Internal Assessment Resource

Achievement Standard Agricultural and Horticultural Science 91289: Carry out an extended practical agricultural or horticultural investigation

Resource reference: Agricultural and Horticultural Science 2.1B

Resource title: "Which Mulch is Best"?

Credits: 4

Achievement	Achievement with Merit	Achievement with Excellence
Carry out an extended practical agricultural or horticultural investigation.	Carry out an in-depth extended practical agricultural or horticultural investigation.	Carry out a comprehensive extended practical agricultural or horticultural investigation.

Student instructions

Introduction

This assessment activity requires you to carry out an extended practical investigation to determine the effect of different mulches on soil water retention and produce a report on the findings of your investigation.

The Task

- You are to plan an investigation into the **effect of different mulches on the water loss from a soil** over a 14 day period.
- **Choose four different mulches that are commonly used.**
- **You are then to plan and carry out the investigation in which you are to collect appropriate data to determine which mulch is the best at preventing water loss..**
- Process the data and present it in a written report in which you relate your findings to your initial prediction. Draw conclusions and critically evaluate your investigation.

With supervision means that your teacher gives you guidelines for the investigation such as the context for the investigation, equipment available or chemicals to use. You then design, complete and report on the investigation using the guidelines provided. Supervision may include teacher discussion with you in order to clarify ideas.

Conditions:
Plan
- You will work alone. You will be allowed one period to plan your investigation.
- You must hand in your plan for checking before you can carry out the investigation.
- You will be allowed one period to write up your final plan and to set up the investigation.

Investigation
- You will be individually responsible for ensuring that you measure and record in a retrievable / systematic form, accurate, relevant information.
- Class time will be allowed to plan, setup and collect the data.
- You must hand in a named copy of the initial recorded data at 7 and 14 days.

Report
- You will work alone, either at school or at home
- Your final written report must be in your own words, completed in class.

Task

Develop your plan

State the **purpose** of your investigation. This may be an aim, testable question, prediction or hypothesis based on a scientific idea.

Develop your method

Design a workable method that is a fair test and will give valid results to test the aim, selecting and using a method of measurement which will give valid data.

Write the steps you will take to carry out your investigation. In these steps you should:

- State what factor you will change **(*independent variable*)**
- Explain what you will measure and how you will measure it and what units you will use **(*dependent variable*)**
- Describe the factors you will keep the same **(*controlled variable)***
- Describe how you will repeat the experiment to ensure the results are **valid**
- **Explain** how you will **collect** and **process** your information.

Check your method with your teacher before proceeding.

Collect, record and process information/results

Conduct the investigation and monitor the plants regularly over a period of time.

Record and process the data to show any trend or pattern.

To do this you will need to:

- follow the method you have designed, or adapt it if necessary
- record any changes you needed to make, with reasons for the changes
- record your results in a table as you collect them
- process your results to help you reach conclusions which can be linked to your aim. This may be using calculations (e.g. averages) and then using a method (e.g. graphs) to make your results show a trend or pattern.

Interpret the information and present your report

Make conclusions based on the data, linking them to the purpose of the investigation.

Identify and include relevant findings from another source.

Discuss the biological ideas relating to the investigation that is based on the student's findings and those from other source(s).

Evaluate the method of the investigation, discussing how successfully it produced valid data to support a conclusion.

To do this you will need to:

- describe the trend or pattern (or absence) shown in the processed data
- explain how the trend or pattern of your data helps you answer the problem described in the purpose of your investigation
- evaluate how successfully your method provided valid data that enabled you to reliably relate the data to the aim. When you evaluate your method, consider:
  - the method you used and how and why it could be improved *or* how and why it produced valid data
  - whether the data you gained was useful in answering the purpose of the investigation and what other data would have helped you reach a conclusion

– why the mulches gave the data gained in the investigation. This should include a reference to how mulches effect soil water retention and how the *plant processes* which occur in *leaves* might effect production.

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The table below shows the requirements of the report for each achievement level.

Achievement	Merit	Excellence

Design includes:
• *a statement of purpose* which may include: aim, testable question, prediction or hypothesis based on a scientific idea
• *a method that describes:*
  • for a fair test: the independent variable and it's range, the measurement of the dependent variable and control of some other variables
  • for pattern seeking: the data will be collected, the range of data / samples and consideration of other factors.
	Design includes:
	• *a statement of purpose* which may include: aim, testable question, prediction or hypothesis based on a scientific idea
	• *a method that describes:*
	  • for a fair test: a valid range for the independent variable, the valid measurement of the dependent variable and control of other variables
	  • for pattern seeking: collection of valid data with consideration of factors such as sampling bias or sources of error
		Design includes:
		• *a statement of purpose* which may include: aim, testable question, prediction or hypothesis based on a scientific idea
		• *a method that describes:*
		  • for a fair test: a valid range for the independent variable, the valid measurement of the dependent variable and control of other variables
		  • for pattern seeking: collection of valid data with consideration of factors such as sampling bias or sources of error

Recording and processing includes: • *recording data over the* length of the investigation • processing the data	**Recording and processing includes:** • Collected sufficient and reliable data, ignoring extremes, recorded repeats to confirm the accuracy of the data in an appropriate format • Processed information using averages and/or graphs which will enable a trend or pattern (or absence) to be determined.	**Recording and processing includes:** • Collected sufficient and reliable data, ignoring extremes, recorded repeats to confirm the accuracy of the data in an appropriate format • Processed information using averages and/or graphs which will enable a trend or pattern (or absence) to be determined.
Interpreted information from the investigation: • A valid conclusion made based on the processed data	**Interpreted information from the investigation:** • A valid conclusion made based on the processed data that links to the purpose of the investigation.	**Interpreted information from the investigation:** • A valid conclusion made based on the processed data that links to the purpose of the investigation • Justify the conclusion in terms of the method used. The justification will involve, where relevant, consideration of the reliability of the data, validity of the method and agricultural or horticultural ideas.

THE INVESTIGATION PROCESS:

STAGE 1: Preliminary planning (one period)
After carrying out preliminary research and following your teacher's guidelines formulate how you will carry out the investigation. Your teacher may want to discuss with you certain aspects of what you have written to clarify your method. This stage will not be marked but is necessary to ensure that you are on the right track before starting the investigation.

STAGE 2: Carrying out the Investigation
After receiving back your plan you should incorporate any suggestions that your teacher has made when writing your final plan.
Carry out the investigation plan.
Record the data as outlined in your plan in a logbook along with any relevant observations.
Your data should be recorded in a retrievable / systematic format, i.e. in a table.
Record any alterations you make to your original plan in the light of carrying out your investigation.
Your teacher will check your progress every few days.
The practical aspects of the investigation should be completed within 14 days.

STAGE 3 Processing and presenting data

Organise, process and present the data in an appropriate manner to reflect the purpose of the investigation and to enable any trend or pattern (or absence) will be shown.

STAGE 4: Interpreting and reporting

Present a report in which you, independently:

- Interpret the collected data and report on the findings, drawing a valid conclusion in relation to the prediction/hypothesis.
- Link observations to the growth of chickens.
- Evaluate the investigation by justifying the conclusions in terms of the method that you used. This could be in terms of:
    - the reliability of data,
    - validity of your method, and
    - **links to agricultural concepts or ideas.**

Check the requirements of the standard. It is **essential that you cover all requirements in your written report in order to achieve at the excellence level.**

Your teacher suggests that you use the checklist of the achievement standard requirements when writing your report. It is also suggested that you follow the order in which the checklist is presented. To help you concentrate on the requirements a checklist has been produced on the single page that follows.

CHECKLIST

- Purpose or Prediction or Hypothesis for the investigation:
- List the equipment used
- Describe the dependant variable and how it is measured/observed
- Describe the independent variable (the factor that is changed) and give at least 3 valid values.
- Describe the variables that must be controlled **and** how you controlled them
- Actions taken to increase the validity and reliability of the method **and/or** data collected. Include any changes to the method used.
- Describe the method used and record any alterations you make to your original plan in the light of carrying out your investigation. Include photographs.
- Present the collected data as along with any relevant observations in a systematic format, i.e. in a labelled table.
- Process relevant data by mathematical calculations and graphical presentation and present the data in an appropriate manner to reflect the purpose of the investigation and to enable any trend or pattern (or absence) to be shown.
- Present a valid conclusion made based on the processed data that **links** to the Purpose/ Prediction/Hypothesis of the investigation.
- Evaluation of the investigation by justifying the method used to allow for a valid conclusion to be made. This could be in terms of:
- the reliability of data and
- validity of your method, **(would you get accurate data and the same result if you repeated this investigation at another time?)** and
- **links to agricultural concepts or ideas. This will involve some research to find other**