**Enterprise management – animal production**

***The effect of feeding methods on the growth rate of Barramundi in aquaculture systems***

Scientists are increasingly required to develop new strategies and technologies to help farmers manage our resources for sustainable food production. World fish stocks are declining and so intensive aquaculture systems will be vital in the coming decades to help meet the global challenge of feeding the world’s increasing population. One fish species farmed using intensive aquaculture systems is barramundi.

Barramundi are fed using a pre prepared pellet feed of 55% protein .The pellets can be 2, 4, or 8 mm in diameter. Improved growth rates of barramundi are correlated to better consumption rates of food pellets. Several factors may influence consumption rate. They include size of pellet, type of pellet – floating or sinking, size of tank, and the feeding regime. In this task students design an experiment to test the effectiveness of one factor on growth rates of barramundi fingerlings.

**Part A: Experimental Design**

Students work individually to design an experimental procedure to investigate the effect of one factor on the growth rates in barramundi raised in an aquaculture system. In order to decide on which factor to test and determine the most appropriate method for the exploration, students research barramundi farming methods and feeding methods and investigate the resources available.

The design proposal includes:

* a summary of the student’s research and why the factor for investigation has been chosen
* an investigable hypothesis
* the dependent and independent variables
* factors that should be held constant and explain why and how they will attempt to control these factors
* factors that may not be able to be controlled
* a list of materials required
* a procedure outlining the steps to be taken to test the hypothesis
* how the data will be displayed and analysed
* how safety and/or ethical risks will be managed

The design is submitted to the teacher for assessment.

**Part B: Investigation**

Students work together on each investigation and in the process of collection of data, but each student should record their own data. The investigation phase takes four weeks.

**Part C: Report**

Each student writes an individual report, to be submitted two days after the experiment is completed, using the following headings:

**Introduction** –relevant agricultural concepts, the hypothesis and variables

**Results** – presentation of data and observations in a table and graph

**Discussion** –analysis of results, linking results to concepts and identifying trends, evaluation of procedures and data, identifying sources of uncertainty that may affect the data

**Conclusion** – a statement relating to the hypothesis and recommendations, with justification, for improved commercial aquaculture production.

**Assessment Conditions for this task**

Part A – Two lessons supervised in class.

Part B – A maximum of 4 weeks to undertake the practical in pairs.

Part C – Each student to complete a practical report at home. Completed two days after the completion of experimental phase

Word Count\*: maximum of 1000 words or 6 minutes for an oral presentation for the introduction, discussion and conclusion sections of the report.

\*The materials/apparatus, method/procedure outlining steps to be taken, identification and management of safety and/or ethical risks, and results sections are excluded from the word count.

**Performance Standards for Stage 1 Agriculture**

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|  | | **A** | **B** | **C** | **D** | **E** |
| **Investigation, Analysis and Evaluation** | **1**  **2**  **3**  **4** | Designs a logical, coherent, and detailed agricultural investigation.  Obtains records, and represents data, using appropriate conventions and formats accurately and highly effectively.  Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.  Critically and logically evaluates procedures and their effects on data. | Designs a well-considered and clear agricultural investigation.  Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.  Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.  Logically evaluates procedures and their effects on data. | Designs a considered and generally clear agricultural investigation.  Obtains, records, and represents data, using generally appropriate conventions and formats with some errors but generally accurately and effectively.  Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.  Evaluates procedures and some of their effects on data. | Prepares the outline of an agricultural investigation.  Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.  Describes data and undertakes some basic interpretation to formulate a basic conclusion.  Attempts to evaluate procedures or suggest an effect on data. | Identifies a simple procedure for an agricultural investigation.  Attempts to record and represent some data, with limited accuracy or effectiveness.  Attempts to describe results and/or interpret data to formulate a basic conclusion.  Acknowledges that procedures affect data. |
| **Knowledge and Application** | **1**  **2**  **3**  **4** | Demonstrates deep and broad knowledge and understanding of a range of agricultural concepts and practices.  Develops and applies agricultural concepts, skills, and practices highly effectively in new and familiar contexts.  Critically explores and understands in depth the interaction between agricultural science and society.  Communicates knowledge and understanding of agriculture coherently with highly effective use of appropriate terms, conventions and representations. | Demonstrates some depth and breadth of knowledge and understanding of a range of agricultural concepts and practices.  Develops and applies agricultural concepts, skills, and practices mostly effectively in new and familiar contexts.  Logically explores and understands in some depth the interaction between agricultural science and society.  Communicates knowledge and understanding of agriculture mostly coherently with effective use of appropriate terms, conventions, and representations. | Demonstrates knowledge and understanding of a general range of agricultural concepts and practices.  Develops and applies agricultural concepts, skills, and practices generally effectively in new or familiar contexts.  Explores and understands aspects of the interaction between agricultural science and society.  Communicates knowledge and understanding of agriculture generally effectively using some appropriate terms, conventions, and representations. | Demonstrates some basic knowledge and partial understanding of agricultural concepts and practices.  Develops and applies basic agricultural concepts, skills, and practices in familiar contexts.  Partially explores and recognises aspects of the interaction between agricultural science and society  Communicates basic information about agriculture, using some appropriate terms, conventions, and/or representations. | Demonstrates some limited recognition and awareness of agricultural concepts and practices.  Attempts to develop and apply one or more basic agricultural concepts, skills, and/or practices in familiar contexts.  Attempts to explore and identify an aspect of the interaction between agricultural science and society.  Attempts to communicate information about agriculture. |