of a new technology, it is commonly excluded if it has a potentially negative moral or social impact in the country of filing or if the scientific basis is unclear.

Whilst patent offices and searchable internet databases significantly facilitate access to patent information and technology disclosures, the technology transfer office will generally contact a professional body or patent attorney if a high-quality search is required. Using the services of a

skilled searcher, whilst costly, is a more reliable and faster method of assessing patentability. Most technology transfer offices will have an established relationship with a patent attorney or agent who will not only be an expert in patent law and procedure, but also competent in the technical area of the technology. An opinion service is another assessment option which is offered by most professional patenting firms, attorneys and by some patent offices. Researchers may request an opinion of a Patent Office on issues of validity or infringement with a non-binding judgement. This means the applicant is free to decide themselves if they wish to pursue a patent application regardless of the opinion expressed.

Before a final decision is made on whether the technology will be patented the issue of cost and alternative intellectual property protection should be considered. The expense involved in the submission and maintenance of patents is a significant cost for any research organisation or third level institute. A return on this investment will be expected and the patentability assessment should include a consideration on whether patenting is the most suitable form of IP protection and, if so, that the patented technology will be exploitable.

Once the researcher and the technology transfer staff are satisfied that the technology meets the practical and substantive conditions required for patenting, they will most likely proceed with a preliminary application to the Irish Patent Office. This process begins with the preparation of a specification containing a detailed description of the technology, one or more claims defining the matter and scope for which protection is sought, and any drawings or examples of how the technology operates. The drafting of a patent specification is a complex matter for which the help of the patent attorney or agent will again be required. Each patent office has rules relating to the form of the specification, defining such things as paper size, font, layout, section ordering and headings, which must be complied with. Before submission the patent agent or attorney will assess the patent application in terms of compliance and ensure that the specification and claims are clear and concise, with sufficient disclosure and no evident contradictions. The subsequent steps involved in the patenting process are outlined in Appendix 4.

STAGE 4: DEVELOPING AND IMPLEMENTING A COMMERCIALISATION

STRATEGY

Every technology has a different route to market and at this point in the process a decision must be made on how best to exploit the technology under consideration. The development of a commercialisation strategy will be a joint endeavour by experienced technology transfer staff and the relevant researcher(s). Considerations to be taken into account include:

- The nature of the technology under development and the meat sector industry(s) it will be applied to.
- The IP position of the technology including the level of novelty, the type of protection in place and any ownership issues.
- Any additional development work required to take the technology or concept to a market ready stage.
- Target markets based on previously gathered information and any potential commercial partners or entities operating within these markets.
- The long-term objectives and expectations of the inventor(s) and the research establishment for which they work.

There are two broad channels for commercialisation that research organisations and third level institutes generally consider:

- a) Assignment or licensing of the technology to an existing company
- b) Starting a new company

ASSIGNMENT OR LICENSING

This common route of commercialisation is often chosen if the research establishment does not have the resources available to fully develop or commercialise the technology themselves. It involves the transfer of the intellectual property and ownership rights to one or more commercial entities that have established routes to market and the necessary skills and resources to commercialise the technology effectively. Although this option helps share the risk associated with the commercialisation of a new technology, it will generate substantially lower returns for the inventor and the research establishment than might be achieved if they commercialised it themselves.

Assignment involves selling the technology and its associated intellectual property (IP) rights to a third party. Once the IP has been assigned to someone else the research establishment and inventor will have no further rights to use that IP, unless permission is given from the new owner.

In return for an assignment, the owner may receive a lump sum payment, a royalty or a combination of both. The lump sum payment is essentially the purchase price and when being negotiated should take into account all the costs involved in taking the technology to its current state of development whilst allowing for a profit component. The purchaser may seek to pay royalties instead of a lump sum amount thus reducing the initial capital outlay. In some cases, payment of royalties may be conditional on the technology being successful in the market place.

A license, on the other hand, is a legally binding contract by which the owner grants another party access rights to use or commercialise the technology in return for payments. Licensing does not transfer ownership of the technology and research establishments often reserve rights to use the technology or invention for the purposes of further research. An exclusive license grants the licensee the right to commercialise or use the technology to the exclusion of all others, including the research establishment. In contrast a non-exclusive license has no features of exclusivity and the research establishment retains the right to commercialise and may grant licenses to any number of licensees, without limitation. If the technology applies to a variety of different markets or uses, it can be licensed to different commercial entities based on territories or fields of use, thereby creating multiple revenue streams. License payments take several forms including royalties, up-front fee, milestone payments or a combination of any of these. The most common is in the form of royalties on sales and the percentage paid is based on factors such as profit margin, exclusivity, standard industry rates, competitive position and patent strength.

When weighing up these two options technology transfer staff and researchers should consider the following:

- **Return on Investment:** If the technology still has considerable development to undergo and may be difficult to commercialise successfully, assignment may be the best option with a guaranteed quick return on investment with no continuing obligations. Licensing will also minimise further capital investment and risk whilst creating an income stream, however ownership is retained and the royalties have the potential to increase over time or with further commercialisation.

- **Future use of the technology:** Once assigned, all rights to the technology are lost and any future research relating to the technology will have to be done with the consent of the new owner and the possible incurrence of charges. Licensing allows the retention of ownership rights and the research establishment can therefore limit the extent to which the technology is used and possibly negotiate areas in which it can be applied to further research.

- Costs: Assignment of the technology means that the new owner will assume responsibility for the maintenance and defence of any registered rights e.g. patent renewal fees or legal costs. Under a licensing agreement, the owner will still retain responsibility for these costs. If the costs outweigh the benefits of owning the technology, the decision may be taken to sell the technology.

If a decision is taken to license or assign the technology, a marketing strategy should be implemented to promote the technology. Depending on the research establishment and the resources available to technology transfer staff, this may involve the design of a marketing flyer that will introduce the technology and define the innovative advantages offered by it over existing solutions. The preparation of an information pack should include a more detailed description of the technology and its potential applications, information on the researcher(s) and institute involved in its development, any scientific publications and the patent status. The flyer and information pack are then used to approach targeted meat sector companies that have been identified as having a potential interest in the technology. This is generally done by email or phone by technology transfer staff. Most research organisations and third level institutes will have a website or newsletter with a section dedicated to technology offerings and licensing opportunities for industry. There are also a number of other databases and websites on which meat researchers and their employers can register licensing or assignment opportunities including

- Enterprise Ireland's 'Techsearch' at <http://www.enterprise-ireland.com/techsearch>
- Intertrade Ireland's 'ExpertiseIreland' at <http://www.expertiseireland.com>
- The Irish Institutes of Technology's 'TecNet' at <http://www.tecnet.ie>
- The Irish University's 'Technology Transfer Strengthening Initiative' at [http://www.enterprise-ireland.com/ ResearchInnovate/Research+Commercialisation/Technology+Transfer+Strengthening+Initiative.htm](http://www.enterprise-ireland.com/ResearchInnovate/Research+Commercialisation/Technology+Transfer+Strengthening+Initiative.htm)
- The 'Enterprise Europe Network' at www.enterprise-europe-network.ec.europa.eu

If there is interest from a commercial entity, the researchers will usually be involved in discussions during the process of selling the technology or agreeing a license.

A more active assignment/licensing strategy can result from existing relationships between meat researchers and industry counterparts. Researchers are often aware, from an early stage of development, that there are specific meat sector companies who will be interested in licensing/purchasing the technology. The direct introduction of assignees/licensees by a researcher can be a more fruitful method of transferring technologies to industry than the passive marketing approach. Enterprise Ireland can also assist in this partnering process and may be

able to introduce technologies to their relevant clients. If there are a number of interested parties, the licensee/assignee will typically be selected based on the company's ability to bring the technology to market whilst generating maximum financial benefits for the research establishment.

SPIN-OUT COMPANIES

A spin-out company is a new business created to exploit a commercial opportunity arising from research work. Whilst creating a new company is very rewarding, the level of risk associated with this commercialisation route is high compared to assignment or licensing of the technology. The success of a spin-out company is often influenced by factors outside the control of the researcher(s) and the process involved has more to do with the target market, business team and resources available than the quality of the technology.

Technology transfer offices associated with the majority of Irish third level institutes will support this method of commercialisation if they feel it is the best route to market and a more valuable opportunity than licensing or selling the technology to a third party. The researcher(s), as the originator, will be at the centre of the spin-out from the outset. Depending on the individual's skill set and the business requirements this role may be as a technical advisor, business manager, shareholder or director. The technology transfer office will generally offer a comprehensive business support programme to researchers starting down this road which may comprise of advice, seminars, one-to-one consultancy, workshops and individual training.

When deciding if the creation of a spin-out is the correct commercialisation route, an assessment will be conducted by the technology transfer office in conjunction with the relevant researcher(s) and will include the following activities:

Step 1: Identifying a market

Technologies often have more than one application and it is therefore important to examine the potential options and identify the different markets to which the technology may be targeted.

Step 2: Market analysis

The most promising technology applications are then selected and more in-depth market analysis conducted to determine the likely direction of the spin-out company.

Step 3: Feasibility analysis

A feasibility analysis will determine if there is sufficient demand for the technology and whether or not its commercialisation will be a profitable exercise. It will involve an examination of the market

opportunities, identification of the key competitors and the competitive and financial advantage offered by the technology.

Step 4: Business Team

Whilst the researcher is an integral part of the technology development, a spin-out company will require a broad range of skills and a strong management team to succeed. If those involved in the development to date do not have the necessary technical/business skills, it is important to identify potential candidates at this point.

Step 5: Business plan

A business plan is an expansion of the feasibility analysis and should provide comprehensive information on the business strategies, management and technical team, sales, marketing and distribution models, pricing strategy, financial projections and the opportunities for investment. A well-prepared business plan can act as a sales document to secure funding and attract investors to the business. Appendix 5 outlines the contents of an effective business plan

As well as a novel technology and astute business team, a spin-out company cannot succeed without finance. This can come from various sources and while the TT office can offer advice and make introductions it is important for the researcher to push for funding opportunities to ensure the development and growth of the spin-out. Some researchers look to family and friends to raise money, however a successful company will require significant financial investment and the following are some of the other options that may be considered:

- **Research Bodies:** The research body or third-level institute in which the technology was developed may invest cash or take a shareholding in the company. This will generally be in exchange for IP rights, research support or the use of the institute's name. As well as direct financial support a research establishment may provide incubation space or the loan of equipment and resources for a limited period of time.

- **Business Angels or Private Investors:** These are private individuals who invest capital in companies during the early stage of development. They can contribute their know-how or experience in company management and can offer valuable expertise and guidance to spin-outs. Initial investments can range between €50K and €500K and the angels receive a significant shareholding in exchange for taking a personal financial risk at the early stages of the company's life. The Business Angel Partnership is the national business angel network in Ireland bringing together the private equity activities of Enterprise Ireland, InterTrade Ireland and the Irish Business and Innovation Centres (BICs). A key activity of this partnership is the

matching of private investors with pre-screened investment opportunities including spin-out businesses.

- **Venture Capital:** VC is capital, typically in the form of cash, provided to early-stage, high-potential companies in exchange for shares in the business. This capital is generally provided by institutional investors and high net worth individuals and is pooled together by dedicated investment firms. In addition to investing cash, venture capitalists are likely to take a role in managing spin-out companies thus adding skills, expertise and credibility to the company. There are a variety of active VC firms in Ireland many of which have been part funded by Enterprise Ireland. Some VCs specialise in certain technology areas or at certain stages of technology development. The Irish Venture Capital Association has published a guide on Venture Capital which is available to download at http://www.ivca.ie/guide_to_vc.html.
- **Public Markets:** An initial public offering (IPO) is the mechanism through which a company raises funds from the public by selling a given number of company shares in an open market like a stock exchange. Commonly referred to as "going public", an IPO is inappropriate for the majority of early stage companies attempting to raise capital. The advantage of an IPO is that the company is never required to repay the capital. Instead the new shareholders have a right to future profits. Whilst the existing shareholders will see their shareholdings diluted they often become more valuable with this capital investment. The AIM (Alternative Investment Market) on the London Stock Exchange is the most successful stock exchange in the world in terms of attracting new offerings. Its objective is to offer smaller companies, from any country or sector, the chance to raise capital.
- **Government and state agencies:** Grant aid is available from a wide range of state agencies to assist in business spin-out including Enterprise Ireland, County and City Enterprise Boards, Intertrade Ireland, LEADER+, Shannon Development and Údarás na Gaeltachta. These grants can range in value and whilst they may contribute to the spin-out or development process they should not be relied on as a source of finance. Enterprise Ireland supports high potential start-up (or spin-out) companies and can provide funding towards the achievement of an overall business plan, rather than towards discrete elements such as R&D. The Seed Capital Scheme (SCS) and the Business Expansion Scheme (BES) are tax relief incentive schemes offered by the Irish Revenue (www.revenue.ie). SCS repays income tax to a person who leaves employment and invests by means of shares in a spin-out company. A refund of income tax paid over the prior six years is claimable. The Business Expansion Scheme (BES) allows individual investors to obtain income tax relief on investments in each tax year. There is

no tax advantage for the company in receipt of the BES, but securing this funding may enhance their ability to attract other external funding.

- **Bank finance:** Banks can offer short term, medium term or long term financing options to spin-out companies once they have established that the proposed business venture has the capacity to repay the debt. Banks will require some sort of personal security against such loans and if the business is unable to repay the debt the banks will collect on their security. Banks differ widely in terms of what they offer the spin-out business sector, so it is important to talk to a number of them before making a decision.

APPENDIX 1

Technology Transfer Support Services within Irish Research Organisations and Third Level Institutes engaged in Meat Research

<p>IgniteTechnology Transfer Office NUI Galway University Road Galway</p> <p>Email: technologytransfer@nuigalway.ie Tel: +353 (0)91 492663 Web: www.nuigalway.ie/tto</p>	<p>NovaUCD Belfield Innovation Park University College Dublin Belfield Dublin 4</p> <p>Email: nova@ucd.ie Tel: +353 (0)1 716 3700 Web: www.ucd.ie/nova</p>
<p>Office of Technology Transfer, UCC University College Cork Cork</p> <p>Email: techtransfer@ucc.ie Tel: +353 (0)21 4902141 Web: www.ucc.ie/research/techtransfer/</p>	<p>UL Technology Transfer Office Foundation Building University of Limerick Limerick</p> <p>Email: seamus.browne@ul.ie Tel: +353 (0)61 234124 Web: www.research.ul.ie</p>
<p>Hothouse Technology Transfer Dublin Institute of Technology Aungier Street Dublin 2</p> <p>Email: hothouse@dit.ie Tel: +353 (0)1 402 7028 Web: www.hothouse.ie</p>	<p>Trinity Research and Innovation Room F48 O'Reilly Institute Trinity College Dublin 2</p> <p>Email: innovation.centre@tcd.ie Phone: + 353 (0)1 896 1155 Web: www.tcd.ie/research_innovation</p>
<p>INVENT DCU Dublin City University Dublin 9</p> <p>Email: maeve.freeman@invent.dcu.ie Tel +353 (0)1 700 7777 Web: www.dcu.ie/invent</p>	<p>Teagasc IP Officer Head Office Teagasc Oak Park Carlow</p> <p>Email: miriam.walsh@teagasc.ie Phone: +353 (0) 59 9183477</p>

APPENDIX 2

TECHNOLOGY DESCRIPTOR

Name/title of the selected technology:

Identification number:

Date:

Field of technology
Key words
Research Project
Organisations and/or people involved in the selected idea (List all organisations and individuals with an interest in the idea, and describe briefly the role of each.)
Inventor(s) of the idea
Idea description ¹ a) brief description of the general principle b) solved problems by technology
Current state of art ²
Principal potential application areas and markets identified.
Advantage(s) of technology (technical and/or commercial) to the meat sector ³
Other notes or comments

¹ The description must allow a non-specialist to understand the invention/idea and its areas of application, and describe in basic terms the technical functionality of the idea.

² The state of art represents the current highest level of expertise/know-how in the matter, and the technologies used at present to solve the same problem(s).

³ Factors which would establish a competitive advantage in case of exploitation within the meat sector.

APPENDIX 3

PATENT DATABASES

COUNTRY/ORGANISATION	WEBSITE
Espacenet	http://ie.espacenet.com
Patent Lens	http://www.patentlens.net
Google patent search	http://www.google.com/patents
World Intellectual Property Org.	http://www.wipo.int/pctdb/en/index.jsp
European Patent Office	http://www.epoline.org/portal/public/registerplus
United States of America	http://www.uspto.gov/patft/index.html
Australia	http://www.ipaustralia.gov.au/patents/search_index.htm
Canada	http://patents1.ic.gc.ca/intro-e.html
Chile	http://www.dpi.cl/dpi_web/Frm_Login_default2.htm
China	http://www.sipo.gov.cn/sipo_English/zljs/
Czech Republic	http://isdvapl.upv.cz/pls/portal30/pt.ptfrm
Finland	http://www.prh.fi/en/patentit/tietokannat/patinfo.html
France	http://www.inpi.fr/front/show_rub.php?rub_id=8
Germany	http://www.dpma.de/suche/suche.html
Hungary	http://www.hpo.hu/English/adatbazis/
India	http://www.pfc.org.in/db/db.htm
Ireland	http://www.patentsoffice.ie/eregister/Query/PTQuery.asp
Japan	http://www.jpo.go.jp/quick_e/index_search.htm
Latin America	http://invenes.oepm.es
Mexico	http://siga.impi.gob.mx and http://vidoc.impi.gob.mx
New Zealand	http://www.iponz.govt.nz/search/cad/dbssiten.main
Republic of Korea	http://www.kipo.go.kr/kpo2/user.tdf?a=user.english.html
Romania	http://193.230.133.4/cgi-bin/invsearch
Russian Federation	http://www.fips.ru/ensite/

COUNTRY/ORGANISATION	WEBSITE
Singapore	http://www.epatents.gov.sg/PE/
Slovakia	http://www.indprop.gov.sk/eskipo.php?lang=en&idd=2&idd2=
Slovenia	http://www2.uil-sipo.si/dse.htm
Spain	http://invenes.oepm.es
Switzerland	http://www.swissreg.ch
Thailand	http://www1.ipic.moc.go.th/dipdcd/owa/p5query1.main?LANG=1
United Kingdom	http://www.ipo.gov.uk/patent.htm

APPENDIX 4

THE PATENTING PROCESS

Applying for an Irish patent:

Once a researcher has established, with the assistance of their organisation's intellectual property staff, that a technology is patentable, a preliminary application is filed in the Irish patent office. This process begins with the preparation of a specification containing a detailed description of the technology, one or more claims defining the matter and scope for which protection is sought, and any drawings or examples of how the technology works. An abstract must also be prepared providing a summary of the invention and this is submitted to the Irish Patent Office along with the specification and the necessary application form and filing fees. The drafting of a patent specification is a complex matter for which the help of a patent attorney is very advisable. The patent office also has rules relating to the form of the specification, defining such things as paper size, font, layout, section ordering and headings, which must be complied with.

When the application is filed at the Patent Office, the date is recorded and this is called the "priority date". Most countries are signatories to an international convention (The Paris Convention) which guarantees that the priority date of an invention filed in one country will be respected in other countries, provided an application is filed in the other countries within 12 months of the date of filing of the first application. Patent examiners working for the Irish Patent Office will check the application to determine that it fulfils all the patentability criteria. These experts carry out searches through previous patent specifications and other literature to ascertain if the invention is novel and includes an inventive step. An 18-month time period exists in which the information contained in the application is held in confidence by the patent office. After this period details of the invention including the specification and search report are published and available in the public domain. Once the patent office is fully satisfied that the patent is novel and the claims made are allowable, notice of the allowance of the patent will be issued and the patent will be granted.

Applying for a patent in Europe:

If the researcher or the organisation employing them wishes to apply for patent protection in Europe, individual patent applications can be filed in each of the relevant countries. Requirements can vary from country to country so it is important to request information in advance from the national patent offices of the countries in which protection is sought. Alternatively a European Patent Application procedure allows the applicant to obtain protection in

all those countries which are members of the European Patent Organisation (EPO). This procedure is based on a single application (similar to the Irish application) filed in one of the official languages of the European Patent Office (English, French, German). The applicant must designate the countries in which patent protection is sought and if successful the EPO grants a European Patent which is the equivalent of a national patent in each of the designated countries. If the language of the patent is not an official language of the designated country, a translation will be required to retain a valid patent in that country. The European Community Patent is a patent law measure currently being debated within the European Union, which would allow companies to obtain a unitary patent throughout the European Union.

Applying for an international patent:

The Patent Cooperation Treaty (PCT) is a worldwide agreement to simplify the filing and processing of patent applications. Approximately 115 countries, including most industrial countries, are party to the treaty. Through a single international application a researcher or their employer can apply for a patent in all the countries party to the treaty. PCT applications may be submitted to the Irish Patent Office, to WIPO in Geneva or to the European Patent Office in either The Hague or Munich. The submission is made in a single language and the applicant must designate the countries in which patent protection is sought. The effect of the international application is the same as if a national patent application had been filed with the national patent office of each country. A search is performed by an International Searching Authority (ISA), accompanied with a written opinion regarding the patentability of the invention. Finally, the examination and grant procedures are handled by the relevant national or regional authorities.

APPENDIX 5

BUSINESS PLAN CONTENT

Executive Summary – A clear persuasive summary outlining the key points of the business plan. The specific content will be dependent on the core purpose and target the audience.

Background – A brief review of the work undertaken to date, particularly the research and any IP generated.

Product/Service – A non-technical description of the product or service that the company will offer including it's competitiveness on the market and future prospectives.

Market – A market-research survey, describing the market sector in which the company will operate and determining whether the market is sufficient to support the business based on size and competition.

Management – A management-team summary surveys the principal roles of each team member and sets out their relevant skills and experience. It may also refer to future plans, such as projected hirings and the financial aspects involved.

Risk Analysis – An examination of the best and worst case scenarios. It will examine the main milestones and the necessary response if they are missed. The likelihood of future funding requirements and the level of investment required should also be addressed.

Financial Information – The most concrete section of the business plan should outline key financial indicators for at least three years and include a break-even analysis, profit-and-loss forecast, cash flow projections, balance-sheet forecast and business ratios. It also is important to predict returns on investment and the method of selling shares for investors.

APPENDIX 6

SPIN-OUT FINANCIAL SUPPORT

<p>Business Angel Partnership Guinness Enterprise Centre, Taylors Lane, Dublin 8. Email: info@businessangels.ie Tel: 01 4100818/9</p> <p>Business Angel Partnership CorkBIC, National Software Centre Campus, Mahon, Cork Email: irelandsw@businessangels.ie Tel: 01 7304603</p> <p>Business Angel Partnership Westbic, Galway Technology Centre, Mervue Business Park, Galway. Email: bmw@businessangels.ie Tel: 091 730850</p> <p>Business Angel Partnership South East BIC, Unit 1b, Industrial Park, Cork Road, Waterford. Email: irelandse@businessangels.ie Tel: 051 356300</p> <p>Enterprise Ireland HPSU Start-up Team The Plaza, East Point Business Park Dublin 3 Email: startup@enterprise-ireland.com Tel: 01 7272972</p> <p>Growth Capital Department Enterprise Ireland, The Plaza, East Point Business Park, Dublin 3 Email: Denis.Shevlin@enterprise-Ireland.com Tel: 01 7272639</p>	<p>Irish Venture Capital Association (IVCA) 3 Rectory Slopes, Bray Co. Wicklow. Email: secretary@ivca.ie Tel : 01 2764647 Website: www.ivca.ie</p> <p>European Venture Capital Association (EVCA) Bastion Tower, Place du Champ de Mars 5 B-1050 Brussels, Belgium Email: info@evca.eu Tel: +32 2 715 00 20 Website: www.evca.eu</p> <p>Seed Capital or Business Expansion Scheme Office of the Revenue Commissioners, Dublin Castle, Dublin 2 Email: mgalvin@revenue.ie Tel: 01 7024107 Website: www.revenue.ie</p> <p>Shannon Development Town Centre, Shannon, Co. Clare Tel: +353 (0)61 361555 Website: http://www.shannon-dev.ie</p> <p>Údarás na Gaeltachta Na Forbacha Co. na Gaillimhe Tel: + 353 (0)91 503100 Website: http://www.udaras.ie</p> <p>The Irish LEADER Network (LEADER) James O'Keefe Institute, Newmarket, Co. Cork Tel: +353 (0)29 60633 Website: http://www.irishleadernetwork.org</p> <p>County and City Enterprise Boards http://www.enterpriseboards.ie</p>
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