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**Innovation and the policy environment
findings from a workshop with meat industry firms in Skive**

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Publication date:
2007

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Baker, D., & Hamann, K. (2007). *Innovation and the policy environment: findings from a workshop with meat industry firms in Skive*. Frederiksberg: Fødevareøkonomisk Institut, Københavns Universitet. IFRO Working Paper, No. 7, Vol.. 2007

Innovation and the policy environment

Findings from a workshop with meat industry firms in Skive

Institute of Food and Resource Economics (FOI)

Working Paper 2007/7

Innovation and the policy environment

Findings from a workshop with meat industry firms in Skive

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Abstract

This report summarises discussions with a small number of meat industry firms about the effects of policy on their innovation activities, and their recommendations for future policy changes. Although firms, like researchers and policymakers, lack strong definitions and measurement procedures for innovation, they were able to list and describe their innovation processes and outcomes. Firms expressed some dissatisfaction with innovation policy, and were able to make a number of recommendations for change. Notably, this included its linkage to an overall strategy that emphasises international competitiveness and other concerns of the firms. Recommendations also include removing several of the favourable conditions currently enjoyed by small firms, and called for amendment or removal of the repayment requirement.

Keywords

Innovation, meat industry, policy, workshop

ISBN 978-87-92087-19-5 (on-line, Innovation and the policy environment)

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Preface

This report summarises discussions with meat industry firms about the role of innovation policy and other related policies on their innovation activities. Firms described their experience with such assistance, expressed their specific needs in the context of their commercial and social environment, and requested policy changes. To a significant extent, this report passes on those requests.

Thanks are particularly due to the firms participating in interviews and the workshop, but who remain anonymous. Thanks are due to Milijana Nastasijevic for telephone interviews made to the firms and for transcription of workshop minutes.

Mogens Lund
Institute of Food and Resource Economics
Copenhagen, May 2007

Summary

Very little past research has described and evaluated innovation in the meat industry, nor the effectiveness of policies that might promote and sustain it. The current project has yielded results on new product introductions (which show the meat industry lagging other food industries), but not on other forms of innovation to which substantial resources are devoted.

The current project has also found that meat industry firms encounter different policy-related barriers to new product development and introduction than do other food industry firms. Their development procedures are also different to those of other food industry firms and have different dynamics of change. Although Denmark consistently scores well amongst EU states as an innovative economy and society, the identified criteria and drivers of change appear remote from the concerns of the meat industry.

At a workshop held in Skive on 3 April 2007, firms' comments on policy centred on innovation policies rather than other policies (e.g. food safety, labelling). Their views include dissatisfaction with its overall targeting, and apparent lack of co-ordination with an overall strategy for the food or meat industry. Some firms claim that available assistance is too small, too complicated to apply for, and that its conditional repayment requirement is counter-productive in terms of innovation success. Treatment of small firms, training and public-private partnerships all prompted comments from the firms. Based on discussion with firms, it is recommended that:

- innovation policy in the meat industry be based on a long term strategy for the food industry;
- co-operation between firms, and particularly across industry sectors, be promoted by policy and both targeted and employed in formulation of the above strategy;
- training programmes for meat industry firms be incorporated into overall innovation policy;
- government-funded university research programmes involving the meat industry to have enhanced focus on competitiveness and other economic factors;
- procedures for applications and grants be simplified and streamlined and eligibility guidelines be clarified;
- distinctions and requirements be made uniform for small and large meat industry firms;

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- grant repayment requirements be reviewed, and be disconnected from the commercial success or failure of an innovation;
- local agencies' labelling and certification procedures to be reviewed in association with meat industry representatives; and
- alternative meat inspection arrangements be investigated, with the goal of increasing innovation-related flexibility in production and processing.

1. Introduction

1.1. Background

Innovation is commonly seen as a vital aspect of food industry firms' ability to enter and persist in the modern marketplace, and to achieve and maintain competitiveness. Innovation by firms can take a variety of forms and involve vertical and horizontal linkages amongst firms. Its form and intensity may also be affected by aspects of the specific industry, the kinds of customers and suppliers served, and a variety of other factors. However, innovation has proved difficult to define and measure, and the factors affecting its incidence and success are not widely known. This report summarises the ways in which a selection of meat industry firms describes firm-level innovation activities and records their thoughts and suggestions about policy.

1.2. Aim

The aim of this report is to present a summary of the views of a selection of meat industry firms about their innovation activities and how they might be improved by changes in policy.

1.3. The project

This research is conducted under the auspices of the project¹ "Perspektiver for og Udvikling over den danske fødevarekæde (phase 2)",² commonly known as "the food chain project". This project is funded under the Innovationslov and administered by the Food Economy Directorate of the Danish Ministry of Agriculture (DFFE). The objectives of the project are to:

- measure changes in function, structure and commercial practice in the Danish food industry and compare and contrast these with developments in other countries;
- characterise vertical and horizontal relationships in the Danish food chain and their role in delivering optimal levels of food quality, variety and safety;
- evaluate the efficiency and competitiveness of the Danish food system at each stage of the marketing chain;
- review and evaluate instruments of Danish, EU and foreign public policy in the development of the food marketing chain; and

¹ Further information about the project are available from the author at db@foi.dk.

² "Perspectives and outlook for the Danish food marketing chain".

- communicate research results in a number of media.

This report employs a workshop with meat industry firms in line with the final two objectives listed above. Preliminary project work on one form of meat industry innovation, namely results of a survey of new product introductions, was presented for the firms' information and to stimulate discussion.

1.4. Outline of the report

This report has 9 sections. The second presents relevant background on meat industry innovation and EU-level assessment of innovation in Denmark. The third maps out innovation policy instruments and the fourth outlines the workshop procedure. The fifth section reports firms' views and discussion at the workshop and Section 6 is their evaluation of policy based on recent experience. Section 7 lists some recent experiences and sections 8 and 9 list conclusions and recommendations respectively.

2. Meat industry innovation

2.1. Innovation as an industrial and economic concept

2.1.1. Definition

The term “innovation” has no widely-accepted definition within economics, but has come to be interpreted as new (or newly-adopted) activities associated with:

- products (new products);
- processes (new ways of doing things);
- marketing (new relationships or transaction formats with buyers and suppliers); and
- organisation (i.e. changing the structure of markets or the nature of transactions).

The predominance of the word “new” may be misleading, for three reasons. First, it is often suggested that food industry firms are frequently not innovators themselves, but rather adopters of innovations developed outside the food industry.³ Second, food industry firms’ new products are often copies of competitors’ products, or are slightly-changed versions of existing products.⁴ Third, food industry firms’ efforts in branding have been interpreted by at least one researcher⁵ as creating and reinforcing loyalty to existing products and relationships, hence it is innovation without any “new” element.

2.1.2. Measurement

It is likely that new products receive too much emphasis in discussions of innovation, and it is clear that organisational⁶ and marketing⁷ innovations have played a significant role in food industry development. However, measurement is problematic and rare. The current project has surveyed Danish food industry firms about new product

³ Traill and Grunert (1997) examine this statement in the European context.

⁴ See Harris (2002) for a study of new food products in the US.

⁵ See Braadland (2000) for a wide-ranging study of innovation amongst Norwegian food industry firms.

⁶ See Yakovleva et al. (2004) and Braadland (2000) for a discussion of organisational innovations by European firms. Avermaete (2006) emphasises the innovative interrelationships that exist between firms within small rural regions.

⁷ See Wilkinson (2002) for a British view of innovation through food marketing developments and Stewart-Knox and Mitchell (2003) on Australian firms. Boon (2001) conducted four in-depth case studies of Danish firms that used vertical relationships in the food marketing chain to diversify product range.

introductions (a few of the results are presented below), but this is one of very few such studies in Scandinavia.⁸ Few studies have been made of food industry innovation in terms of process, marketing and organisation.

The European Commission annually publishes a “European Innovation Scoreboard” (EIS)⁹ that is used to compare the degrees of innovation amongst member states, as well as in Norway and Switzerland. The scores assigned are not sector-specific (they span the entire economy) and use 26 indicators of innovation under two general headings: innovation “inputs” and “outputs”.

Inputs include:

- Innovation drivers (state-wide achievements in education and communications);
- Knowledge creation (state-wide expenditures in R&D by various stakeholders); and
- Entrepreneurship (state-wide estimates of firms’ behaviour toward innovation).

Outputs include:

- Applications (measures of the predominance of high-technology activities and new products); and
- Intellectual property (patents, trademarks and design).

Using these scores, Denmark consistently ranks amongst the top European countries: in 2006 Danish performance was above the EU average in almost every regard. Poor performance (below the EU average) was reported for the low Danish level of public-private collaboration in research and development, apparently poor innovation due to public funding, a reluctance of firms to innovate in non-technical areas, and the paucity of high-technology products amongst exports.

A critique of the EIS is beyond the scope of the current paper, but one comment arises from the list of “innovation drivers” it uses, as compared to the list reported as a result of an American study¹⁰ of innovation in the meat industry in the presence of strict food safety regulation (see table 1). Although the level of generality of the two lists of drivers is different, the USDA’s list is both simple and thought-provoking.

⁸ Asplund and Sandin (1999) studied the introduction and life cycles of new beers in Sweden.

⁹ EU Commission (2006).

¹⁰ USDA (2004).

Table 1. Innovation drivers in different contexts

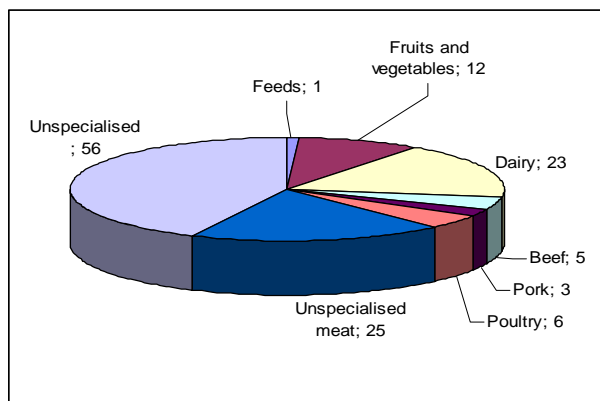
EIS	USDA
<ul style="list-style-type: none">• Education• Research• Public-private partnerships	<ul style="list-style-type: none">• Ability of firms to appropriate benefits of innovation• Demand for innovation• Technological opportunity

2.2. Survey results: new product development by Danish meat industry firms¹¹

2.2.1. Overview of survey

An interview-based survey of Danish non-farm food industry firms was conducted November -December 2005 and March - June 2006. Data collected covered a variety of policy and marketing related topics for the year 2005 and (by staff members' recollection) 2000. Draft questionnaires were prepared, and repeatedly circulated to 15 different organisations with an interest in food industry research, during the period May-October 2005. Testing used mock interviews with volunteer firms. From a database of 444 firms some 200 interviews were arranged, and 131 valid responses were returned. Of these firms, 39 were from "meat" sectors (5 beef, 3 pork, 6 poultry and 25 un-specialised meat: see figure 1.)

Figure 1. Surveyed firms by sector



¹¹ The results presented here are a small part of the full results. Their presence here reflects their use at the workshop in the promotion of discussion and comment from participants. An in-depth analysis of the survey data is available elsewhere, and the interested reader is referred to the authors.

2.2.2. Numbers of new products

Figure 2 details the average numbers of new products introduced and removed by surveyed firms in 2000 and 2005. On both counts, clearly the average for meat industry firms is far below that for non-meat firms. These trends are confirmed when data are adjusted for firm size (see figure 3).

Figure 2. New product introduction and removal

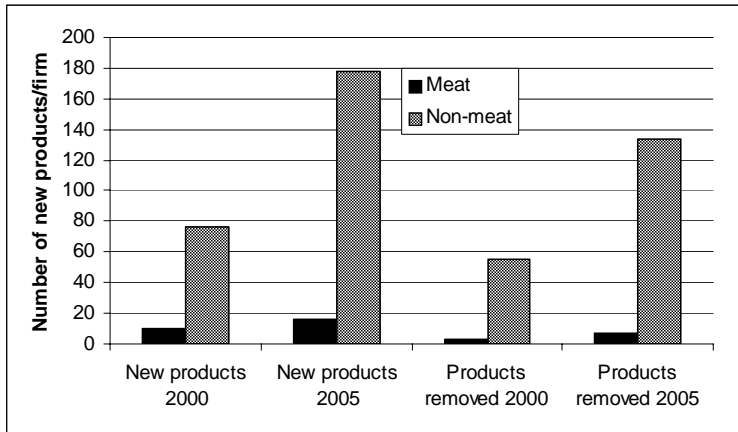
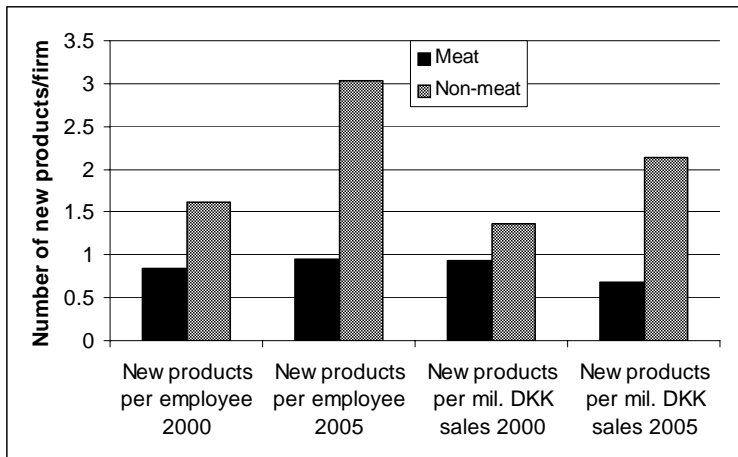


Figure 3. New product introduction adjusted for firm size



2.2.3. Product longevity

Meat industry firms in the survey reported a smaller proportion of their new products lasting more than 6 months on the market than did other firms (figure 4) in both 2000 and 2005. However, meat industry firms reported their products' lives to be significantly longer than did other firms for 2005, which is a substantial change from 2000 (figure 5).

Figure 4. Product removal time

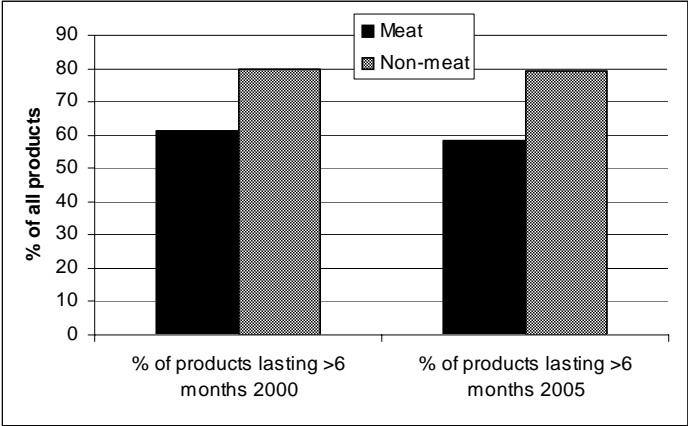


Figure 5. Product age at removal



2.2.4. Newness of new products

Surveyed meat industry firms report that the number of new products are “truly new” has declined from 35% in 2000 to around 25% in 2005, while for other firms this number has stayed the same (figure 6). An additional large proportion of new meat products (35%) are small (as opposed to large) changes to the existing product line.

Surveyed meat industry firms overwhelmingly tend to introduce new products under existing brands, which is a different procedure than for other firms (see figure 7). Although retailers’ own-label brands are significant in new product introductions for both sectors, there has been much more significant growth for meat industry firms. The difference between branding strategies for meat and non-meat firms is further demonstrated in figure 8: meat industry firms tend to have many products for each brand.

Figure 6. “Newness” of new products

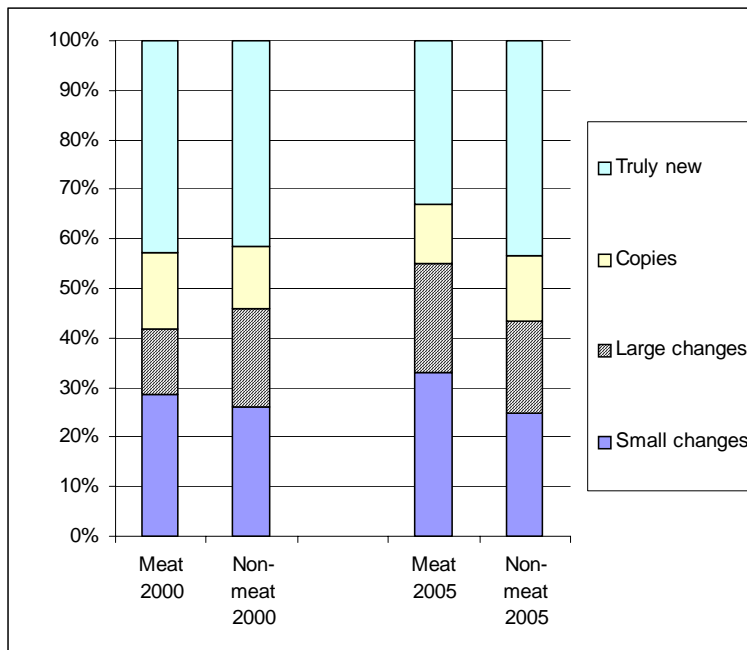


Figure 7. Branding of new products

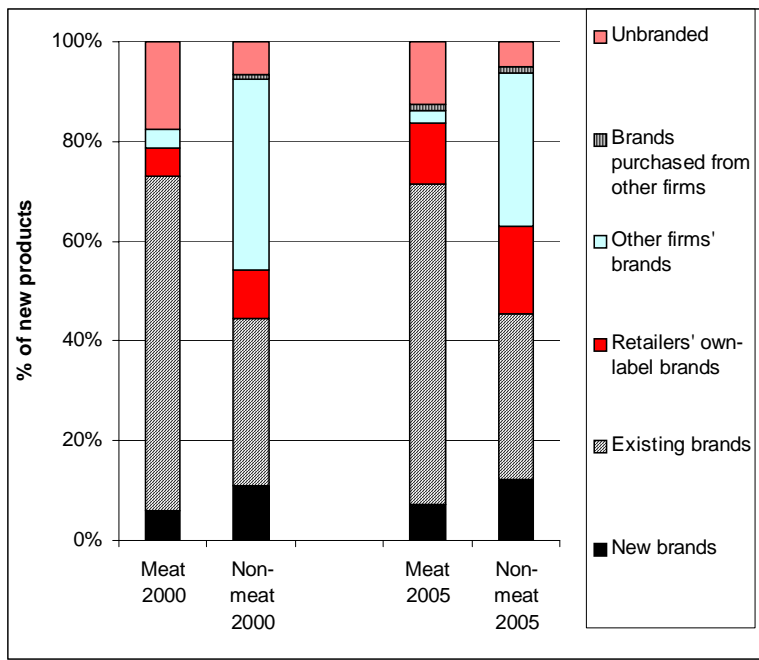
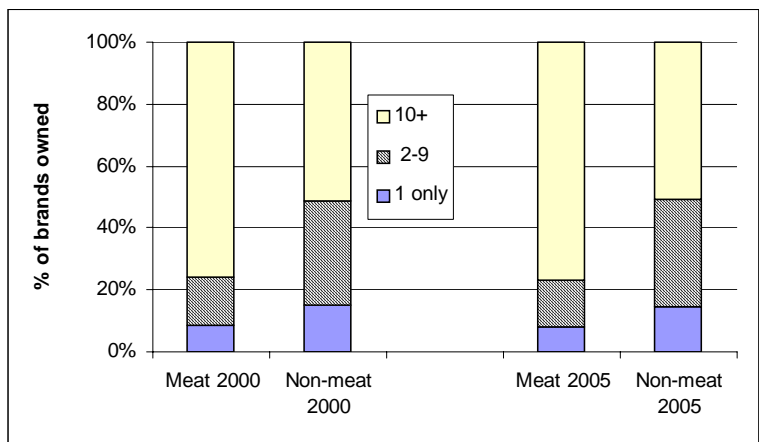


Figure 8. Numbers of product per brand



2.2.5. New product development

Surveyed meat industry firms report devoting fewer overall man-months to new product development activities (see figure 9). In addition, the configuration of the activities is quite different between the two sectors: meat industry firms report spending much more time on initial development of new ideas, and much less time on technical development, than do non-meat firms.

Figure 10 summarises changes between 2000 and 2005. The way in which resource use in new product development has changed is quite different for the two sectors. Meat industry firms have cut back considerably on market research, consumer testing and trials, while increasing their use of time in negotiating with buyers. Contrary to expectations, surveyed meat industry firms reported that regulatory issues had increased the time spent on new product development, but only by 20% between 2000 and 2005: for non-meat firms this figure was 65%.

Figure 9. Product development practices

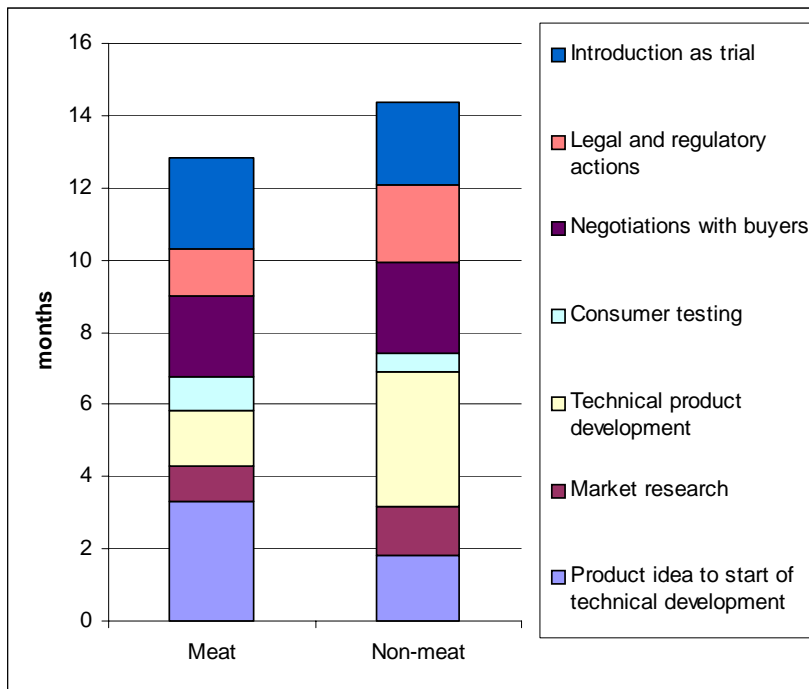
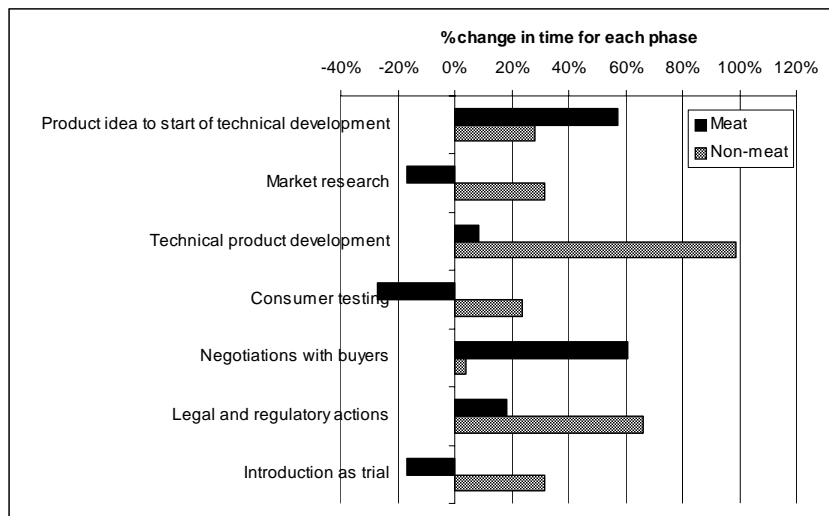


Figure 10. Changes in product development practices



2.2.6. Barriers to new product introduction

About 33% of all surveyed firms claim that they face no significant barriers to new product introductions (figure 11). Small numbers of firms claim that the Danish market is saturated or resistant to new products (figure 12), and although 20-30% of all firms report that introduction costs or within-chain arrangements are barriers to new product introductions, there are no differences between the sectors (figure 13).

With regard to competitive conditions (figure 14) fewer meat industry firms than other firms find retailers' own-label brands to be a barrier, although meat industry firms are more concerned about retail concentration than are other firms. Figure 15 indicates that meat industry firms find several regulatory areas to be a significant barrier to new product introduction, particularly food safety, animal welfare and environment.

Figure 11. Firms claiming to face no barriers to new product introduction

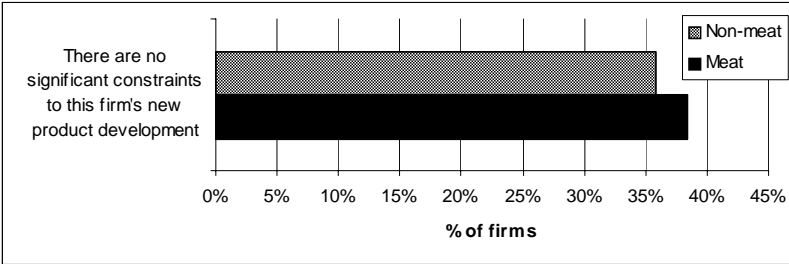


Figure 12. Demand factors as a barrier

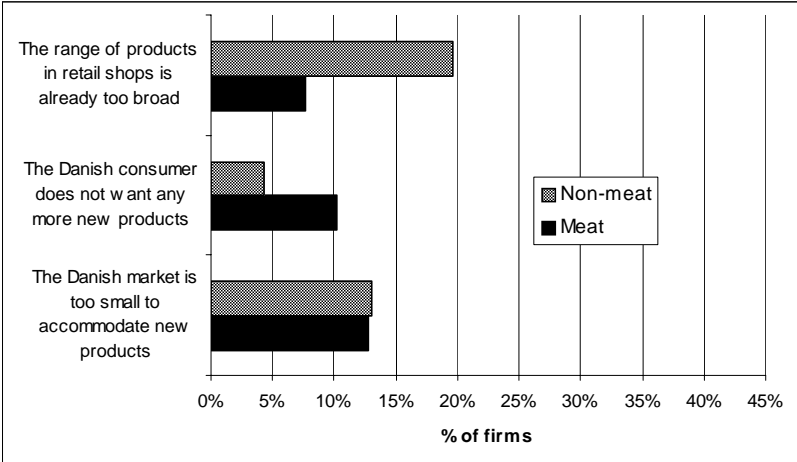


Figure 13. Cost factors as a barrier

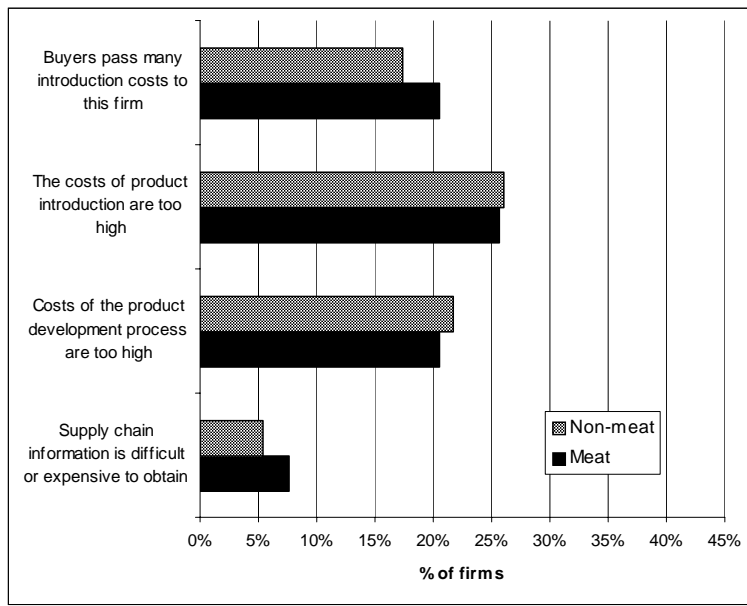


Figure 14. Competitive factors

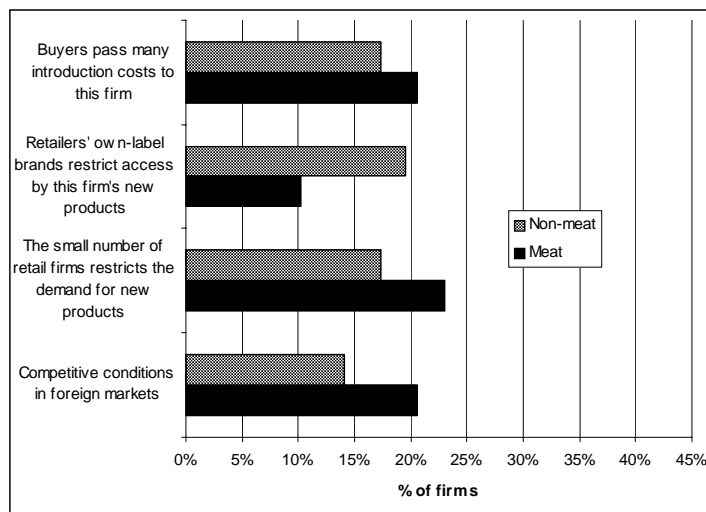
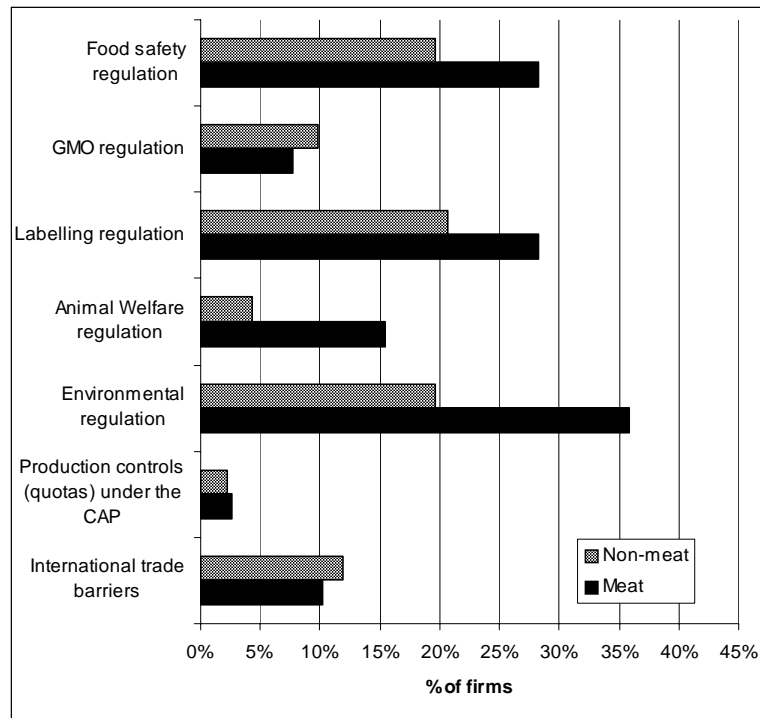


Figure 15. Firms claiming to face no barriers to new product introduction



2.3. A European perspective on innovation in the meat sector

2.3.1. Innovation spending

In 2004, European food sector companies spent, on average, 0.24% of turnover on innovation. This is lower than for the US at 0.35%, Australia at 0.40%. Japan's figure is the highest at 1.21%.¹² There are significant differences in innovation spending according to firm size and food industry subsector. Food and beverage manufacturing companies spend on average 1-3% of turnover on innovation, and the figure for the meat processing industry is similar. There is much higher spending on innovation among firms in the biotech industry or producing food ingredients, which spend approx. 6-8% of turnover on innovation.¹³

¹² CIAA (2006).

¹³ Hamann (2007).

2.3.2. Definitional and organisational issues

Examples of innovations in the meat sector encompass new products, new processing technologies, management systems for traceability and food safety, and new technologies for improved food safety. Right across Europe, small and medium-sized enterprises in the European meat industry mostly regard product reformulations or adaptation of new technologies as innovation. Large meat processing companies distinguish between Innovation and R&D to a higher degree: R&D is regarded as internal development work in the firms, whereas innovation is interpreted as commercialisation of new products or technologies.

Most innovations that have become commercialised are developed internally in the respective companies, e.g. producers of IT solutions develop traceability systems while meat processors formulate new products. This suggests that innovations resulting from cooperation between companies and research environments are less likely to reach commercialisation. This may be due to the fact that innovations from research environments are not ready to be commercialised, or that the meat industry is not yet ready to implement the innovation. Examples of successful cooperation between research environment and meat industry is the technology for Danish Crown's slaughterhouse in Horsens, or the cooperation between Spanish meat processor Embutidos Frial and the University of Madrid on new antioxidants for processed meat products.¹⁴

2.3.3. Technologies and innovation

Innovations focusing on technologies have been given much attention from companies in the meat industry. There appear to be several development trends for such innovations. One is the development and improvement of existing technologies, another is application of technologies not originally developed for the meat industry, and finally development of completely new technologies (see table 2).

¹⁴ Hamann (2007).

Table 2. Applications of new and improved technologies in the meat industry

Technology	Origin of technology	Applications in the meat industry
Scanning	Detection of anthrax spores (terrorism-related)	Detection of food pathogens on products and in stores
Mass spectrometry	Well known technology, further developed for new applications	Detection of foodborne pathogens
Nanotechnology	New technology	Active packaging, smart packaging, detection of contaminants

Source: Hamann (2007).

Much current research on meat preservation technologies is aimed at reducing the impacts of processing, and prolonging shelf-life. One example is rosemary extract added to packaging materials for prolonging shelf life of fresh meat.¹⁵ The meat industry shows some very strong innovation themes within technologies, and particularly for the adaptation and application of existing technologies developed outside the meat industry. Meat processing firms across Europe are also regarded as very innovative when it comes to introducing new or modified meat products, and this extends to both small and large firms.

¹⁵ Nastasijevic (2006).

3. Innovation policy instruments

3.1. Innovation policy instruments used in the food industry

3.1.1. Innovationslov

Applications under the innovationslov programmes are received by DFFE. Eligible expenditure for re-imbusement includes salaries, expenses on external consultants and assistance, and equipment. For all applicants other than small and medium-sized firms (and this includes research institutes), co-operation is required for all supported projects. Large firms are compelled to co-operate with a small to medium-sized firm or a research institution.

If the supported project is commercially successful¹⁶ within three years, firms generally must repay grants. Exceptions include projects:

- implemented as small and medium-sized firms' first two projects;
- with grants less than 750.000 DKK;
- generating profits under 100.000 DKK;
- addressing innovation competencies; and
- involving certain organic products.

3.1.2. Nordic Industrial Fund

The Nordic Industrial Fund is an official Nordic institution under the Nordic Council of Ministers. With the purpose of stimulating, initiating and financing R&D in Nordic industry in order to promote innovation, strengthen competitiveness and encourage internationalisation, the Nordic Industrial Fund operates four types of project:

- Innovation systems (targeting infrastructural development for cooperation between the actors in the innovative systems);
- Innovation projects (R&D for innovative products, processes and services in the Nordic or international markets);
- Network projects (contributions to knowledge at the Nordic level that utilise linkages amongst Nordic countries, and have an incubator function); and
- Synergy projects (that avoid duplication of effort amongst Nordic countries).

¹⁶ According to DFFE definitions.

Conditions for support include that public financing not exceed 50% of the total budget, there must be participants from at least three Nordic countries, and the project must not exceed 3 years' duration. The project plan must include an information dissemination plan. The project output should generally be able to be implemented industrially. Although allowance is made for confidentiality in order that participants can appropriate results (e.g. by patent), the funding agency generally retains the right to publish some information about its projects and to encourage dissemination of results throughout industry. Results fully appropriated by firms may lead to cost recovery by the Fund.

3.1.3. Interreg programmes

The Interreg programme for the Øresund Region entails about EURO 31 million from the EU under Structural Funds, with equal co-financing from Sweden and Denmark. In line with EU regional development practice, administration and responsibility rests with municipalities.

By design, projects ideally address overcoming the physical barrier between the two countries by development and use of networks, institutions and structures. Innovation projects supported are typically:

- small (often with two, but only two, partners);
- small budget (max. 150.000 SEK, of which EU-support can be 50% at a maximum); and
- short duration (max. 6 months).

3.1.4. EU framework programmes

Designed to promote intra-EU mobility and exchange, supported projects must be transnational, and involve travel between EU members states for training and other exchanges. Projects that can be better implemented at national or regional level are excluded. Applications are made subject to cycles of tender calls, and certain types of applicants are targeted, specifically:

- research groups at research institutions;
- innovating firms (for which 15% of the budget is reserved);
- small or medium-sized enterprises (SMEs);
- an SME association or group; and
- public bodies.

The 7th, as opposed to 6th, framework programme is more specifically targeted at innovation and its linkage both to job creation and international competitiveness. Notably, co-operation with third countries is also encouraged. The standard rate of grant for research is 50% of project cost, with 75% applying for non-profit public bodies, SMEs, research organisations and higher education establishments. However, flexibility exists for projects of various natures, with a 100% reimbursement rate applying to “frontier” research activities.

3.2. Challenges identified by EU agencies

The EU’s annual summary of innovation policy trends for 2006¹⁷ was, in general, very positive about the form and performance of Danish innovation policy. It highlighted the significance on the Danish economy of “low technology industries” (citing food), which have a tendency to introduce few products that are “new to the world”.

Three challenges are identified by the EU report for Danish policy:

- “improving education at all levels”;
- “improving labour supply”; and
- “strengthening conditions for all forms of innovation, particularly those involving non-technical innovation”.

¹⁷ EU (2007)

Table 3. Assistance available to food industry firms

Programme or organisation	Target	Instrument
Innovationsloven (only available for food, agriculture and fish sectors).	Farmers	<ul style="list-style-type: none"> • Grant of 45-50% of incremental costs of projects developing or improving existing products and production processes, commercial utilization of the results from development cooperation, market development and research. • Some organic projects may receive 70% reimbursement.
	Cooperation between farmers and researchers	<ul style="list-style-type: none"> • Farmers receive a grant of 40-50% of incremental costs. • Research institutes receive up to 90% reimbursement.
	Small and medium-sized firms ¹⁾	<ul style="list-style-type: none"> • Grant of up to 50% of incremental costs of a development project • Co-operation with larger companies and/or research institutions is allowed.
	Large firms, only in co-operation with other organisations.	<ul style="list-style-type: none"> • When in co-operation with small or medium sized firms, or research institutes, large firms can receive up to 40% reimbursement of incremental costs. • Research institutes receive up to 90% reimbursement.
Nordisk Industrifond	Co-operation, networks, researchers and government agencies	<ul style="list-style-type: none"> • Grant of 50.3% of costs of establishing cooperation and networks, and exchanging experience in the Nordic setting.
Interreg IIIA (succeeded by Interreg IV)	Promotion of Øresund region	<ul style="list-style-type: none"> • Grant of up to 50% of costs of initiating projects, testing ideas and creating contacts across the Øresund. • Projects must be relevant to the region.
EU's 6th framework programme for research and technical development (succeeded by 7 th framework)		<ul style="list-style-type: none"> • Up to 50% of research and development costs. • Provides small firms with opportunities to participate in large research projects.
Landdistriktsprogram (partly EU-financed)		<ul style="list-style-type: none"> • Of 100 mill. DKK budgeted in 2006, 50 mill. DKK is dedicated to food companies' innovation in production, new products, and processes.

1) Up to 250 employees; up to 300 mill DKK sales; up to 200 mill DKK in profits; maximum shareholding by large firms is 25%.

4. Method used

Discussion with firms during, and following, survey procedures indicated a willingness amongst food industry firms to address innovation and innovation policy. Preliminary survey results suggest that meat industry firms lag those of other food industry sectors in new product introductions, although this may not reflect innovation as a whole.

A small number of firms were approached in order to allow lengthy input from each firm and substantial time for discussion. Preliminary telephone discussions with firms were used to define clearly the topics to be addressed: primarily definition and measurement of innovation, the role of policy and experience of using policy instruments (see figure 16).

Five firms participated anonymously in the workshop. They spoke freely about procedures for innovation management and control, and experience with a selection of innovations. They also shared their views on innovation policy.

Figure 16. Outline of workshop

Purpose

To develop recommendations to government about policy that affects innovation by firms in the meat industry.

Background

The workshop is organised under the auspices of an economic research project that is targeted at increasing the efficiency of operation of the Danish food marketing chain. In particular, the project seeks to identify actions by government that can improve food industry performance. The project is funded under the Innovationslov and administered by DFFE.

Procedure

- 5-6 firms in attendance.
- Informal discussion of a structured set of topics (see below).
- Definitions of conclusions.
- Formulation of recommended changes to policy or policy implementation.
- Recommended topics for research.

Topics for discussion

- Meat industry performance in new product development and introduction (results from a recent survey, presented by Derek Baker)
 - Definition of innovation at firm level
 - How to measure innovation at firm level
 - The impact of innovation on a meat industry firm (whether the innovation comes from within the firm, from other meat industry firms, or from outside the meat industry)
 - List some significant recent innovations: were they successful?
 - What could have made the innovation process more successful?
 - within the firm;
 - partnerships with other firms;
 - relations with buyers and suppliers;
 - regulatory procedures; and
 - legal procedures.
 - What should government do to make innovation in meat industry firms:
 - easier and cheaper; and
 - more successful.
 - What can government do to
 - encourage innovation by meat industry firms;
 - remove barriers to innovation; and
 - manage government research and dissemination better.
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5. Firms' perceptions of innovation

5.1. Definition and description of innovation

Firms offered no unambiguous and operational definitions of innovation. One firm labelled it “creativity that succeeds”, and another “good ideas that gradually assume structure and usefulness”. A third firm expressed the view that innovation was “renewal” of the company as the driving force in replacing old products and practices with new ones.

Firms expressed the view that the definition of innovation may vary depending on whether a firm supplied retailers or other firms (“business to business”), or the consumer (“business to consumer”). Most firms provided clear statements of the forms innovation take in their own context. Several firms listed their “innovation drivers” and the means used for harnessing them (table 4).

Table 4. Innovation drivers and their use

Innovation drivers	Means of harnessing the driver	Numbers of firms citing this driver
The consumer	Panels used in testing and repeated surveys	1
Cross-sectional elements of the firm	A within-firm “think tank” or “innovation group”	2
Individual staff members	Repeated use of single sources of good ideas	1
Technology	Capability of machinery items	1
Knowledge	Published research or activities of research institutes	2
Supply chain	Requests from customers and/or suppliers	1
Value and profitability	Pressure for performance within the firm	1
Communication events	Seminars featuring suppliers, customers, allied industries, researchers	1
Brands	An unstructured process of renewal	1

5.2. Measurement of innovation

Most firms cited measures of innovation that they used for management purposes. However, these were generally difficult to quantify and firms acknowledged that the measures were rarely used in a systematic way. The most common was “customer sat-

isfaction”, but firms pointed out that this was expressed and used differently by firms that dealt “business to business” as opposed to “business to consumer”.

One firm measured both “number of new products” (averaging 30 per year) and “number of new concepts” (averaging one per year). Two firms used the shares of sales from new products as a measure of innovation, one of which also used a measure of new products’ contribution to growth in sales: the % of growth in sales due to new products. Table 5 summarises firms’ innovation measurement variables.

Just one firm focused primarily on process innovation. That firm used measures based on investment analysis: reduction in processing costs due to a specific investment in new or altered equipment; and the payback period for a new piece of equipment.

Table 5. Measurement of innovation

Measure	Numbers of firms using this measure
Numbers of new products	1
Numbers of new concepts	1
Number of products copied by competing firms	1
Share of sales due to new products	2
Share of growth in sales due to new products	1
Return in investment in new equipment (measured in terms of processing cost reduction)	1

5.3. Impacts of innovation

Firms were generally unable precisely to quantify the impacts of their innovations, although most mentioned:

- maintained competitiveness;
- maintained consumer satisfaction; and
- “a gradual renewal of the firm”.

6. Firms' views on policy toward innovation

6.1. Elements of assistance

Several firms proposed that innovation policy be based on a long term (20 years was cited as an appropriate time frame) strategy for the Danish food industry. Firms identified foreign competition as the main reason for needing such a strategy. The strategy would ideally identify key aspects of international competitiveness and the innovation pathways most likely to achieve and sustain them.

Firms called for a broadening of the emphasis of assistance to innovation. This was expressed by two firms as “a focus on innovation is too narrow: support should also promote co-operation between firms and across sectors”. A popular theme was that the meat industry could learn from the fish industry, and that few current policy instruments would promote such an outcome. Forms of co-operation that were identified as opportunities for such support included technical and consumer-based research and development.

Firms' needs for technical consultants in the application and implementation processes was identified both as a significant cost of innovation and as a wasted opportunity for firms to learn from each other. Firms recommended that innovation policy provide more support for dissemination and learning processes between firms. Firms particularly noted the “knowledge-base” of the Danish food industry and the desirability of sharing this domestically to promote international competitiveness.

6.2. Innovationslov

Firms unanimously stated that applications for support under the Innovationslov involved “too many forms” and were complex and time-consuming. Firms variously requested simplified and streamlined procedures, the establishment of an independent agency to assist with applications, and a clearer set of guidelines on eligibility.

All firms stated that the subsidy available under the Innovationslov was too small for most firms. Several firms stated that the grant available was of the same general magnitude of the cost of the time spent on applications and associated administrative items.

Firms questioned the motivation for, and effectiveness of, the higher grant available to small and medium-sized firms than to large firms. They noted that the majority of meat industry firms are large, both in Denmark and elsewhere.

Both the principle, and the mechanism of repayment were criticised by firms. Repayment only in the case of successful innovation was interpreted as “penalising winners and rewarding losers”. Most firms felt that the operational definition of “success” in this context was sufficiently open to interpretation to influence firms’ reporting.

6.3. Public-private partnerships

Most discussion centred on contacts with universities. In general, firms were dissatisfied with such linkages across a range of themes. First, most firms expressed the view that too little research at universities embraces companies as partners. Second, firms criticised university-defined research topics as being “wrong”. Various definitions of “wrong” were offered, most entailing inappropriate targeting, and there was considerable support amongst firms for research topics being more focused on international competitiveness, economic growth, and job creation.

6.4. Training

Firms called for an increase in funding for “education along the food chain”, meaning additional training for the staff of food industry firms. The proposed goal of such training was the improvement of productivity per employee, in pursuit of international competitiveness.

6.5. Certification procedures

Several firms reported that certification and documentation issues caused delays for innovations. A specific example included several months’ delay in local authorities’ delivery of an English language certificate, essential in accessing a particular foreign market.

6.6. Food safety policy

All firms first expressed the view that Danish food safety policy (i) provides a marketing advantage for Danish firms and (ii) does not restrict innovation. One firm stated that more stringent food safety regulation was applied to domestic Danish meat

industry firms than to those in countries with access to the Danish market. It was claimed that this provided a cost advantage to foreign firms serving the Danish market. Links to that firm's innovation activities were unclear.

Following some discussion of food safety regulation, three firms stated that food safety activities (e.g. inspection, audits) were sometimes difficult to accommodate alongside an optimised production, processing and marketing plan. It was agreed amongst the participating firms that this can affect innovation. An example cited was an innovation that eliminates a processing step: regulations may require that inspection and data generation associated with that step be collected, effectively preventing the implementation of the innovation or constraining cost advantages derived from it.

6.7. Co-operatives

Firms gave no conclusive judgement on whether a co-operative status was a positive or negative influence on innovation frequency or success, or on the capacity of a firm to implement innovation. Points in favour (clear communication and transparent financial arrangements with suppliers) were discussed alongside points against (portfolio and horizon problems amongst members, and the capacity to dedicate capital to innovation).

7. Firms' recent innovations

Table 3 summarises firms' descriptions of their recent innovations.

Table 6. Examples of recent innovations			
Type of innovation	Description	Notes	Co-operating partners
New product	Vegetable mix (a non-meat product).	For delivery through existing channels to existing wholesale customers.	<ul style="list-style-type: none"> Developed in co-operation with machinery supplier
New product line	Branded line of fresh products.	An exclusive brand targeted at consumers.	<ul style="list-style-type: none"> Co-operation with famous chefs. No co-operation with retailers.
New process	Mechanisation of a formerly hand-performed operation on the processing chain		<ul style="list-style-type: none"> Developed in co-operation with machinery supplier
New product, new process	Copying of an existing product not produced in Denmark	Replaces a product supplied by former wholesale customers.	<ul style="list-style-type: none"> Developed due to deep knowledge of the competitor's product and consumer base
New product	Marinades included as a separate package (not pre-applied)		
New process	Bubble packaging	Prevents quality degradation as consumers handle the product	<ul style="list-style-type: none"> Developed with retailer
New product	Oven-usable packaging		<ul style="list-style-type: none"> Developed following consumer consultation.
New product, organisational change	Corn-fed meat product	Involves intensive contracting with suppliers.	<ul style="list-style-type: none"> Introduced as a retailers' own-label brand.
New process	Electrical stimulation of carcasses.		

8. Conclusions

Across Europe and in Denmark, the meat industry devotes substantial resources to research and development, and to innovation in its various forms. This report presents some of the limited research currently available on innovation, and identifies actual and potential roles for policy. The report is based on firms' expressed views and experiences.

Definition and measurement of innovation is problematic for researchers, food industry firms and policy makers. Forms of innovation (product, process, marketing and organisation) are reasonably well understood by stakeholders but these also lack facility for measurement. There is some evidence that meat industry firms lag behind other food industry firms in new product introduction, and also that they encounter different policy-related barriers to new product development and introduction. Their development procedures are also different to those of other food industry firms and have different dynamics of change. Comparisons of all aspects of innovation between the meat industry and the rest of the food industry have not been drawn.

While Denmark consistently scores well amongst EU states as an innovative economy and society, the identified criteria and drivers of change appear remote from the concerns of the meat industry. Firms' comments on policy centred on innovation policies rather than other policies (e.g. food safety, labelling), despite these having been identified as barriers to new product introductions.

At the workshop, firms' views on innovation policy included dissatisfaction with its overall targeting, and its apparent lack of co-ordination with an overall strategy for the food or meat industry. Some firms claim that available assistance is too meagre, too complicated to apply for, and that its conditional repayment requirement is counter-productive in terms of innovation success. Moreover, its favourable treatment of small firms is considered by the firms to be outdated and undesirable. Firms' attitudes to public-private partnership centres on university research, which they view as poorly focused on firms' activities and also not subject to an overall strategy for the food or meat sector. Firms also expressed strong views on training and certification, which they linked to innovation activities.

Firms were willing and able to discuss their innovation activities and procedures, and gave many examples of innovations of several forms. Most of the firms had not been able to measure their success with these innovations.

9. Recommendations

It is recommended that:

- innovation policy in the meat industry be based on a long term strategy for the food industry;
- co-operation between firms, and particularly across industry sectors, be promoted by policy and both targeted and employed in formulation of the above strategy;
- training programmes for meat industry firms be incorporated into overall innovation policy;
- government-funded university research programmes involving the meat industry to have enhanced focus on competitiveness and other economic factors;
- procedures for applications and grants be simplified and streamlined and eligibility guidelines be clarified;
- distinctions and requirements be made uniform for small and large meat industry firms;
- grant repayment requirements be reviewed, and be disconnected from the commercial success or failure of an innovation;
- local agencies' labelling and certification procedures to be reviewed in association with meat industry representatives; and
- alternative meat inspection arrangements be investigated, with the goal of increasing innovation-related flexibility in production and processing.

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