

Chapter 12

Agriculture and Agri-Food Canada

A New Crop: Intellectual Property
in Research

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Agriculture and Agri-Food Canada

A New Crop: Intellectual Property in Research

Main Points

12.1 The context of intellectual property related to food production in Canada has changed dramatically in the last 10 to 15 years. This is forcing Agriculture and Agri-Food Canada's Research Branch to seriously rethink its way of managing its own intellectual property. It faces the following issues:

- What should the Research Branch do when it makes a discovery that leads to an invention? Should it publish it, or legally protect it and then license it to others? If it does license it, should it license it to one organization or many?
- How should the Research Branch deal with intellectual property of others that it uses in its own research? For example, if it develops a new potato by taking advantage of private sector patents, will this hinder its ability to get the new product into the hands of producers? Should the Branch buy access to private sector patents? Should it barter with its own patents?

We believe that it is important for the Branch to answer these questions — how best to release its intellectual property and how best to acquire the intellectual property of others — because they have implications for the future success of agriculture. As Canada's agriculture sector becomes more and more sophisticated, it depends increasingly on exchange of and access to new knowledge coming from the Research Branch and other organizations. Answers to these questions also have implications for future government revenues from intellectual property.

12.2 Particularly urgent is the risk to the Branch's continued ability to provide the agriculture sector with innovations. The risk stems from its significant use in research projects of intellectual property owned by others. Should it encounter significant obstacles to procuring the rights to use these proprietary technologies, the Branch may have to alter, postpone or abandon current research initiatives.

12.3 The Research Branch is endeavouring to cope with these challenges, but this has become difficult due to substantial changes in the Branch and in the agri-food sector. In our opinion, the Branch needs to hasten and expand its efforts. A decision framework is needed to guide employees in deciding which research products should be legally protected, how to best acquire new intellectual property and how to best release its own protected intellectual property. Other tasks facing the Branch are to improve communication with staff; improve information on the Branch's intellectual property; and improve the integration of stakeholders' views into decision making. An overall approach to managing intellectual property is needed.

Background and other observations

12.4 Intellectual property is information that is useful and transferable and controlled by someone. It includes inventions, some of which are controlled through patents and others that are controlled by secrecy. It also includes plant varieties and plant materials. Until recently, there were few ways to protect intellectual property stemming from agricultural research, and new crops offered little monetary return to the breeder. New crop types can now be protected under the 1990 *Plant Breeders' Rights Act*, and some new biotechnology processes can be protected by patent.

12.5 The Research Branch is the part of the federal agriculture department that does scientific research. It has a budget of about \$250 million annually and is a key player in agricultural research in Canada. It is a major contributor to “Innovating for a Sustainable Future”, one of the Department’s business lines. It first made its mark more than 100 years ago with the release of Marquis wheat, which greatly helped develop Prairie agriculture. Current revenue from the Branch’s intellectual property licenses is around \$3.4 million a year, a minor but growing part of its \$250 million budget.

12.6 The challenges the Branch faces in managing intellectual property include the accelerated pace of change, especially in the field of biotechnology; uncertainty in the Branch brought on by downsizing and a greater focus on research partnerships; the need to consult broadly on intellectual property policy; the high cost of protecting and enforcing its intellectual property rights; the need to understand the market for its intellectual property; and the need for good management information.

The Department has accepted our recommendation and has committed its Research Branch to work to develop and communicate a general framework for managing the Branch’s intellectual property.

Introduction

12.7 A few years ago it was unlikely that a Canadian would become rich by coming up with a new plant. There were few ways to protect ideas, and new crops offered little monetary return to the breeder. During the past decade, though, the possibilities of making money through agricultural research have improved. New crop types can now be protected under the 1990 *Plant Breeders' Rights Act* and new biotechnological processes can be protected by patent. How should the research arm of the federal agriculture department deal with these developments and their implications?

Role of the Research Branch in Agriculture and Agri-Food Canada

12.8 The Research Branch is the part of Agriculture and Agri-Food Canada that does scientific research. It is a major contributor to “Innovating for a Sustainable Future”, one of the Department’s business lines. It first gained recognition more than 100 years ago with the release of Marquis wheat, a pivotal crop in the settlement of the Prairies. Research Branch innovations continue to play a significant role in Canadian agriculture (see Exhibit 12.1). In developing higher-yielding, hardier, and more disease-resistant crops, the Branch is recognized as an important factor in the continuing success of Canadian farming. Departmental economic studies have estimated that the Branch’s research has brought economic benefits to the agri-food sector well in excess of its expenditures on research. In 1998–99, the Research Branch released roughly 60 new plant types and was granted 10 new patents.

12.9 The Branch has reported that while it will collaborate with private research firms, it does not want to compete head-to-head. It has geared its efforts primarily toward science and technology that have value to the country that the private sector, working alone,

cannot provide at a profit. For example, it develops plant varieties to fill specific niche markets and to deal with special challenges faced by Canadian producers.

12.10 The Research Branch is both a user and a producer of intellectual property. It obtains intellectual property from other research organizations around the world and, as a provider, it licenses out its own inventions and plant varieties. Acquiring and licensing intellectual property is one way for the Branch to use the products of other research groups in its own activities and then transfer the benefits to Canada’s agri-food sector.

12.11 Depending on the Branch management’s goals, and on market demand, the eventual revenues from licensing its intellectual property may or may not become significant. Its intellectual property royalties currently earn revenue of roughly \$3.4 million a year, a minor but growing part of the Branch’s \$250 million budget.

12.12 More urgent than revenue considerations, however, is the need for the Branch to maintain its freedom to

The Research Branch is recognized as an important factor in the continuing success of Canadian farming.

Exhibit 12.1

The Shepody Potato: A Research Branch Innovation



Shepody potatoes are good for making french fries. Thanks to its high yield and relatively early maturing, the Shepody potato has captured a large part of North American french fry production and has helped to keep Canadian growers competitive. Agriculture and Agri-Food Canada estimates that about 1.5 billion pounds of Shepody potatoes were grown in North

America last year. The Shepody potato originated at the Department’s Potato Research Centre in Fredericton, New Brunswick in 1969 and was licensed for production in 1980. In recent years the Shepody potato has been the subject of biotechnological research, and several genetically modified varieties have now been developed.

We were told that if the Shepody potato had been released with the current *Plant Breeders' Rights Act* in place, it would now be returning \$5 million to \$10 million a year to the Research Branch.

Access to new ideas that can be turned into readily available crops for producers is becoming more complex and expensive for the Branch.

A scientist can patent a process used to produce a new life form, but not the life form itself.

operate on the acquisition and research side of its activities. The future success of Canadian farming depends on access to new knowledge. As agri-food companies seek to protect new advances, gaining access to new ideas that can be turned into readily available crops for producers is becoming more complex and expensive for the Branch.

Federal policy on intellectual property

12.13 The federal government's policy on managing and recovering intellectual property fees is contained in the Treasury Board policy on user charges. That policy directs that user charges should "earn a fair return for the Canadian public for access to, or exploitation of, publicly owned or controlled resources" and that prices should be "based on market value for the sale, lease or license".

12.14 The ownership of intellectual property generated as a result of public expenditure is governed by the following legislative and policy frameworks:

- *Public Servants Inventions Act* and Regulations; and
- Policy on Ownership of Intellectual Property in Government Contracts.

Ownership of intellectual property arising out of collaborative work and as a result of grants and contributions is governed by the terms and conditions of the related program or through individual agreements. Intellectual property generated by the federal government is also subject to all laws and regulations governing intellectual property in general, for example, the *Patent Act*, the *Copyright Act*, and the *Plant Breeders' Rights Act*.

12.15 In its 1996 federal strategy for science and technology, the government made a commitment to immediately review its policy on intellectual property and resolve a number of outstanding issues. "Management of Intellectual Property in the Federal Government", on page 12–9 of this chapter, provides a brief

review of the extent to which the government has fulfilled this commitment.

Legal context of intellectual property in agriculture

12.16 There are two main justifications for the existence of intellectual property rights. First is the philosophical notion that someone who comes up with a new idea should own that idea, and others should recognize the ownership. The second justification is the incentive to engage in research, development and commercialization. Protection of intellectual property rights brings the originator the potential for financial return. This, in turn, fosters new research and provides for improved products.

12.17 To obtain a patent, an inventor must fully disclose the inner workings of the invention. In return, a patent provides an inventor with a limited monopoly on the new process or product. To be granted a patent, an invention must display a novel use, or a new or improved way of doing something — for example, a better mousetrap or a new type of telephone. In the agriculture sector, the Canadian Patent Office is allowing inventors to patent biotechnological processes that can produce new characteristics in plants. However, to date it has not granted patents for inventions that are new higher forms of life, such as plants and animals. In other words, a Research Branch scientist can patent a process used to produce a new life form, but not the life form itself.

12.18 The *Plant Breeders' Rights Act* is a way of providing "patent-like" protection for cultivated plants in Canada. However, this protection has some key differences from general patent protection. For example, the *Plant Breeders' Rights Act* allows producers to save seed from crops they have grown in order to produce crops in subsequent years. If a patent protected the plant variety, this would not be permissible. Various organizations have estimated that roughly 70 percent of the grain on the Prairies is grown from

Management of Intellectual Property in the Federal Government

What Is Intellectual Property?

Intellectual property includes inventions; computer software; trademarks; literary, artistic, musical or visual works; plant varieties and other biological materials; and know-how. Because it is a potentially valuable asset and can yield economic benefits, intellectual property warrants effective management, including appropriate protection.

The tools for protection can take different forms. For example, inventions may be protected by patent and registered industrial design; software and literary, artistic and musical works may be protected by copyright.

Intellectual property is generated by the federal government in a variety of ways — for example, as a result of research conducted by federal departments, research contracted with outside suppliers, collaborative research, and research supported through grants and contributions.

The Science and Technology Strategy Commitment on Intellectual Property

In its 1996 Strategy, *Science and Technology for the New Century*, the federal government made the transfer of knowledge and technology an explicit objective of its activities. The Strategy stated that the existing federal policies to encourage the transfer of intellectual property from federally supported research to the private sector needed to be communicated better, applied more evenly and assessed regularly for effectiveness. The government committed itself to immediately review its intellectual property policy in order to determine what improvements could be made to increase opportunities for commercialization and partnerships with the private sector.

The Government Still Lacks a Comprehensive Approach

We looked at what progress had been made in meeting the commitment made in the Strategy. While we found that some limited initiatives are under way, there is still no comprehensive approach to the management of all intellectual property generated by the federal government.

Industry Canada is leading an exercise to revise the 1991 Treasury Board policy governing the ownership of intellectual property arising under Crown procurement contracts. The objective of the new policy is to increase the potential for its commercial exploitation by having the ownership rest with the contractor. The policy will go into effect six months after its approval, following communication of the changes and opportunities for departmental contracting officers to receive training.

In late 1998, Industry Canada initiated discussions with the Assistant Deputy Ministers Committee of Science and Technology about the need for a comprehensive approach to the management of intellectual property in the federal government. Discussions are ongoing but a clear action plan is not yet in place.

In June 1999, the Advisory Council on Science and Technology (ACST) published its expert panel report, *Public Investments in University Research: Reaping the Benefits*. The report makes a number of recommendations to government to strengthen the exploitation of intellectual property generated by federally funded university research. However, the report deals with only one facet of intellectual property management (federally funded university research) and is not linked to a government-wide policy.

In 1997 the Federal Partners in Technology Transfer, a forum of representatives from 15 departments and agencies, published *Guiding Principles for the Management of Intellectual Property Issues*. The principles provide guidance on managing intellectual property throughout the government. Unfortunately, the principles do not have the force of policy and their application by departments and agencies is voluntary.

Conclusion

The federal government develops intellectual property in a number of different ways. Although it is making progress in the management of intellectual property arising out of Crown procurement contracts, we have concluded that the commitment made in the Strategy has not yet been met. A comprehensive approach to the management of all intellectual property generated by the federal government has yet to be developed.

The challenges identified in the current audit of intellectual property management at Agriculture and Agri-Food Canada are an indication of the growing complexity of these issues for departments. A clear statement of the government's expectations for how departments should manage intellectual property would ensure that departments and agencies share a common understanding of what is expected, and that they have reasonable flexibility to establish practices that respect their mandates. Many of the building blocks are now ready or soon will be. The policy on intellectual property arising from Crown procurement is being revised. The Federal Partners in Technology Transfer have published guiding principles for the management of intellectual property issues. The Expert Panel on the Commercialization of University Research has reported to the Prime Minister's Advisory Council on Science and Technology and the report's recommendations are being discussed with federal, provincial, university and private sector stakeholders. It remains for the government to pull the components together into a comprehensive policy framework.

Many of the Branch's research results have broad applications that directly benefit producers and have little licensing potential.

producers' bin seed. As well, the *Plant Breeders' Rights Act* does not limit someone else from using a protected plant variety for further research work. Plant breeders' rights protection is considered weaker than patent protection.

The market for Research Branch technologies

12.19 For many companies in the private sector, the key to maintaining a good return to shareholders is often based on the exploitation of intellectual property. Those companies invest a great deal to develop a technology or product that will give a clear market advantage over their competition. Companies go to great lengths to protect their intellectual property to ensure that revenue and competitive advantage are not lost. Under some circumstances, a company may decide that the maximum return can be achieved by licensing the protected technology or product.

12.20 A parallel exists in government departments that conduct research and development leading to new technologies and products. However, the market for these technologies and the very purpose of intellectual property management have to be considered in a broader context than is the case in the private sector. The focus of the Research Branch's efforts is on initiatives for the public good. In some circumstances, these efforts can result in the development of a technology or product that can be transferred to the agri-food sector through licensing. The Branch makes the transfer in the belief that maximum benefit to the taxpayer and the agri-food sector will accrue through commercial exploitation by the private sector. The Branch considers licensing revenue to be primarily a tool to ensure sound management of the license and the associated intellectual property.

12.21 Many of the Branch's research results have broad applications that directly benefit producers and have little

licensing potential. The main value of public research and development in the agri-food sector lies in the effect on the national economy and not simply in the revenue stream from license fees.

Focus of the audit

12.22 This work was completed in conjunction with the audit of user charges in the agriculture portfolio. The objectives of our audit were to determine whether the Research Branch properly manages the acquisition and release of intellectual property. We also wanted to determine whether the Research Branch uses regular strategic review of information and experience to improve the management of intellectual property.

12.23 The audit focussed on intellectual property that is administered solely by the Research Branch. Specifically excluded from the scope of our work was the Department's Agri-Food Research and Development Matching Investment Initiative, under which the disposition of intellectual property is determined by prior agreement between the Branch and private sector research collaborators.

12.24 More details about how the audit was conducted are at the end of the chapter in **About the Audit**.

Observations

Challenges Facing the Research Branch

12.25 In managing its intellectual property, the Research Branch faces a number of challenges — both internal and external. In addition to managing the acquisition and release of patents and new plant varieties, it has to maintain an asset management regime that ensures an effective portfolio of intellectual property. To be effective, the portfolio must:

- support the goals of the Branch, the Department and the government, and be able to improve the ongoing

competitiveness of the Canadian food and agricultural sector through the development and transfer of innovative technologies; and

- earn a fair return to the Canadian public for access to, and exploitation of, these publicly owned resources.

Limits on the Branch's freedom to fulfil its mandate

12.26 As noted earlier, perhaps the Branch's most urgent intellectual property issue is that its freedom to pursue its mandate is being challenged by its use of intellectual property developed elsewhere. The Branch is using in the order of 100 technologies that have been patented by others. It appears that the use of these technologies in its research programs is significant, but the full extent is not yet known.

12.27 The Branch's ability to continue providing the agriculture sector with innovations will be at risk until it is able to secure rights to the technologies that it requires. Unless it does so, its research products may not be transferable to the agri-food sector. The Branch has recognized the need to secure the rights to use these technologies and is endeavouring to develop a co-ordinated approach to pursuing licenses to these patents. Should it encounter significant obstacles to procuring the rights to use these proprietary technologies, the Branch may have to alter, postpone or abandon current research initiatives.

12.28 An example of this situation is the case of potatoes that were genetically modified at the Branch's Pacific Agri-Food Research Centre to resist certain viruses. To modify the potatoes, the Research Centre used several patented technologies, at least one of which belonged to Monsanto Company. When Monsanto became aware of the Branch's interest in developing these varieties for commercial use, it understandably raised the issue of its prior intellectual property

rights. Moreover, Monsanto has its own interest in developing virus-resistant potatoes. To date, this potato has not been developed for commercial use.

12.29 In addition to being limited by the intellectual property rights of other research organizations, Branch managers told us that they are concerned about being limited by different approaches to intellectual property in other jurisdictions. For example, while the Canadian Patent Office does not allow the patenting of higher life forms, the United States Patent Office does. Similarly, there are concerns that other jurisdictions may be much more flexible in defining what constitutes a new invention. For example, a patent application was recently filed to grant protection for canola with a "yellow seed coat" characteristic. Canadian researchers consider that the "yellow seed coat" characteristic is in the public domain and is not patentable because it is commonly found in Asian varieties as well as a Canadian variety. Branch management considers the patent application to be relatively narrow and believes that it would likely permit the production of yellow seeded canola by other means. However, some researchers remain concerned about the patent's effect on this area of the Branch's research activity.

Keeping up with its environment

12.30 According to Industry Canada, worldwide agri-food biotechnology activity in the year 2000 is estimated at US \$2.5 billion and is projected to rise to US \$9 billion by 2005. Scientific breakthroughs of the 1970s are resulting now in viable commercial products, and the pace of change is rapidly increasing. In addition, the growing market has attracted many more players, and some are very aggressive in marketing and protecting their intellectual property. Intellectual property related to biotechnology has been hotly contested, with court decisions awarding hundreds of millions of dollars to patent holders.

The Branch's most urgent intellectual property issue is that its freedom to pursue its mandate is being challenged by its use of intellectual property developed elsewhere.

The Branch may have to alter, postpone or abandon current research initiatives.

A growing market for genetically modified plants has generated a pace of change that requires the Branch to develop new management regimes much more quickly.

12.31 So far, the Branch has followed an evolutionary, conservative approach to managing its intellectual property. It takes roughly 12 years to breed a new variety of plant, and this amount of time allows for a gradual developmental approach to management. It took roughly 20 years for the Branch to move from essentially giving away its varieties in the 1970s to using a competitive bidding process today as a means to obtain fair market value for plant variety licenses. A growing market for genetically modified plants has generated a pace of change that requires the Branch to develop new management regimes much more quickly.

Uncertainty within the Research Branch

12.32 The Branch has undergone significant changes over the past five years, not the least of which has been the shrinking of its full-time work force from more than 3,000 to just over 2,000. At the same time, there has been significant decentralization of intellectual property management and a reorientation to collaboration with private sector players.

The result has been uncertainty about how best to manage intellectual property:

- Managers in the Branch’s research centres have devised different approaches to commercializing new plant varieties. There are differences in their timing of a new variety’s release, in their payment regimes for new licenses and in the criteria they use when evaluating proposals to commercialize a variety. While this may be partly a reflection of different commodities and different local markets for different research centres, these factors cannot entirely explain such a range of approaches (see Exhibit 12.2).

- During our audit, researchers reported that they were not certain how to decide whether to publish new scientific breakthroughs in journals or pursue legal protection for their discoveries.

- The Research Branch has two lawyers on staff for advice on intellectual property but, due to the size and decentralized nature of research operations and the rapid change in this area, some researchers and managers are uncertain about the legal framework for intellectual property. For example, under its current arrangements for licensing varieties, the Branch grants a licensee permission to enforce intellectual property rights as circumstances arise. However, we were told that the Branch has yet to clarify and communicate the circumstances in which it will enforce its intellectual property rights in its own behalf. Given the competitive marketplace, the Branch believes its best approach is to make decisions to enforce its rights on a case-by-case basis.

Obtaining the views of all Canadians

12.33 The Department maintains a close working relationship with the agri-food sector — and particularly, in the case of the Research Branch, with seed companies and companies engaged in agricultural and agri-food-related research.

Exhibit 12.2

Management Uncertainty Results in Different Approaches to Licensing Plant Varieties

Both the Eastern Cereal and Oilseed Research Centre in Ottawa and the Cereal Research Centre in Winnipeg release their respective cereal varieties by separately inviting marketing proposals from outside organizations.

The Ottawa centre checks the proposals to make sure they comply with the submission requirements and criteria. These criteria include the past performance of the organization and the proposed marketing plan for the new variety. After screening, the organization proposing the biggest initial payment is chosen as the future licensee.

The Winnipeg centre evaluates the proposals using a multi-dimensional worksheet that integrates the past performance of the organization, the proposed marketing plan for the new variety and the present value of all proposed payments.

In Ottawa, immediate financial return is the key final decision factor, while in Winnipeg it is only one of many factors. Which decision process best meets the objectives of the Research Branch?

As one Branch employee said, “Everyone knows everyone else.”

12.34 The form of this relationship is complex and varied. Private sector researchers and managers have attended the same schools as their Research Branch counterparts, may have worked at the Research Branch in the past, and may belong to the same professional organizations. In addition, a number of companies ensure that they have staff tasked with keeping track of developments taking place in the Research Branch laboratories spread across the country. The relationship between the Research Branch and its client group is very close.

12.35 Given this close relationship with the agri-food sector, the Branch faces the challenge of ensuring that its approach to intellectual property management reflects the views of all interests, including those of producers and the general public. The Branch has a number of consulting mechanisms that it uses to determine its research priorities and co-ordinate the transfer of research and technology with other organizations. These mechanisms include the Canadian Agri-Food Research Council, the Research Branch Advisory Committee and advisory committees at the Branch’s research centres. However, we did not identify a systematic approach to consulting these or other groups about the Branch’s management of intellectual property. During the audit, researchers told us that in the absence of such a mechanism they feel that they have become the sole guardians of the public good.

Difficult resource decisions to be made

12.36 The Research Branch’s budget was cut by approximately 20 percent between 1995 and 1998 and it lost approximately 1,100 full-time equivalent employees. While intellectual property decisions once were managed centrally from Ottawa, they have largely been

devolved from the Research Branch headquarters to the research centres.

12.37 The resources needed to protect intellectual property are considerable and compete directly with other resource requirements of the research centres. We were told that it can take up to \$100,000 to support a patent submission. We were also told that the process can take one year and a substantial amount of a researcher’s time away from ongoing research. This means that decision makers are faced with the difficult question of whether the future benefits of patenting will exceed the future costs. Biotechnology researchers told us that they could each probably come up with one or two patentable ideas every year if they had adequate support.

12.38 The research centre directors with whom we spoke could not point to any formal guidance from Ottawa on how best to make decisions on the use of intellectual property resources.

Understanding the market for intellectual property

12.39 Acquiring, selling and protecting intellectual property requires substantial organizational resources and knowledge about the market for intellectual property. Management needs to understand the market to set realistic expectations for new intellectual property and to evaluate the performance of its existing portfolio. The Branch conducts market studies to support research planning. Also, it provided us with a study in which it had evaluated the market for a new technology, but we were unable to identify any other systematic assessments of the market for Branch intellectual property or an assessment of the impact of its licensing regime. Researchers reported that they often have a sense of what the market for their research products might be. However, they also contended that in their role as research scientists they should not be the ones responsible for knowledge of the market.

We did not identify a systematic approach to consulting interested groups about the Branch’s management of intellectual property.

The research centre directors with whom we spoke could not point to any formal guidance from Ottawa on how best to make decisions on the use of intellectual property resources.

Research centre directors, managers and researchers need a structure for making decisions about intellectual property.

12.40 To help support the licensing of intellectual property, the Branch has created commercialization officers at the research centre level. These people assist in patent filing, and are also tasked with helping to negotiate matching investment agreements and managing the release of new plant varieties. It is unlikely that they would have the time to spend on a strategic assessment of the intellectual property market.

Lack of information for managing

12.41 To manage an asset, whether a building or intellectual property, an organization needs to know how much of the asset it has, its location, and its value in terms of both its ability to generate revenue and its broader public benefits. The Research Branch is unable to fully answer these fundamental questions. For example, it could readily tell us how many plant varieties were earning revenue but could not easily tell us how many released varieties it currently has, and how many are generating no revenue.

12.42 Similarly, the Branch needs to define management's performance expectations for its portfolio of intellectual property. It also needs to develop a reporting regime that adequately recognizes the dual objectives of providing Canadian research products that help to keep the agriculture sector competitive and earning a fair return on publicly owned resources. Performance expectations could, for example, be set for the financial return to the portfolio, or the extent to which producers adopt new varieties.

12.43 In recent years, the Branch has made some progress in that it is able to report how many plant varieties it has released in a year. It can also report on significant earnings. The need to improve information systems in all research-oriented departments was recognized by the government in its 1998

update of the federal Science and Technology Strategy.

The Way Forward

12.44 The challenges the Branch is facing are mostly due to changes in the Branch and in its environment. In some cases, the changes have a direct bearing on the commitment the Branch has made to innovate for a sustainable future for agriculture. These changes can hamper the Branch's ability to provide research inventions to the agriculture sector and can make it possible for other organizations to patent the Branch's research output and potentially restrict its use. To address these challenges, Branch management needs to hasten and expand its efforts in some key areas.

Framework to help guide decisions

12.45 Research centre directors, managers and researchers need a structure for making decisions about intellectual property. A decision-making framework would foster a consistent approach and help to ensure that the goals of the Branch, the Department and the government are met. This is particularly important in a decentralized "knowledge-based" organization like the Branch, with research centres spread across the country.

12.46 A framework would support a number of key decisions that the Branch needs to make, for example:

- whether or not to protect or publish new scientific breakthroughs and how best to arrange the licensing of a technology or a plant variety. Among other considerations are the need to protect a future stream of revenue, and to guarantee future access for Canadians to the Branch's results;
- how to develop a portfolio of intellectual property that can be bartered in exchange for intellectual property held by the private sector;

- how aggressive the Branch should be in protecting its intellectual property rights; and
- whether to license a new technology from the patent holder or to develop the Branch's own solution.

The Research Branch is not alone in the need to deal with these issues. Some of them were faced in the first patenting of biotechnological inventions in the 1980s (see Exhibit 12.3).

12.47 Starting points for developing a decision framework are the Branch's own 1993 technology management manual and the government's current review of intellectual property. The technology management manual needs to be updated to bring it into line with the changes that have taken place in the Branch. For example, the manual needs to reflect the role of the commercialization officers, the loss of the Branch's Industry Relations Office and the closer relationship that the Branch has with industry in areas such as the Matching Investment Initiative. It also needs to consider the more aggressive environment in which it must operate. The challenge will be to develop an effective decision framework that ensures some level of consistency while supporting the development of a more entrepreneurial culture, able to deal with the uncertainties of the commercial world. Exhibit 12.4 shows the major elements of what we would expect to see in a decision framework.

Communication with Branch employees to foster an entrepreneurial culture

12.48 Tied to the development of a framework for decision making is the need to clearly communicate the framework and foster an entrepreneurial culture among Branch employees. This communication could take many forms, including a training program. No matter what vehicle it chooses, however, the Branch needs to ensure that its employees

understand its approach to intellectual property and that they understand and are secure in the role they play. We were told that information sessions on legal issues surrounding intellectual property are already being held. These could probably be developed and expanded to include briefings on the decision framework and to emphasize an entrepreneurial approach to intellectual property rather than the traditional bureaucratic approach.

12.49 Along with communication, the Branch could put in place mechanisms that would help foster an entrepreneurial approach. These might include, for example, changes in the way the Department rewards and recognizes the development of intellectual property.

Enhanced management information and development of performance measures

12.50 The Branch has made some moves to improve its information systems but it needs to do more. It is currently developing a database of all protected technologies used in its laboratories, and assessing whether to pursue licenses from their owners or replace them with the Branch's own technologies. At the time of our audit, the Branch had collected the data but had not yet checked them for accuracy or compiled them in a usable

The Branch needs to ensure that its employees understand its approach to intellectual property.

Exhibit 12.3

Dealing With Objectives for Intellectual Property: The Stanford University Experience

In 1980, after dealing with resistance from its own researchers, Stanford University obtained one of the first biotechnology patents ever granted. Then, according to Niels Reimers, former director of Stanford's Office of Technology Licensing, it faced additional problems. How was the university going to "develop a licensing program consistent with the public service ideals of the university, encourage the application of genetic engineering technology for public use and benefit, minimize the potential for biohazardous development, and finally, provide a source of income for educational and research purposes?"

To meet these objectives, Stanford granted non-exclusive licenses that allowed access to all potential users of the patent. It also devised a rate scheme based on how the invention would be used in an eventual product, and included disincentives for use outside the United States. In addition, the license included guidelines on safe use of the invention.

form. Still needed also is a centralized system to keep track of the Branch's plant varieties and the performance of all the Branch's intellectual property.

12.51 The Branch needs to establish management expectations against which to measure the performance of its portfolio of intellectual property. As we have noted, expectations could be stated in the form of the financial return to the portfolio or the extent to which producers adopt new varieties. Another step, one that private sector firms undertake, could be to measure and then seek to reduce the amount of valuable research in the Branch that is unpublished or unprotected. An

“intellectual property audit” and the help of market experts could facilitate this.

Strengthened consultative tools

12.52 The purpose of consultations between government departments and stakeholders is to allow people a voice in decisions that affect their lives, to improve the quality of those decisions and to provide transparency in the decision-making process. Given its central role in ensuring the success of Canadian agriculture, the Branch's approach to intellectual property affects a number of Canadians. To help ensure that it develops an effective decision-making framework

Exhibit 12.4

Elements of an Effective Decision Framework

The objective of a decision framework is to help ensure that all members meet the goals of the organization. The intent is to overcome the restrictions of distance and time while dealing with new circumstances. Senior management cannot afford to make all decisions, nor can it abdicate decisions to individual members of the organization and reasonably expect that management's vision will be achieved.

An effective decision framework sets boundaries and outlines priorities for decision making. The degree to which the framework is prescriptive depends on the goals of the organization, its structure, and the nature of its activities. Given the dynamic nature of the environment surrounding the Research Branch's intellectual property, a less prescriptive approach would likely be appropriate.

The elements of a framework to support decision making on intellectual property in the Research Branch would apply to both the acquisition and the release of intellectual property. Some suggested elements are listed below:

- The goals of decision making on intellectual property would be clearly stated and explained. The goals concerning the public good would be specified and any financial expectations stated. These would set out the Branch's response to Treasury Board's user charge policy requirements.
- The goals would be translated into strategic objectives and the financial and other resources needed (e.g. legal, marketing expertise) would also be outlined. These would support priorities among decisions and would help to communicate organizational constraints on intellectual property decisions.
- Measures to determine if the organization is achieving its strategic objectives would be identified, stated and put in place, and would relate achievements to the resources expended.
- A description of decision-making roles would specify who is responsible for what decisions and the scope of decisions that can be made. The scope of decision-making responsibility would be defined by the magnitude of the possible outcome.
- The key intellectual property decisions required by the Branch would be identified.
- Guidance would be provided on the timing of intellectual property decisions. Key factors would be the stage of an intellectual property's development and the expected value of that property in terms of both the public good and financial return.
- The requirements for information that might reasonably be factored into decisions would be outlined.
- Specific examples of “good” decisions and practices would be included, or communicated as they develop. This would help ensure that best practices in decision making are spread through the organization.
- The framework would be actively supported by Branch senior management and organizational responsibility for implementing and maintaining the framework would be stated.
- A timetable to regularly review the decision framework would be included.

Source: Developed by the Office of the Auditor General

for intellectual property, the Branch needs a way to incorporate a broad range of concerns.

12.53 Agriculture and Agri-Food Canada has developed sophisticated ways to ensure that it interacts with a broad spectrum of stakeholders when it is making strategic decisions. Similarly, the Research Branch has mechanisms to help it obtain advice on what research it should undertake and on the transfer of technology. The Branch now needs to take advantage of these and perhaps other consultative tools to help it develop a strategy for its intellectual property.

Conclusion and Recommendation

12.54 This audit had two objectives. We wanted, first, to assess the quality of intellectual property management in the Research Branch, and second, to determine whether it is improving its management regime. Based on our audit work, it is apparent that the Branch needs to deal with a number of significant issues before we can say that it is adequately managing intellectual property.

12.55 Particularly urgent is the risk to the Branch's continued ability to provide the agriculture sector with innovations, a risk that stems from its use in its research projects of intellectual property owned by others. Should it encounter significant obstacles to procuring the rights to use these proprietary technologies, the Branch may have to alter, postpone or abandon current research initiatives.

12.56 There are clear indications that Branch management recognizes the challenges it faces and has begun efforts

to deal with issues surrounding its freedom to operate. These efforts need to be hastened and expanded. The Branch needs to build a framework for better decision making, improve its information systems, broaden its consultations, and clarify roles for employees in a way that will foster a more entrepreneurial culture.

12.57 Agriculture and Agri-Food Canada should ensure that the Research Branch develops and implements an overall approach to managing its intellectual property. The approach should be appropriately communicated to staff and support the development of a more entrepreneurial culture. Implementation should include the development of a decision framework for Branch staff, a statement of management expectations against which to measure performance, and the use of appropriate information systems.

Department's response: The Department is pleased that the Office of the Auditor General recognizes that the management of intellectual property is a rapidly changing field and presents a complex challenge to research organizations in both the public and private sectors. Agriculture and Agri-Food Canada has been working to address these challenges as they have developed over the past nine years.

The Department welcomes recommendations on improving the management of any intellectual property issue and appreciates the useful suggestions for improvements made by the Auditor General. The Research Branch will work to develop a general framework for managing its intellectual property, and to communicate this approach to staff.

Based on our audit work, it is apparent that the Branch needs to deal with a number of significant issues before we can say that it is adequately managing intellectual property.



About the Audit

Objectives

The objectives of our audit were to determine whether Agriculture and Agri-Food Canada's Research Branch:

- has properly managed both the acquisition and the release of intellectual property; and
- is using regular review of information and experience to improve the management of intellectual property.

Scope and Approach

The audit focussed on intellectual property that is administered solely by the Research Branch. Specifically excluded from the scope of our work was the Department's Agri-Food Research and Development Matching Investment Initiative. Under that initiative, the disposal of intellectual property is determined by prior agreement between the Branch and private sector research partners.

We based our criteria on the Treasury Board user fee policy, private sector practices and available literature on intellectual property management.

We visited three research centres and evaluated and compared their respective regimes for managing intellectual property. Specific items of intellectual property were examined to determine how property has been licensed to the private sector. This work was supported by interviews with senior Branch management, research centre directors and staff.

Criteria

We expected that:

- the Research Branch would have a comprehensive intellectual property strategy with clear objectives, and that this would be applied consistently in all areas where intellectual property existed in the Research Branch;
- the Research Branch would properly communicate the strategy to Branch employees so that managers and staff would understand it as well as their roles and responsibilities in managing intellectual property;
- meaningful and effective consultations would be held with stakeholders in relation to intellectual property management;
- performance expectations for intellectual property management would be set and appropriate information would be collected to assess whether the stated expectations were being achieved;
- a process would be in place for the periodic review of the management of intellectual property and this would include an analysis of results achieved against expectations; and
- the information gained from periodic review and from consultations would be considered for potential changes to intellectual property management and would be incorporated in the strategy and objectives of the Research Branch.

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