RESEARCH PROJECT - FINAL REPORT FORM

FOOD STANDARDS AGENCY

COVER PAGE

Project Title	Development of methods for the identification of duck, pheasant, venison, horse, donkey and wild boar in meat products
Agency Project Code(s)	Q01083

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- **Sections 1 - 8** should be completed by the **Project Leader** of the **Lead Contractor**.
- **Sections 9-10** are for Agency use for completion by the **Project Officer**.
- When a project is completed, the Lead Contractor is responsible for completing the relevant parts of this form. The completed form should be submitted with 5 printed copies of the Final Technical Report to the Project Officer.
- Wherever possible an electronic copy should also be provided, on floppy disc or CD-ROM (Word/Excel 97 preferred, please contact the Project Officer regarding alternative formats). This form is in Word 97, font Arial size 11. The form may be manipulated as required or information may be supplied as separate attachments if preferred. All boxes for text are fully expandable.
- It is **strongly recommended** that the format and content of the Technical Report is discussed and agreed well in advance of the project end date with the Agency Project Officer).
- Guidance notes (RCU-A17) for the completion of this form and the Final Technical Report are available from Project Officers.

RESEARCH PROJECT - FINAL REPORT FORM

FOOD STANDARDS AGENCY

Section 1 : Project Details

1.1	Agency Project Code(s)	Q01083
1.2	Project Title (from Contract)	Development of methods for the identification of duck, pheasant, venison, horse, donkey and wild boar in meat products
1.3	Project start date	1/7/03
1.4	Project end date	28/2/05
1.5	Date final report submitted	20/6/05
1.6	Agency Project Officer	R. Hodgson
1.7	Name and address of Lead Contractor	Central Science Laboratory Sand Hutton York YO41 1LZ
1.8	Lead Contractor Project Leader	
	Name	Dr Hez Hird
	Telephone	01904 462585
	FAX	01904 462111
	E-mail	h.hird@csl.gov.uk
1.9	Collaborating Partners or sub-contractors (Establishment name and contact name for each)	None

1.10 Has any actual or potential Intellectual Property that may be suitable for development or exploitation been identified as part of this project?

No

If yes please give details below and indicate whether and how you might consider this development or exploitation.

NB – If actual or potential IP has been identified it is important that before any action is taken to develop, protect or make public any information relating to the project's findings, this should be discussed as soon as possible with the Project Officer and the Agency Research Co-ordination Unit

Section 2 : Key Findings - Executive Summary

Provide at Section 2.1 (or append) a Non-Technical (Layperson's) Executive Summary of the findings made by the research.

This should be understandable by the general public and consumers; no specialist technical knowledge should be assumed. It should seek to identify the reason for the research, its findings and the implications for the Agency, its objectives and, if appropriate, the consumer.

Because of the target audience the summary should express the project in terms which are distinctly different to the executive summary in the Technical Report.

It should be no more than 1200-1500 words (e.g. 3 pages of A4 typescript at 1.5 line-spacing); a suggested layout and headings that may be used are given at section 2.1. The summaries should not contain experimental detail. See Final Report Guidelines (RCU-A17) for further information.

To ensure effective communication of the project's findings, it may be necessary for the Agency to modify this summary before publication.

Project officers are encouraged to gain contractors' agreement to any modified versions.

The Agency intends to publish this summary on the Agency's web-site.
Is there any reason why the Agency should not do this? (YES or NO)

No

*If **YES** please explain any reasons for this below:*

Section 2.1 : Non-Technical (Layperson's) Executive Summary

Project Title: Development of methods for the identification of duck, pheasant, venison, horse, donkey and wild boar in meat products	
Contractor(s): Central Science Laboratory	
Agency Project Reference: Q01083	Duration: 21 months
Start/End Dates: 1/7/2003 – 28/2/05	Contract Price: £31258

The objective of this study was to design and optimise real-time PCR assays for the specific detection of horse, donkey, duck, deer, pheasant and wild boar in commercial products. The assays were to be easy to use and applicable for use by public analysts and other laboratories. Although the assays were primarily for use with real-time PCR equipment, they were also to be available for use by laboratories which did not have real-time PCR capability, but which did have experience of gel electrophoresis. Finally, the outputs of the project were to include a comprehensive set of standard operating procedures to facilitate technology transfer to other laboratories.

The objectives of the study were broadly met, with assays specific for the detection of all target species successfully designed and optimised, with the exception of wild boar. After extensive sequence analysis, and utilising the results of population genetics work at CSL (a MAFF funded project), it was concluded that the identification of wild boar in commercial products was not achievable using this real-time PCR based approach and that a microsatellite based approach might be more applicable.

The real-time PCR based approach was found to be applicable to the detection of duck, deer, horse, donkey and pheasant. Sensitive and specific assays were designed and optimised which were shown to be capable of detecting their target species in heat and pressure processed commercial products. The design of the assays made them fully portable between real-time PCR and gel electrophoresis equipment. Finally technology transfer has been facilitated by the early submission of two manuscripts to peer reviewed journals detailing the design and optimisation of the horse, donkey and duck assays, both of which have been accepted for publication. Additionally, a comprehensive set of standard operating procedures has been provided for use by public analysts and other laboratories.

The final part of this project sought to evaluate an emerging methodology for species identification which utilises chip technology. The Food Expert ID system, developed by bioMerieux, was loaned to CSL for a period of 6 months and its operation and applicability to the identification of species in food products evaluated. The range of species included on the chip allowed samples from 3 FSA funded projects to be assayed: white fish mixtures from the CCFRA fish project, meat mixtures from the DNA quality project (Q01033 & Q01034) and exotic meats from the Exotic meat project (Q01083). Additionally the chip was assessed using tuna standards, originally from the FSA tuna survey, conducted in 1999. The system was able to detect both single species and species in mixtures, even after heat and pressure processing. Cod was detected in a mixture of cod and haddock, and pork, beef and chicken were also detected, all below the 5% level given as the sensitivity of the assay. A range of tuna species were correctly identified from raw muscle, however canned tuna could not be detected, even at 100%. The system was easy to use and provided information on the species present in a samples without running numerous assays. When the technology becomes more established it is anticipated that the range of species included on the chip will be extended and the price of the chips fall, making these types of analysis more widely available.

Section 3 : Project Outputs

List any outputs from the project, e.g.

a) Refereed papers (not abstracts) published or in press, i.e. accepted for publication by a specified journal;

b) Abstracts or presentations. These may be already published or accepted for publication or presentation. Include presentations given or planned and dates for future presentations;

c) Papers submitted for publication but not accepted and papers in preparation.

d) Workshops held or planned where project work is to be presented (with dates).

NB – Contractors are reminded that the Agency's permission should be sought before any publication, presentation or publicity of the project's work. Please supply a copy of any papers, abstracts etc. to the Agency's Project Officer as soon as they are published.

Manuscripts:

Chisholm, J., Conyers, C., Booth, C., Lawley, W. & Hird, H., The detection of horse and donkey using real-time PCR. *Manuscript accepted for publication in Meat Science*

Hird, H., Brown, J. & Chisholm, J., The detection of duck species in food using a multiplex real-time PCR assay. *Manuscript accepted for publication in European Food Research and Technology*

Hird, H. & Chisholm, J., The detection of deer species using a multiplex real-time PCR assay. *Manuscript in preparation*

Chisholm, J. & Hird, H. The detection of pheasant using real-time PCR. *Manuscript in preparation*

A comprehensive set of standard operating procedures has been provided for use by Public Analysts and other laboratories.

Oral presentations:

Project to be presented at Food Standards Agency Authenticity programme research seminar, 9th March 2005-02-24

Section 4 : Achievements of Project Targets

4.1 Please indicate whether the project has achieved the objectives, milestones and deliverables expected.

The scientific objectives, milestones and deliverables for the project are set out in the contract Scope of Work (Sections SW1, SW3 and SW4). They may have been amended since then by agreement in writing with the Agency Project Officer.

Please list below the agreed scientific objectives, milestones and deliverables for the whole project, and indicate clearly any that have been amended, with the relevant amendment date. Also indicate targets that have been completed and state whether or not they have been achieved as expected (in full and on time).

(Alternatively your Project Officer may provide their record of these from the Agency's database (FaRMS) and ask you to confirm its accuracy and comment on achievement of targets.)

NB - It is the responsibility of the lead contractor to check fully that ALL primary milestones have been met. Provide detailed comments or explanation on any targets that have not been achieved in full or as expected plus any other relevant comments at Section 4.4.

4.2 SCIENTIFIC OBJECTIVES (from Scope of Work section SW1):

Objective No.	Objective Description
01	Objective –Acquisition of *mCyt b* sequence data for duck, pheasant, wild boar, venison, donkey and horse Achievement – availability of high quality sequence data applicable to duck, pheasant, wild boar, venison, donkey and horse commercially available in the UK.
02	Objective – Design and optimisation of primers and probes for duck, pheasant, wild boar, venison, donkey and horse Achievement – Optimised primer and probe sets for each species
03	Objective –Determine the specificity and limit of detection of each primer set Achievement – availability of primers and probes of known specificity and sensitivity.
04	Objective –Validate assays Achievement – Fully optimised and validated assays ready for publication.
05	Objective – To determine the performance characteristics of the BioMerieux food Expert ID system. Achievement – Full data on the methodologies performance to be reported in the final report. Results of analyses to be fed into projects Q01084 and Q01069
05	Objective - Technology transfer Achievement – Through production of standard operating protocols.

4.3 MILESTONES AND / OR DELIVERABLES (SW3 and SW4):
(add more lines as necessary)

Milestone / Deliverable		Target Date	Date Achieved	Achieved In Full?
Number	Title			
M01/01 & D1	Acquisition of *Mcyt b* gene sequence data for duck, pheasant, wild boar, venison, donkey and horse	01/11/03 Month 4	20/01/04	Yes
M02/01 & D2	Design and optimise specific primers and probes	01/01/04 Month 6	01/06/04	Partly, 4 out of 5
D3	Interim report	01/01/04 Month 6	11/12/03	Yes
M03/01 & D4	Determination of the specificity and limit of detection of each primer set	01/05/04 Month 10	25/06/04	Yes
M04/01 & D5	Assessment of assay accuracy on model samples Technology transfer to Public analysts complete.	30/06/04 Month 12	25/06/04	Yes
M05/01 & D7	Analysis of common meat species samples completed with the Biomerieux system for Q01084	01/09/04	31/05/05	Yes
M06/01 & D7	Analysis of fish samples with Biomerieux system for Q01069 completed by CCFRA	17/09/04	31/05/05	Yes
M07/01 & D8	Analysis of exotic meat and mixtures for project Q01083 complete.	31/11/04	31/05/05	Yes
M08/01 & D9	Report on the performance characteristics of the system	31/12/04 Month 18	20/06/05	Yes

4.4 CONTRACTOR'S COMMENTS ON ACHIEVEMENT OF TARGETS.

If any targets have not been met as expected, either in terms of scientific progress or on time, please comment or provide an explanation below.

The objectives have been met for horse, donkey, venison, duck and pheasant. Unfortunately sequence analysis of wild boar samples from the UK and Europe revealed no regions of heterogeneity between wild boar and pig which were conserved across all the wild boar samples. This is due to the very close genetic relationship between wild boar and pigs, making them indistinguishable using mitochondrial cytochrome b sequence data. Wild boar was therefore abandoned for the remainder of the project. There is potential for a microsatellite based method as discussed at the project review in June 2004, however this would be outside the scope of this project.
The project was extended to accommodate new technology: the Biomereaux species identification chip system. However the kit was delivered late to CSL and the availability of the chips has meant a further postponement of the work.

Section 5 : Further Work

Please comment briefly on further work or new scientific opportunities that may arise as a result of findings from this project.

Section 6 : Expenditure, Effort and Staff

Summarise the Costs and Staffing for the Project.

Approved figures were set out for the Project in the contract Pricing Schedule (Sections PS1 and PS2 and staff in the Proposal RCU-A3). Indicate clearly if they have been subsequently amended by agreement in writing with the Agency Project Officer.

6.1 Whole of Project Costs:

	Approved project expenditure	**Actual** project expenditure
	£	**£**

6.2 Whole of Project Staffing:

Grade (from pricing schedule section PS2)	***approved** staff input	***actual** staff input

***staff years of direct science effort**

6.3 Key staff involved.

Please list staff who have made a significant contribution to all or part of this project during its lifetime and identify their grade (as defined in your proposal), their contribution to the project and the dates applicable.

Name and Grade	Contribution and dates applicable
Hez Hird	Project management and laboratory work 01/07/03 – 20/05/05
James Chisholm	Laboratory work 01/07/03 – 31/05/05
Wendy Lawley	Laboratory work 01/07/03 - 15/01/04
Chris Conyers	Laboratory work 01/07/03 - 15/01/04
Chris Booth	Laboratory work 01/07/03 - 15/01/04

Section 7 : Contractor's Comments

The Food Standards Agency is continually seeking to improve quality of its research how that research is managed. If you have any comments on any aspect the handling and execution of this project by the Agency and its officials (positive as well as negative), we will be pleased to receive your feedback in the box below.

Section 8 : Contractor's Declaration

I declare that the information I have given is correct to the best of my knowledge and belief.

I understand that the information contained in this form may be held on a computer system.

Signature _____ Name (block capitals) _____

Date _____ Position _____

Section 9 : Project Officer's Actions

9.1 AGENCY DETAILS

a) Research Programme Number and Title	
b) Programme Advisor *(if appropriate)*	
c) Agency Programme Manager *(and Agency Division/Branch)*	
d) Agency Project Officer *(and Agency Division/Branch)*	

9.2 TECHNICAL REPORT RECEIPT

a) Project end date	
b) Date report received	
c) Date Final Reports and Publications (FRAP) database updated with receipt details.	

9.3 PEER-REVIEW / INDEPENDENT ASSESSMENT

In addition to internal assessment by the Project Officer and Programme Advisor (where appointed), it is frequently advantageous for Final Technical Reports to be subject to independent peer-review. Peer-review provides the Agency with an independent opinion and assessment of the technical work undertaken, the key findings made, the validity of findings, their significance and utility and of any relevant IP issues.

The peer-review applied can take a number of forms, depending on what the commissioning division needs from the work or how it will utilise the project's results. It may be a specifically requested review by an independent expert (using form RCU-B7) but suitable peer-review may also be achieved through other means, e.g. publication of findings in a refereed journal, consideration by expert or advisory committees or working parties, etc.

Further guidance may be found in the RCU-A17 Guidelines. Evaluation Forms mentioned above are available to Project Officers from the Research Guidelines on Lotus Notes. Completed assessment forms must be retained on the project file.

NB – If work or findings have the potential to be controversial, high profile or closely affect consumer interests, it is **strongly recommended** that evaluation of the quality of the work and its findings is completed before the Agency places it in the public domain.

a) Details of specific Peer-Review Evaluations (RCU-B7)**.**

Evaluations Made	**Name(s)**
Project Officer	
Programme Advisor	
Evalution(s) by External Independent Expert(s	

b) Details of other specific peer-review evaluation applied/undertaken.

Include comments made by these reviews on the quality of project work and findings and provide references to any reports that cover its consideration.
(Refer to Outputs, section 3, where appropriate).

c) Has the project satisfactorily achieved the intended objectives?

*If **NO,** comment on whether this was reasonable at Section 10.*

9.4 INTELLECTUAL PROPERTY

a) Have any IP issues been identified (section 1.10)

b) Does the Agency need retain rights to the project's IP or take measures to assure public access to research findings?
*If **YES,** specify the issues and appropriate actions at Section 10.1, and record further details etc. in the project file.*

9.5 ACCEPTANCE OF FINAL REPORT.

The Technical Report is considered acceptable, the contract has been fulfilled satisfactorily and the contract retention is payable:

Signature: _____ Name (block letters): _____

Date: _____ Agency Division/Branch: _____

9.6 DISSEMINATION.

Once the technical report is accepted, the findings of Agency research should be made publicly available and communicated to relevant interested audiences.

As a minimum, for research projects:

i) the Technical Report must be placed in the Agency library for public access;

ii) the Technical Report must be placed in FSA Scotland's library for FSAS staff;

iii) the completion of the project and availability of the Technical report should be announced through Food Standards Agency News;

iv) a summary of the project and the results should be placed on the Agency website (using the template forms available) and

v) the Technical Report and other documents should be saved in the REMIND system.

The Layperson's Executive Summary (section 2.1) should include a clear statement of the Agency's views on the findings. e.g. how useful they are, how they enhance the Agency's knowledge base, how they will be used, how they relate to Agency policy and whether they will be considered by other bodies or committees. This should be developed in conjunction with the Agency's Communications Division.

Consideration should also be given at this point as to whether to make use of additional dissemination methods, media or other appropriate channels to communicate the findings of the project to the appropriate target audience (part f) and project details on the Agency's FaRMS database must be brought up to date.

a) Is there any reason why the Report and its findings should not be released immediately into the public domain? | |

*If **YES** state why **and** give the date or circumstances when it may be released, at Section 10.*

b) Date Technical Report sent to Agency Library/Information Centre | |

(use Annex form and update Reports and Publications database)

c) Date Layperson's Executive Summary (section 2.1, including Agency statement) sent to RCU for placement on the Agency web-site. | |

d) Date FaRMS database updated:
Project technical abstract entered (Contract Entry, Sub-Ledger Tab Power Pad) **and** 'Date Results in Public Domain' field completed. | |

e) Date details of completed project sent to Food Standards Agency News (Newsletter Editor, Comms Branch) | |

(Use Annex Form)

f) Is additional dissemination action appropriate? (e.g. press release, major or topical scientific or popular press articles, papers to be tabled at scientific advisory committees etc.)

*If **YES**, specify action taken at Section 10.1.*
***NB** - the Agency's COMS division (Publicity Branch) should be closely involved in any such activities.*

9.7 USE OF RESEARCH FINDINGS BY THE AGENCY

Please explain below how the findings of the research project will be beneficial to or used by the Agency. This can be described in a number of ways, including (but not exclusively):

- How do they enhance the Agency's technical position or knowledge base?
- What plans are there for the findings to be reported to other bodies?
- To what use will the Agency put the project's findings?
- How will the findings influence or change Agency policy or advice?
- Has the project fulfilled the original research requirement?

  etc.

If the impact of the project is not immediately evident, a timetable for assessing the project's impact at a later date may be defined in section 9.8.

9.8 PROJECT IMPACT ASSESSMENT

It may be appropriate for the Agency to make further assessments of the impact and implications of the project's research findings, for the Agency and the consumer, which may not be immediately apparent on completion of a project.

Use the table below to define a timetable (as bring-forward dates) for revisiting the findings of the research to reassess their impact and any views, actions or messages that are appropriate. The findings of such reviews may be of use when research programmes are reviewed.

Review Dates For Reassessment Of The Impact Of Agency Research Findings.

Period after completion (months) or date/occasion.	Date	Agency officer responsible, and identity of the reviewing division, body or committee etc.

Section 10: Additional Comments

10.1 Project Officers may record below any additional relevant comments, observations or actions relevant to the performance, management or reporting of this project.

10.2 Completed project acknowledged by Agency Head of Division

Signature _____ Name (Block letters) _____

Date _____ Agency Division _____

ANNEX : INFORMATION FOR LIBRARY SERVICES / COMS / RCU

When the Project Final Report is placed into the public domain (section 8.5 and 8.6) complete the sections below in full, and make 3 copies:

Send Copy 1 with a copy of the Final Report, to the Food Standards Agency Library and Information Centre (John Dixon, 020 7276 8060)

Send Copy 2 with a copy of the Final Report, to the Food Standards Agency Scotland Library and Information Centre (Sandra Cruickshank, 01224 285117)

Send Copy 3 (form only) to FSA News Editor (Frank Chalmers, Publicity Branch, COMS Division) to publicise the availability of the report from the Library through FSA News

Project Number	
Full Report Title	
Name of Contractor (Institution and Department only)	
Agency contact for further information (Name, telephone number, e-mail address)	
Project Abstract for Food Standards News (approximately 150 words)	
Length in pages (each part separately)	
Date final report received at FSA	
Date report placed in FSA library	
Any additional information or instructions	