

DNA Profiling: The Great Escape



THE UNIVERSITY of EDINBURGH
Easter Bush
Science Outreach Centre

Farmer Jamie needs your help to find a mischievous sheep. Can you use evidence from the farm and DNA profiling to solve the mystery?

Farmer Jamie owns a small herd of Shetland sheep. During the past few weeks, they have escaped several times from their paddock, each time breaking the fence and causing havoc on the rest of the farm. Jamie needs your help to discover the identity of the mischievous sheep using clues from the scene of the escape and DNA profiling to compare the DNA of five sheepy suspects.

Learning Level: S1 to Higher

Availability: On demand

Cost: £5 per pupil

Learning objectives

- To understand DNA structure and function
- To understand that there are some characteristics that we cannot see and that DNA technology can reveal
- To understand that we can identify individuals using DNA profiling
- To understand how restriction enzymes cut DNA
- To interpret and discuss experimental results
- To reveal the world of work in scientific research


Techniques used

- Micro-pipetting
- Restriction digest*
- DNA gel electrophoresis

Workshop activities

- Analysis of sheep fleece from the scene of the escape
- Introduction to micropipettes
- Restriction digest of DNA samples*
- Introduction to DNA profiling and DNA fragment analysis
- DNA electrophoresis using agarose gels
- Analysis and interpretation of results
- Discussion with scientists from The Roslin Institute

*Full-day workshop includes DNA digest with restriction enzymes, shorter workshop uses pre-digested DNA samples.



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science

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Curriculum links

Level 3

I have explored the role of technology in monitoring health and improving life quality. **SCN 3-12b**

I can express an informed view of the risks and benefits of DNA profiling. **SCN 3-14b**

Level 4

I can use my understanding of how characteristics are inherited to solve simple genetic problems and relate this to my understanding of DNA, genes and chromosomes. **SCN 4-14C**

National 4

Key Area 2 DNA, genes and chromosomes

Key Area 3 Therapeutic use of cells

Key Area 4 Properties of enzymes and their use in industries

Key Area 8 Controversial biological procedures

National 5

Unit 3 DNA and the production of proteins: (a) Structure of DNA

Unit 4 Proteins: (a) Protein structure (b) Enzymes (c) Enzyme conditions

Unit 4 Variation and inheritance: (a) Discrete variation (single gene inheritance) (b) Understanding of genetic terms: gene; allele; phenotype; genotype; dominant; recessive; homozygous; heterozygous and P, F1 and F2

Higher Biology (2018-2019)

DNA and the genome

1 The structure of DNA (a) Structure of DNA

3 Gene expression (e) Phenotype is determined by the proteins produced as the result of gene expression.

5 The structure of the genome The genome of an organism is its entire hereditary information encoded in DNA.

Sustainability and interdependence

2 Plant and animal breeding (e) Genetic technology

4 Animal welfare Animal welfare in livestock production

Higher Human Biology (2018-2019)

Human Cells

2 Structure and replication of DNA

(a) Structure of DNA (b) Replication of DNA

3 Gene expression (e) Phenotype is determined by the proteins produced as the result of gene expression.

5 Human genomics

The genome of an organism is its entire hereditary information encoded in DNA.

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Developing the Young Workforce – “I can” statements

The following statements are supported through EBSOC’s workshops:

- ‘I can demonstrate and apply the skills I have learnt across the curriculum in relation to the world of work.’
- ‘I can demonstrate diverse thinking when exploring learning opportunities and pathways.’
- ‘I can investigate and assess ethical issues in business and trade decisions.’



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