Chapter 4

Programme Outputs

4.1 Introduction

Chapters 2 and 3 dealt with various aspects of the rationale for the Bovine TB Eradication Programme. This chapter and the succeeding one move on to deal with the next principal evaluation question, which concerns the efficiency with which the Programme has operated over the period under review.

4.1.1 Definitions of efficiency

The Department of Finance defines *efficiency* as being the optimisation of the ratio of inputs to outputs and *economy* (a subset of efficiency) as the securing of the appropriate quality of inputs at the best price. While evaluation of economy will have regard to issues of the cost and quality of inputs, evaluation of efficiency requires an examination of the level of output; the cost and quality of outputs; the timeliness of their production; and the manner in which resources are allocated (Dept. of Finance, 2007). This chapter, which is primarily descriptive, will

- Define programme outputs in a qualitative and quantitative sense;

- Comment on the timeliness and completeness of these outputs.

Chapter 5 evaluates all other aspects of efficiency described above and reaches a number of conclusions in relation to the overall efficiency of the Programme. The analysis of cost-effectiveness, which might reasonably have been included in the evaluation of programme efficiency[1], will be addressed in this review under the heading of effectiveness (Chapter 6).

4.1.2 Efficiency in the BTEP

The starting point for the analysis of efficiency is to define the various components of the Programme in terms of the Programme Logic Model (PLM), which is a conceptual framework that defines the various constituent elements – inputs, activities, outputs and outcomes – of the programme under review and articulates the relationship between them. Figure 4.1 builds on the generic model, previously introduced in Chapter 1 [1.6], to show the PLM applied to the Bovine TB Eradication Programme.

Figure 4.1   Programme Logic Model and the Bovine TB Eradication Programme
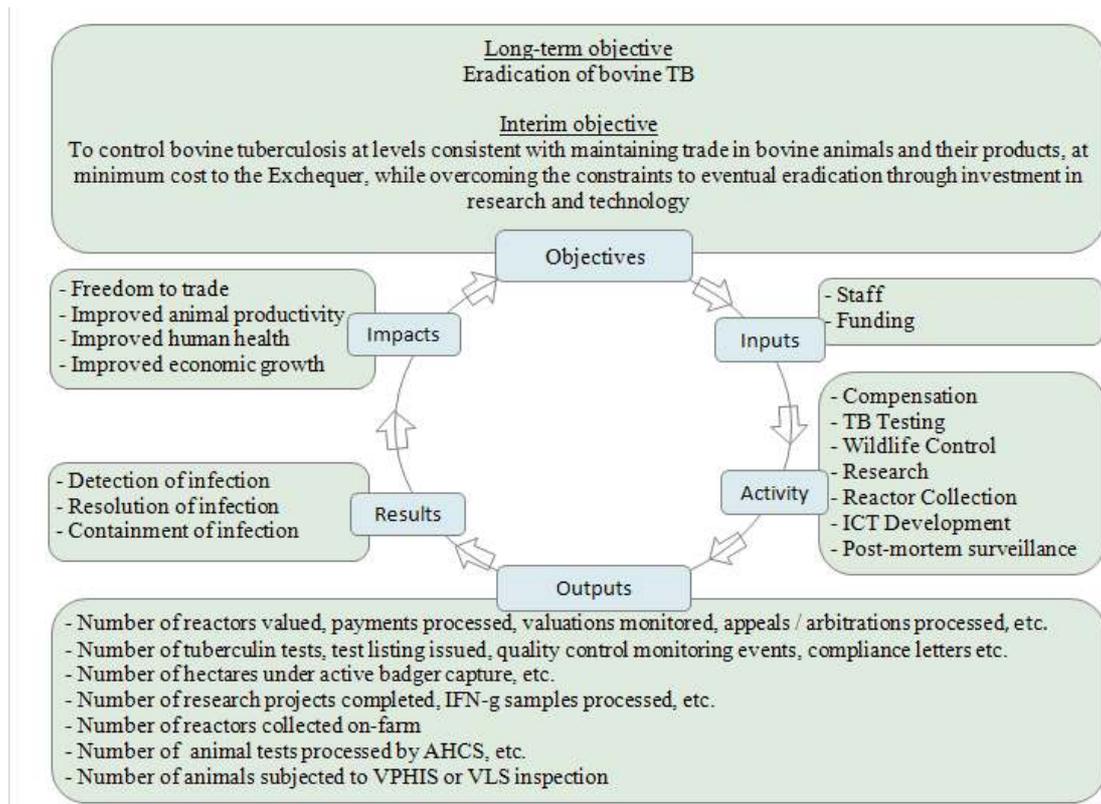
Source: DAFF

Of particular relevance to the discussion in this chapter is the classification of the activities and outputs of the BTEP, which for the purpose of this review have been placed into seven categories, corresponding closely to the eight expenditure categories previously introduced in Chapter 1 [1.5.3] and further described in Appendix A. One of the expenditure categories – 'Supplies / Miscellaneous' – is ignored for the purpose of this discussion of outputs and activities because of the difficulty of associating these inputs with any given programme output or activity. Thus, the output categories that will be discussed in this chapter, in decreasing order of expenditure, are as follows:

- Compensation;
- Testing;
- Wildlife Control;
- Research;
- Reactor Collection;
- ICT Development[2];
- Post-mortem surveillance.

4.2 Compensation

The Department operates a number of schemes for the purpose of compensating farmers for both the direct and indirect losses arising as a result of the disclosure of tuberculosis in cattle herds. Compensation for direct losses, which are those associated with the depreciation of animals that are disposed of as reactors, is provided via the On Farm Market Valuation Scheme and its predecessor the Reactor Grant Scheme. Income Supplement and the Depopulation Grant help offset indirect losses, which arise as a result of the removal of production animals, such as cows, or the premature disposal of other cattle. The Hardship Grant Scheme is designed to assist farmers who incur additional feed costs arising from restrictions placed on the sale of cattle from restricted holdings during the winter period. No similar provision for compensation in respect of indirect losses was found in the three jurisdictions against which the BTEP was benchmarked for the purpose of this report.

4.2.1 On-Farm Market Valuation Scheme (OFMVS)

<u>Description</u>

This is the main element of the compensation regime under the BTEP, providing for the compensation of farmers on the basis of the market value of cattle removed as reactors. The OFMVS completely replaced the RGS from 2nd April 2002, having been introduced incrementally from February 2001[3]. The move to a system of on-farm market valuation was accompanied by a decision to outsource the valuation of reactors, and expressions of interest were sought from suitably qualified individuals. Currently, 60 qualified individuals are included on the Department's list of approved valuers.

The principal objective of the scheme is to ensure that market value is paid for reactor animals removed under the Programme. For the purpose of valuations carried out under OFMVS, 'Market Value' is the equivalent price which might reasonably have been obtained for the animal at the time of determination of compensation from a purchaser in the open market if the animal were not affected by TB. Valuers place a value on reactor cattle on the basis of their personal judgement and by reference to guidelines and summary prices drawn up by Department staff from prevailing market information. Farmers receive the residual value (salvage value) of reactor cattle directly from the meat factory and the difference between this amount and the market valuation (Gross

Differential Amount) from the Department [5.6.1]. Individual animal valuations are subject to ceilings and are open to appeal either by the Department or the herdowner. If the valuation cannot be agreed on appeal, the matter is referred to an arbitration panel for a binding decision. Further details of the OFMVS are provided in Appendix I.

Output

The outputs associated with reactor compensation are:

- The completed valuation of each TB reactor animal carried out on-farm within prescribed timescales. Approximately 148,000 reactor animals were valued in some 36,500 separate valuation episodes between 2001 and 2006;

- The weekly compilation and issue of summary prices as a reference guide to valuers;

- The monitoring of valuations by Department staff and the undertaking of follow-up action, as appropriate. In 2006, approximately 11% of valuations were monitored by Department staff;

- The processing of valuation payments to farmers in respect of each reactor removed under the Programme;

- The processing of appeals initiated by both the herdowner and by the Department. 485 appeals on first valuations were processed between 2002 and 2006;
- The arrangement of arbitration hearings. A total of 51 cases proceeded to arbitration between 2002 and 2006. The cost of administering the arbitration process was ca. €27,000, representing 0.035% of the aggregate value of valuations carried out over that period.

The outputs of the OFMVS, as is to be expected, closely follow the level of disease, as measured by the number of reactor animals disclosed in any given year. The number of valuations carried out *per annum* is also influenced by the severity of disease at the level of the individual herd, given that more severe breakdowns can be expected to result in an

increase in the number of animals valued per valuation episode. The number of reactors valued in any given year does not necessarily equate with the number of reactors disclosed in that period because a small number of reactors disclosed towards the end of a particular year may not be valued until early in the following year. For the three years 2005 to 2007 the average period between the date of test and the date of valuation was 10 days. The timeliness of payments made under the OFMVS has shown a steady improvement since its full implementation early in 2002. Over the period 2003-2006 the percentage of OFMVS payments made within 8 weeks of receipt of provision by the herdowner of all required documentation has risen from 90% to 99%. In 2006, the proportion of payments made within three weeks of receipt of documentation was 93%, compared to 66% within a four-week period in 2003. These payments are made well within the 90-day time limit set down by the EU under the co-funding arrangements.

The output of the appeals and arbitration systems will be influenced by the number of disease outbreaks, but also by the general level of satisfaction with the valuations awarded.

4.2.2 Depopulation Grant

Description

Farmers whose herds are depopulated (totally or partially) as a result of an outbreak of tuberculosis may qualify for Depopulation Grants. Depopulation Grants are paid in respect of all reactors and all animals removed in the depopulation measure. Payments are made monthly for the entirety of the period for which the herd is without stock. Dairy cows, in-calf heifers and pedigree bulls over 12 months of age receive €57.13/month; cows and in-calf heifers of non-dairy breeds receive €31.74/month; and all other cattle receive €19.04/month. Further details of the Depopulation Grant and the other supplementary compensation schemes are provided in Appendix I.

Output

Table 4.1 shows the output of the supplementary compensatory schemes over the period 2000-2006. These are more closely related to the severity and the timing of disease episodes than they are to the absolute number of reactor animals. The number of recipients of the Depopulation Grant fell sharply over the six-year period examined, from 117 in 2000 to 29 in 2006. This decrease reflects both the overall reduction in the

level of disease and the decreasing reliance on depopulation as a means of controlling infection. In 2006, 92% of Depopulation Grant payments were processed within 8 weeks, and 77% within 3 weeks, of receipt of the required documentation.

4.2.3 Income Supplement

<u>Description</u>

Income Supplement is payable in cases where an outbreak of tuberculosis results in the removal of more than 10% of animals in a herd and where depopulation is not deemed appropriate. Payment is in respect of each animal removed as a reactor from a herd, subject to a maximum of 100 animals qualifying for payment. The rates currently payable are €25.39/month in respect of dairy cows and other animals and €38.09/month in respect of non-dairy cows for the period of restriction.

<u>Output</u>

Because Income Supplement is paid in respect of herds in which more than 10% of animals are removed as reactors, the outputs of this Scheme will vary with disease severity. The data presented in Table 4.1 show that the number of recipients has generally declined, from 2,572 in 2000 to 1,434 in 2006, in line with the reduction in the number of reactor herds (which fell from 10,785 to 7,047 during the same period). In the latter year, 100% of Income Supplement payments were processed within 8 weeks, and 98% within 3 weeks, of receipt of the required documentation.

4.2.4 Hardship Grant

<u>Description</u>

The Hardship Grant Scheme is designed to alleviate additional costs incurred by certain farmers whose holdings are restricted over the winter period and who are therefore obliged to carry more stock than would ordinarily be the case. Subject to certain qualifying conditions the grant is payable up to a maximum of €250 per month for a period not exceeding 4 months within the period 1st November to 30th April. Under this scheme, suckler cows are paid €38/month, and all other classes of cattle receive €25/month.

The output of the Hardship Grant Scheme is related to the timing of the disease episode and the extent to which restricted holdings conform to the eligibility criteria of the Scheme. Table 4.1 shows that the number of recipients of this grant fell from 1,882 in 2000 to 1,560 in 2006 (a reduction of 17%), reflecting the reduction in disease levels over this period (herd incidence fell by ca. 16% over the same period). 100% of Hardship Grant payments were made within 8 weeks and 99% within 3 weeks of receipt of the required documentation in 2006.

4.3 Tuberculin Testing

Description

One of the key Programme measures, previously summarised in Chapter 1 [1.5.3], is the comprehensive programme of animal testing based on the Single Intradermal Comparative Tuberculin Test (SICTT). The surveillance element of this programme, which constitutes approximately 65% of the total testing programme, consists principally of an annual herd test (round test), under which all eligible animals in every herd in the country are subject to a test every year. The other 35% of intradermal tests are carried out for the purpose of disease control [Figure 4.3]. In all, in 2006, some 9 million animal tests were carried out on the approximately six and a half million animals in the national herd.

Irrespective of the type of the test carried out, each herd test requires two visits to the herd by the testing veterinary surgeon and a high level of cooperation from the herdowner, who is required to muster all stock and ensure that animals are restrained to the extent necessary to allow the test to be performed satisfactorily. On the first day of the test, the veterinary surgeon must record the identity of each animal by means of its official eartag, clip the injection sites, measure and record the skin thickness at these sites using an approved callipers, and inject the required amount of avian and bovine tuberculin intradermally into the respective sites. On the second day of the test (72 hours after injection), the veterinary surgeon must again record the identity of each animal by its official tag number, examine the injection sites, measure the skin thickness at each site using the approved callipers, and record these measurements together with any other

reactions or clinical signs that may be present. Animals classified on the basis of the test results as reactors are identified by the veterinary surgeon by means of an official reactor tag and a red disc inserted in the animal's left ear.

In addition to those activities carried out by PVPs, tuberculin testing generates considerable activity for Department staff based in DVOs, who are responsible for the issuing of test listings and herd profiles to PVPs, the checking of PVPs' advance testing itineraries, and the inputting of the approximately 5% of animal tests that continue to be submitted in written, rather than electronic format. The monitoring of delivery of the test programme requires the regular preparation of overdue test and untested herd reports on AHCS, while enforcement of compliance requires that untested herds are issued with warning letters and notices, as appropriate, and are restricted, if so required. Other tasks include the management of overdue testing and the issuing of permits for animals moving out of reactor herds for slaughter. A wide range of quality control activities, which are also undertaken by DVO staff, are discussed more fully in the following chapter [5.7.2]. The level of activity in a DVO area is a function of the cattle population and the number of herds in that area, and of the prevailing levels of disease.
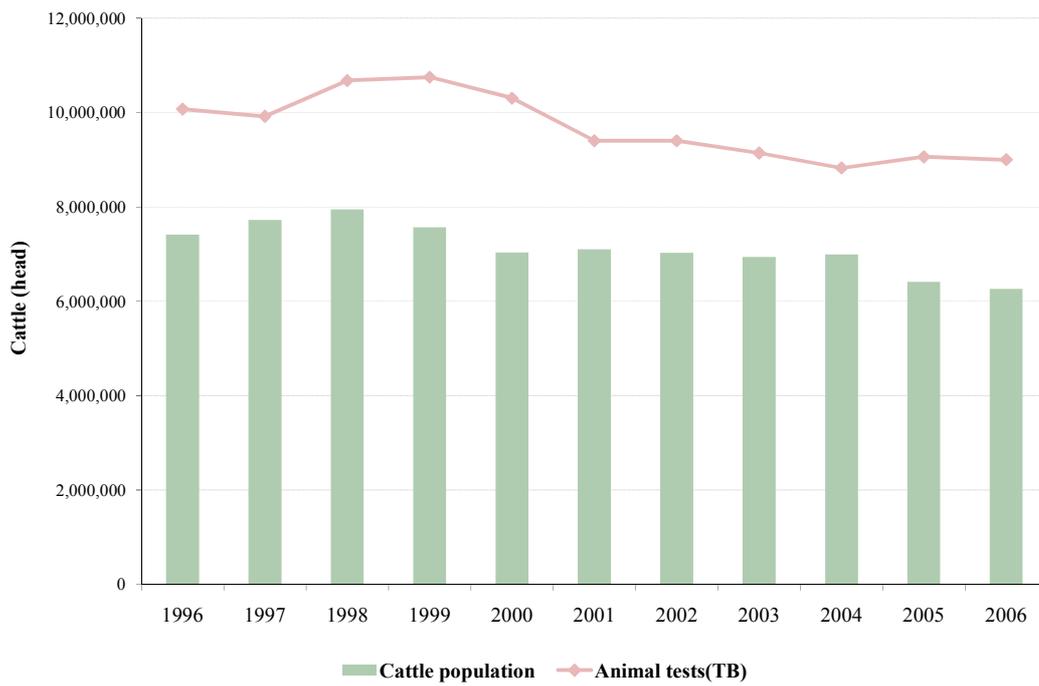
Output

The outputs of tuberculin testing activities include the completed animal and herd tests and the associated test listings issued to PVPs, quality control monitoring events and compliance letters issued to herdowners. Table 4.2 and Figure 4.2 show that the number of animal tests carried out over the period ranged between 10.7m (1999) and 8.8m (2004), generally decreasing over time in line with the reduction in the national cattle population. Table 4.2 also provides a measure of the intensity of the testing output, as shown by the relationship between the number of cattle subject to test and the number of animal tests actually carried out *per annum*. Over the period of interest, the average number of tests per animal was 1.36 and the range from 1.26 and 1.47. Another measure of the output of the testing element of the Programme is the *rate of coverage* of the national herd, which can be defined as the number of herds with at least one herd test in a given period divided by the total number of active herds in that period. It is one of the key indicators used by the European Commission to monitor member states' compliance with intra-community trading rules. Table 4.2 shows that, over the eleven-year period, this ranged from 98.2% (1996) to 95.1% (2001). With the exception of the latter year, in

which the annual programme of surveillance testing was disrupted by the occurrence of Foot and Mouth Disease, the Programme has consistently delivered in excess of 97% coverage of the national herd over the period of the review. Herds with no stock and seasonally-operated herds account for the majority of those herds that remain nominally untested in any given annual period.

Figure 4.3 shows the composition of testing output over the period, differentiating between annual surveillance testing, and testing aimed at disease control (comprising disease containment and resolution), respectively. The cost-effectiveness of the various test types will be considered at a later stage [6.3.4]. The proportion of all tests accounted for by surveillance testing over the period under review ranged between 59% (2000) and 73% (2006), the average (mean) for the period standing at 65%. This subset of the overall testing programme will continue to take place, in compliance with EU legislation, driven largely by fluctuations in the size of the national cattle population and the number of herds that comprise it, rather than by changing disease levels. The lowest frequency at which testing may take place is determined by the requirements of the trading Directive (64/432/EEC), which establishes that, for continued eligibility to intra-community trade, member states (such as Ireland) whose national or regional herd incidence exceeds 1% may not reduce the testing frequency below that of one test per herd *per annum* .

The TB testing output is also affected by the prevailing level of animal disease. This is so because each herd in which a reactor is detected enters a testing cycle that normally requires it to undergo two additional herd tests before trading status can be restored. Testing of herds contiguous to an infected herd, herds designated high-risk, and the forward or backward tracing of reactor animals generate further consequential testing when a reactor is identified. In comparison, uninfected herds in clear areas generally undergo no more than one herd test *per annum*. Variation in the proportion of surveillance tests to other tests largely reflects patterns of disease. As incidence of disease increases, so too does the proportion of tests that are of the 'control' type. In years in which disease incidence is lower, surveillance tests represent a greater proportion of the total tests carried out.

Figure 4.2   Animal TB tests and cattle population (1996-2006)

Source: DAFF

Figure 4.3   Distribution of herd test output by test type (1996-2006)
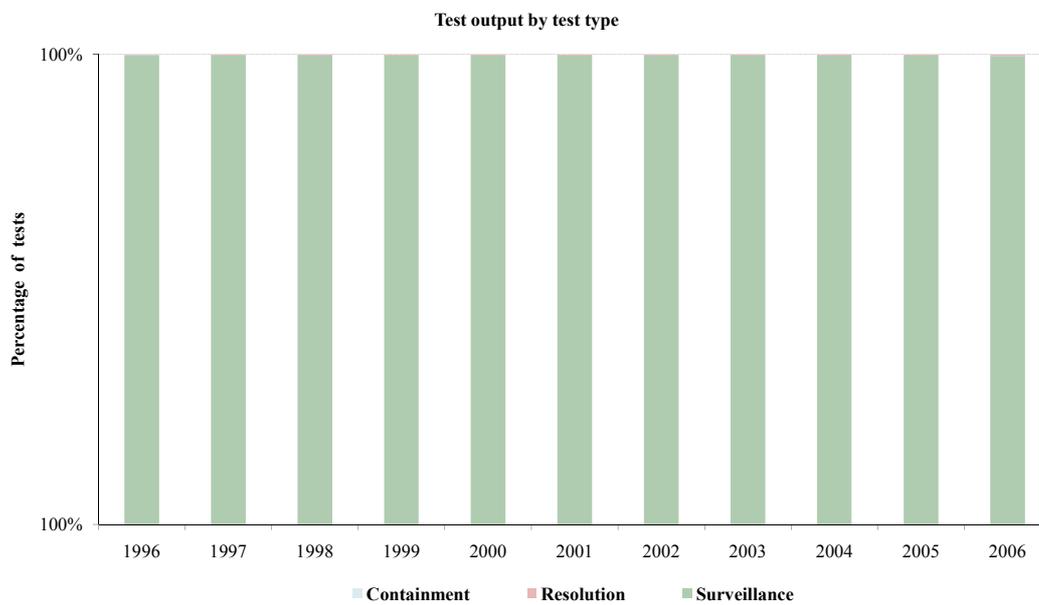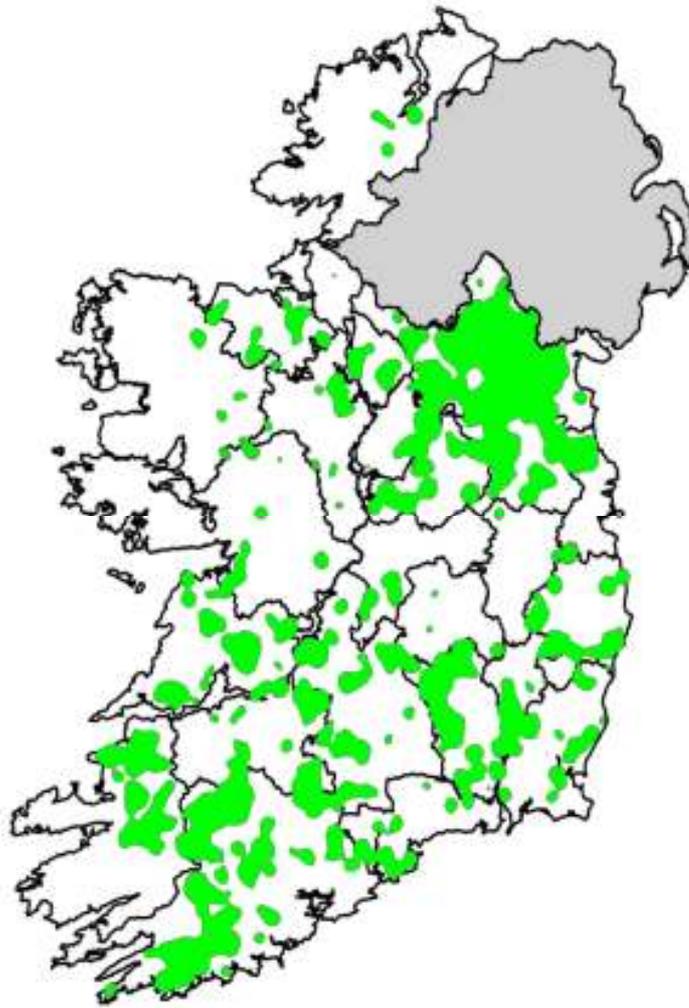

Source: DAFF

4.4 Wildlife control

<u>Description</u>

The Department's formal involvement in the investigation of the possible role of wildlife in TB breakdowns can be traced back to the mid 1980s to a number of small-scale field investigations, including those in Counties Galway and Cork, which predated the East Offaly and Four Area Badger Projects. The scale of government intervention in relation to the wildlife reservoir increased significantly following the Social Partnership Agreement of 2000 (Programme for Prosperity and Fairness). Under the terms of this agreement, the objective of reducing the incidence of TB by 50% over the following four years was adopted by the parties involved, and a number of specific measures aimed at making this reality were put in place. Responsibility for the implementation of these measures was vested in the Wildlife Unit, which was formally established within the Department of Agriculture, Fisheries and Food in 2002. Its remit, subject to licensing by the National Parks and Wildlife Division of the Department of the Environment, is to implement the badger control policy agreed through Social Partnership in those areas of the country where, following a thorough epidemiological investigation, it is considered that the local badger population may be contributing to the persistence of tuberculosis in cattle in the area. The Unit is also responsible for undertaking field trials in support of the badger vaccination strategy.

Badger capture is concentrated on those areas of the country where the greatest numbers of reactors in cattle occur; previous studies show that approximately two-thirds of all standard reactors are found in approximately one third of the agricultural land. Within these areas, which are shaded green in the accompanying map [Figure 4.4], badger capture is limited to 60% of the agricultural land, while, in the remainder of the country, the upper limit for badger capture is 20%. Overall, badger capturing is limited to 30% of the agricultural land area of Ireland (O'Keeffe, 2002). The aim of the strategy outlined above, which has been in place since January 2004, in combination with ongoing research into badger vaccination [4.5.2], is to permit the business of farming to continue in tandem with the conservation of a healthy badger population nationally.

Figure 4.4   Areas of country with highest levels of TB in cattle

Source: DAFF (Wildlife Unit)

Output

The outputs of the Wildlife Unit may be defined as the proportion of the agricultural land in which capturing is ongoing at any point in time[4]. In December 2005, the total land area under treatment was 402,260 hectares, (8.1% of agricultural land), while the corresponding figure in December 2006 was 695,900 hectares (14.1% of agricultural land). Other measures of the Unit's outputs are problematic in that they may be inversely related to the Unit's activity. Thus, for example, the number of badgers removed is not a useful output indicator, as it will tend to decrease over time in an area subject to badger control measures.

4.5 Research

<u>Description</u>

The current TB research programme has three components:

- A data analysis, epidemiology and support function, carried out by the *Centre for Veterinary Epidemiology and Risk Analysis* (CVERA);

- A vaccine development function, carried out by the *Badger Vaccination Programme*; and

- A diagnostics function, carried out by the *TB Diagnostics and Immunology Research Centre* in UCD and by the Central Veterinary Research Laboratory in Backweston.

These Units are funded directly by the Department and, in addition, rely to a large extent on the human and other resources provided by the Department to supplement their own, permanent staff complement. The links between the various arms of the research programme and policy developments in respect of tuberculosis eradication are discussed in Chapter 6 [6.5.2].

<u>Output</u>

The output of the three strands of the TB research programme can be considered to consist of the completed individual research projects, academic qualifications awarded in respect of work undertaken on these projects, data and information generated, scientific publications, and citations in scientific journals. In addition, the outputs of the TB Diagnostics and Immunology Research Centre can also be described in terms of the number of samples processed under the various diagnostic techniques employed by the Centre (see below).

4.5.1 Centre for Veterinary Epidemiology and Risk Analysis (CVERA)

Since the commencement of the ERAD executive in 1988, the *TB Investigation Unit* and its successor, CVERA, have provided the Department with an additional resource to evaluate the extensive data generated by the computerised management systems and to provide advice in relation to the design of research directly undertaken or commissioned

by the Department. CVERA, which has assumed the role of national resource centre for veterinary epidemiology, has a broad remit, covering a wide range of animal health matters, of which bovine tuberculosis remains a central part.

TB-related research undertaken or supported by CVERA can be categorised as falling into three broad areas:

- Bovine tuberculosis and wildlife reservoirs;

- Bovine tuberculosis in cattle; and

- Other aspects of bovine tuberculosis.

Under this first category, the principal areas of investigation are: the transmission of the disease between badgers; transmission between badgers and cattle; the implications of badger control activities for badgers and cattle; the vaccination of badgers; and the role of other species as reservoirs for *M. bovis*. The second strand of research examines the epidemiology, management, detection and measurement of disease in cattle, while the third strand covers a variety of disciplines including demography, genetics and animal production. A full list of ongoing and completed research is provided in Appendix J.

4.5.2 Badger vaccine programme

The development and implementation of a vaccine strategy for use in badgers in Ireland is a key component of the strategy to eradicate bovine tuberculosis. The expectation is that, if badger vaccination is successful in preventing disease transmission between badgers and subsequently between badgers and cattle, the existing comprehensive control and surveillance programme for cattle will then be capable of bringing about eradication.

The current phase of the badger TB vaccination programme is a 10-year research programme that commenced in 2001 and which has involved parallel laboratory (pen) and field studies. The nature of these studies, their inter-relationships, and the timepaths over which they are expected to take place are represented graphically in Figure 4.5.

The field vaccination trial, which is a critical component of the vaccination programme, is a very substantial undertaking that will involve the introduction of a vaccine into a population of badgers over a large area for a period of at least 3 years. The objective of the field vaccination trial is to provide information as to the efficacy of an oral vaccine in reducing the level of TB infection in the badger population under study. Consideration is also being given to undertaking separate, smaller badger vaccination trials with the objective of providing information on the other aspects of badger vaccination, including its empirical contribution to reducing levels of bovine tuberculosis in cattle in certain project areas. In parallel with badger vaccination trials, ancillary work will continue in a number of related areas, including: strain typing in associated badger and cattle populations; badger movement studies; and studies into the genetic diversity of badgers.

In the event that the vaccination trial is successful, incorporation of field vaccination of badgers into the national Bovine TB Eradication Programme – the culmination of the various research elements described above – is scheduled to commence, at the earliest, in 2013.

Figure 4.5   Badger Vaccine Development Programme
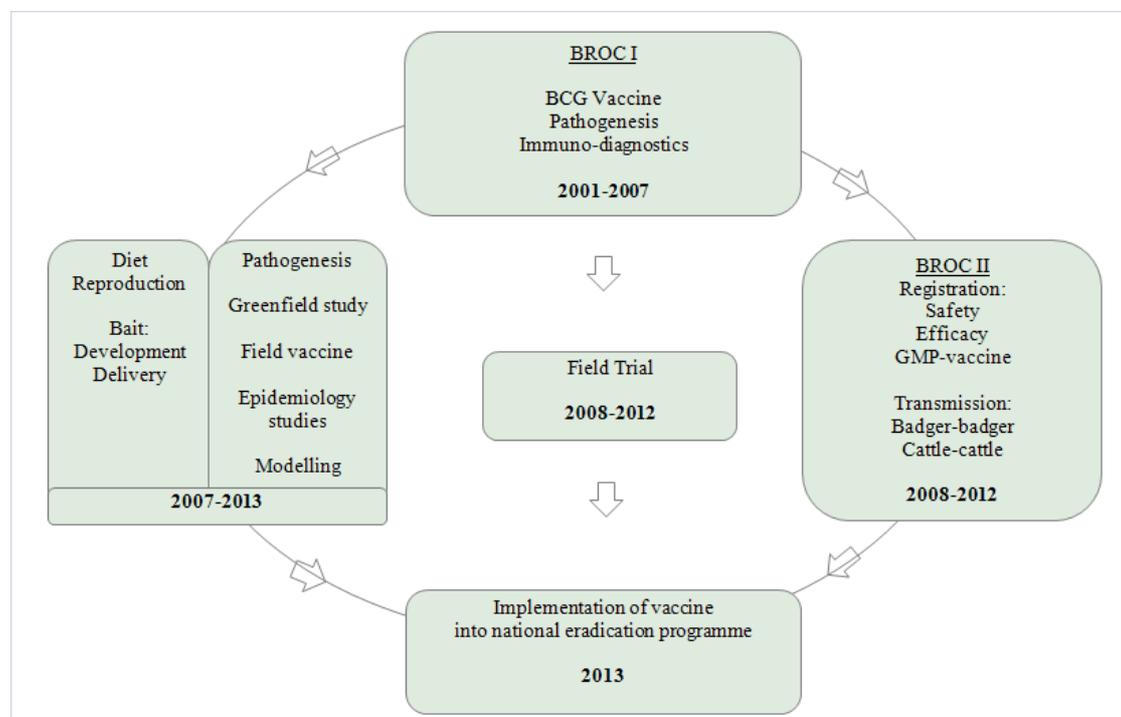
Source: Gormley et al., unpublished (adapted)

4.5.3 TB diagnostics and immunology

The core activity of the TB Diagnostics and Immunology Research Centre is the analysis of blood samples using the Interferon-gamma (IFN-γ) assay and associated research aimed at improving and optimising the performance of the assay and evaluating its diagnostic potential in a range of field situations. The development and application of the IFN-γ assay is discussed more comprehensively in Chapter 6 [6.3.5] and in the Literature Review [Appendix B]. Here, it is sufficient to note that the use of the assay is provided for under EU and national legislation in recognition of the valuable role it can play, in conjunction with the intradermal test, in detecting the maximum number of infected animals in a herd and consequently reducing the period of restriction and the need to depopulate infected herds. Because the specificity of the assay is lower than that of the intradermal test (SICTT), it is not used as a screening test, but rather in situations in which there is a high probability that infected cattle remain in the herd. Steps have been taken to enable increased use of the IFN-γ assay. Since late 2006 Sligo Regional Laboratory has been equipped with the capacity to accept up to 15,000 IFN-γ samples per annum, which are stabilised prior to forwarding for analysis at the existing facility in the Veterinary College in Belfield, Dublin.

The TB Diagnostics and Immunology Research Centre also carries out strain typing of material cultured by the Veterinary Laboratory Services (VLS). Routinely, typing of strains is only carried out to the level of *Mycobacterium* complex, and this does not differentiate between *M. tuberculosis* and *M.bovis*. Spoligotyping techniques can differentiate these strains, however. Approximately 800 samples were so typed between 1996 and 2000 and all were shown to be *M.bovis*. With the transfer of the Central Veterinary Research Laboratory to Backweston now complete, the checking of laboratory cultures for instances of *M. tuberculosis* in at-risk herds using this technique will resume.

Figure 4.6   IFN-γ animal test output (1996-2006)
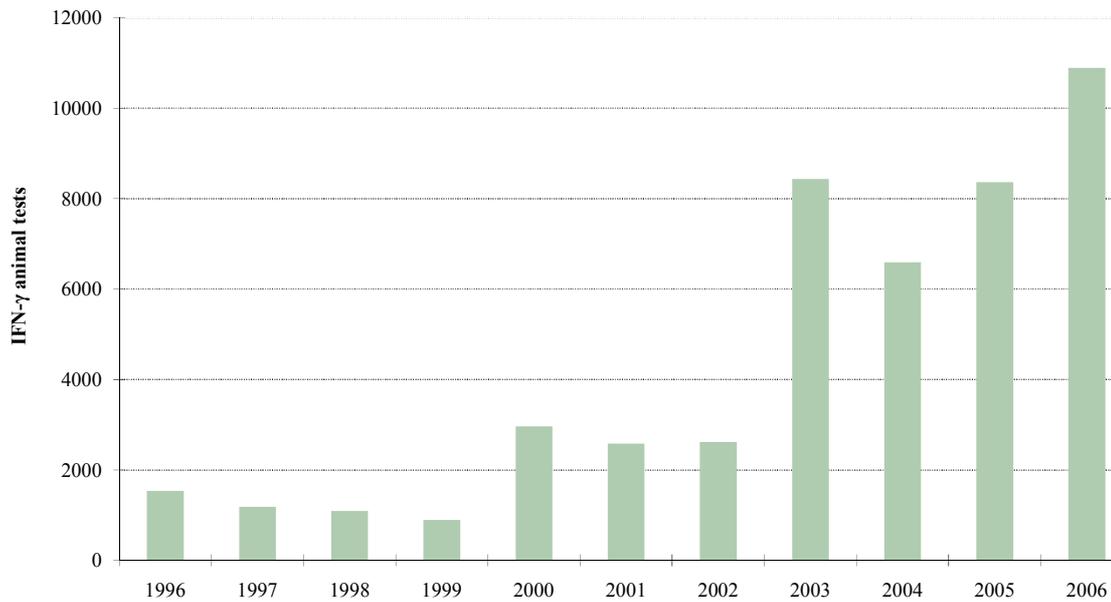
Source: DAFF

Output of Gamma Interferon (IFN-γ) testing

The output of IFN-γ testing as represented by the numbers of tests carried out is provided in Figure 4.6, which shows that these ranged from 900 in 1999 to 10,888 in 2006. A further, notable increase occurred in 2007, when the total number of IFN-γ animal tests rose to 17,320, a 60% increase on the previous year's output. 3,173 (ca. 18%) of these samples underwent initial processing in Sligo Regional Laboratory.

4.6 Reactor Collection Service

Description

The reactor collection service, which provides for the transport of reactors from farms to the slaughterhouse free of charge, was launched in the late 1980s in order to provide better security in the transport of tuberculosis and brucellosis reactor cattle from farms to slaughter plants and to enhance disease control measures. The service, which ensures a fast, secure and effective disposal system for reactor animals, operates in all counties.

Output

The annual output of this service is equivalent to the number of reactors detected in any given calendar year, any minor variation from the latter being attributable to the

inevitable time lag between the detection and collection of reactor animals. Over the three years 2005-2007 the average period between the date of valuation and the removal of reactors was 10 days. Allowing for an average delay of 10 days between the date of test and reactor valuation [4.2.1], the removal of reactors generally takes place 20 days after the date of test.

4.7 Information and Communication Technologies (ICT)

4.7.1 Animal Health Computer System (AHCS)

Description

AHCS was developed following significant investment by the Department in the modernisation of its ICT capabilities in relation to animal health and welfare programmes and other aspects of its corporate services. It came into service in February 2005, expanding the functionality of the previous, standalone Nixdorf computer system, which was designed for the management of TB only. The Nixdorf system had been in place since 1986 and had continued to operate in some DVOs up until 2004. AHCS, which is a modern, fully networked, internet-based facility, provides a much greater range of functionality than the previous system, allowing staff to access information in respect of all herds and animals throughout the country. It is fully integrated with the Corporate Customer System (CCS) and the Department's Financial System (SAP) and augments and shares data with other computer systems, particularly those relating to cattle traceability. Further details of AHCS are provided in Appendix K.

Output

The replacement by AHCS of the Nixdorf system required the migration of a large volume of data from the latter to the former, including approximately 250,000 herd records, 28 million animal records and nearly 20 million test records. As the principal ICT system for the active management of bovine TB, AHCS continues to handle the very considerable amounts of data generated by the approximately 9 million animal tests carried out annually. The system serves some 1,300 internal users and a further 1,500 external users, located in private veterinary practices (Dept. of Agriculture and Food, 2006a).

4.7.2 Cattle Movement Monitoring System (CMMS) / Animal Identification and Movement System (AIM)

Description

Ireland has operated an individual animal identification and tracing system for cattle since the 1950's based on individual ear tags and accompanying cattle identity cards. In compliance with EU legislation[5], Ireland developed CMMS, a computerised database containing animal identity and location information, which has been operational since September 1998. A major ongoing ICT project – AIM - will replace and enhance a number of existing animal identification systems, including CMMS, to provide a generic identification and movement system capable of recording the births, movements and disposals of a number of animal species. AIM, which is already on-line in the majority of livestock marts across the country, is in the process of being rolled out to all export assembly points and export-approved slaughter plants.

Output

Approximately 2.1 million calf births are registered annually using the CMMS system. Other outputs of the system in 2006 included the issuing of some 350,000 herd profiles and some 375,000 compliance certificates, and the processing of ca. 470,000 animal movement forms.

4.7.3 Other ICT developments

Description

Further computer enhancements have included the deployment of a Trace-Onward and Epidemiological Investigation Tracking System (TOTS), a Geographical Information System ('Herdfinder') and a Reactor Herd Management System (RHMS).

TOTS

The Tracing Onward Tracking System (TOTS) was developed as an aid to the management and tracking of animals originating from TB, brucellosis and BSE-infected herds which move to other herds where they may pose a disease risk. At-risk animals in infected herds are logged onto the TOTS system for tracing through the national network of DVOS. Within each DVO a list of work in progress is maintained and checked on a regular basis. The system prints any follow-up documentation required and provides for the recording of the outcome in respect of each animal tracing completed. In addition to

the core tracing functions, the system also logs contiguity visits for TB, Wildlife Unit survey requests and the allocation of wildlife unit surveys to field staff. The functionality of the TOTS system is currently being migrated to AHCS.

Herdfinder

Herfinder is based on the Department's main mapping programme *iMAP*[6]. It is a tool that permits Department staff view the geographical relationship between an infected index herd, contiguous herds and topographical features. It is a web-based system capable of serving several thousand users simultaneously.

RHMS

The system, which was introduced in 2002, was used to manage all herds restricted as a result of both tuberculosis and brucellosis outbreaks. It was used to electronically record the passports of each animal in these reactor herds, to produce permits for their movement to slaughter, and to partially automate the processes of reactor valuation and the epidemiological investigation of reactor herds.

Output

HerdFinder has something of the order of 1,172 active users and an average of approximately 140 unique users per day. The TOTS system processes approximately 20,000 at-risk animals annually, 75% of which are TB-related. RHMS is now largely redundant following the transfer of functionality to AHCS.
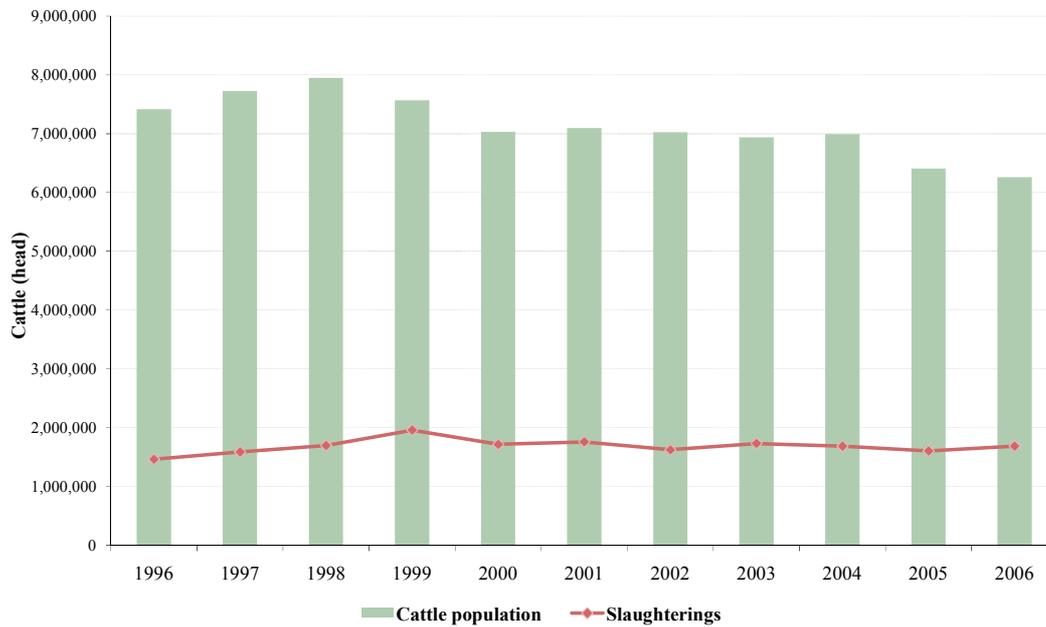
4.8 *Post-mortem* surveillance

4.8.1 Meat factory surveillance

Description

All cattle presented for slaughter in the state undergo a routine veterinary inspection *post-mortem*, which is primarily for the purpose of determining fitness for human consumption, but which incorporates an inspection for evidence of tuberculosis. Because suspect tuberculous lesions generally cannot be distinguished on gross inspection from non-tuberculous granulomas, suspect lesions from attested animals (those with a clear TB status) are submitted to VLS for detailed examination.

Figure 4.7   Cattle slaughterings and cattle population (1996-2006)

Source: DAFF

Output

The relevant outputs of surveillance carried out at meat factories are the animals (including reactor animals) subjected to inspection *post-mortem*. Data for the years 1996-2006, showing the total number of cattle slaughtered, is presented in Figure 4.7. Each of these animals undergoes a routine inspection, which includes examination for evidence of tuberculosis. The other relevant outputs from the perspective of this review are the processing of suspect lesions for onward dispatch to the laboratory and the forwarding of the post-mortem results for reactor cattle to DVOS, where they provide useful epidemiological information for the Veterinary Inspectors investigating breakdowns in the field.

4.8.2 Laboratory analysis

Description

The outputs of the Department's laboratory services relevant to the TB Programme are the suspect lesions examined by histology and the subset of these that are examined by culturing. Laboratory examination is necessary because suspect lesions identified at meat factories cannot generally be distinguished on gross inspection from non-

tuberculous granulomas. Laboratory examination of cattle that have already been identified as reactors following a TB test is not normally carried out.

Output

Table 4.3 shows the number of examinations carried out by VLS on suspect tuberculosis samples from cattle (mostly non-reactor) on foot of veterinary post-mortem inspections carried out by the Veterinary Public Health Services in the period 1996-2006. Over the period a total of ca. 60,000 histological examinations and ca. 28,000 cultures were performed. The percentage of histological examinations that require culturing in order to obtain a diagnosis has varied markedly over the period, from 30% in 1996 to 53% in 2000. In 2006, histological examination was performed on 5,678 suspect lesions of which 2,200 (39%) were subject to additional analysis by culturing. As is the case for post-mortem inspections on reactor cattle, laboratory results in respect of non-reactor cattle are forwarded to DVOs for use in the field investigation of TB breakdowns. A positive laboratory result confirms the disease control measures, initiated on a presumptive basis upon the detection of the TB-suspect lesion, and triggers a regime of herd testing, aimed at containing and resolving any remaining infection in the herd.

4.9 Key findings

- The Department operates a comprehensive range of compensation schemes designed to help offset the various types of losses incurred by farmers due to tuberculosis breakdowns. In contrast to the programmes in the benchmark jurisdictions, the BTEP provides compensation for both direct and indirect losses incurred as a result of a TB breakdown.

- Payments of compensation under the OFMVS are made in a timely manner. Currently 93% of payments are made within 3 weeks of receipt of the necessary documentation.

- The cost of administering the process of arbitration within the OFMVS is extremely small in relation to aggregate reactor valuation.

- Significant reductions in the numbers of recipients of the Depopulation Grant, Income Supplement and the Hardship Grant occurred over the period 2000-2006, reflecting falling disease levels over this time.

- The tuberculin testing regime is comprehensive. In 2006, some 9 million animal tests were carried out on the approximately six and a half million animals in the national herd and at least 97% of the herds in the country were tested.

- Surveillance testing accounts for the majority of the testing output, representing approximately 65% of all tests carried out.

- Significant increases have taken place in the use of the blood-based IFN-γ assay, which is deployed in conjunction with the standard intradermal test.

- The activities of the Wildlife Unit are concentrated on those areas of the country where the disease is most prevalent in cattle.

- The TB research programme is extensive, generating information on all relevant aspects of tuberculosis in cattle and other species.

- The Department operates a system for the collection and secure delivery to meat factories of all reactor animals.

- The Department has developed a number of ICT systems that provide it with a wide range of information required for the efficient management of bovine tuberculosis.

- Each bovine animal presented for slaughter each year undergoes a routine veterinary post-mortem examination which is primarily for the purpose of determining fitness for human consumption, but which incorporates an inspection for evidence of tuberculosis. Suspect tuberculous lesions from non-reactor cattle are subjected to comprehensive laboratory analysis involving histological examination and culturing.

4.10 Conclusions

- The various outputs of the Bovine TB Eradication Programme are clearly definable in both qualitative and quantitative terms. They are generally delivered in a timely and complete manner, and in compliance with the provisions of domestic and European legislation.

TABLES

Unless otherwise stated, data in these tables are sourced from the Department of Agriculture, Fisheries and Food

Table 4.1   Outputs of the compensation schemes (1996-2006)

Year	Income Supp. (recipients)	Hardship Grant (recipients)	Depop. Grant (recipients)	Reactor Grant (animals)	OFMVS (animals)	OFMVS valuations (animals)	Reactors (animals)
2000	2,572	1,882	117	13,790	n/a	n/a	39,847
2001	1,854	1,909	40	9,827	12,138	1,232	33,702
2002	1,873	1,883	50	2,380	28,584	7,207	28,930
2003	1,579	1,608	50	62	30,086	7,918	27,978
2004	1,496	1,424	32	32	24,401	6,857	22,967
2005	1,338	1,450	32	20	26,999	6,907	25,884
2006	1,434	1,560	29	11	25,692	6,397	24,173

Table 4.2   Outputs of the tuberculin testing programme (1996-2006)

Year	Cattle pop. under test	No. animal tests	No. tests per animal	No. herds tested	% herds tested
1996	7,412,933	10,073,859	1.36	149,128	98.2%
1997	7,725,634	9,910,074	1.28	145,209	98.1%
1998	7,946,989	10,677,291	1.34	142,302	97.8%
1999	7,569,735	10,749,580	1.42	138,263	97.9%
2000	7,032,407	10,304,162	1.47	135,542	98.0%
2001	7,097,430	9,402,196	1.32	130,525	95.1%
2002	7,025,096	9,400,065	1.34	127,711	97.2%
2003	6,936,820	9,168,722	1.32	125,517	97.2%
2004	6,992,264	8,825,720	1.26	124,414	96.7%
2005	6,407,456	9,060,044	1.41	119,963	97.3%
2006	6,260,133	9,000,519	1.44	118,925	97.2%

Table 4.3   Selected outputs of the Veterinary Laboratory Service (1996-2006)

Year	Histology	Culture
1996	4,232	1,264
1997	4,290	2,142
1998	5,665	2,626
1999	6,905	2,796
2000	6,229	3,316
2001	5,688	2,934
2002	5,836	2,944
2003	5,426	2,744
2004	4,930	2,341
2005	5,109	2,475
2006	5,678	2,200
Total	59,988	27,782

NOTES

[1] The National Audit Office of England (NAO, 2006) noting that efficiency, economy and effectiveness are to some extent interlinked, states that '*The economic acquisition of resources contributes to efficiency by minimising the cost of inputs used. Efficiency also overlaps with effectiveness because it is an important factor in determining the most cost-effective method of achieving the intended aims and objectives of a public service*'.

[2] Information and Communication Technology

[3] From that date forward the owners of certain categories of herds were provided with the option of having their reactors valued either under the existing Reactor Grant scheme or under the OFMVS.

[4] Lands captured are calculated as within a 0.5 km radius of any sett approved for capture (O'Keeffe, 2002).

[5] Regulation (EC) 1760/2000 of the European Parliament and of the Council

[6] The *iMap* system contains the digitised data from maps submitted by farmers claiming Single Farm Payments and is stored in an Oracle spatial database. Its principal purpose is to assist the management of customer payments, such as the Single Farm Payment, that have a spatial component.