**Science & Engineering Fair Research Plan**

**Vertebrate Animal Research**

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| Name  |
| School |
| Category |
| Research Teacher |

**Question or Problem being addressed - Title**

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**Rationale**

Brief synopsis of the background that supports your research problem and explain why this research is important scientifically and if applicable, explain any societal impact of your research.

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**Research Question/Hypothesis/Engineering Goals/Expected Outcomes**

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**Materials List**

List of all items used in research. Make sure to include concentrations of all chemicals, source and amount of all living organisms, and all equipment used.

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**Procedures**

Detail all procedures and experimental design to be used for data collection (see Research Plan/Project Summary Instructions, ISEF Rules and Guidelines, page 31). See pages 7-23 of the ISEF Rules and Guidelines for specific inclusions involving Human subjects, vertebrate animal, potentially hazardous biological agents, and/or hazardous chemicals, activities or devices. **Make sure to clarify which procedures were completed by the researcher and which were completed by others**.

**Vertebrate animal research**: Procedure must include the following items!

* **Describe potential ALTERNATIVES to vertebrate animal use and present a detailed justification for use of vertebrate animals.**

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* Explain potential impact or contribution this research may have to science.

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* Include **methods used to minimize potential discomfort**, distress, pain and injury to the animals during experimentation.

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* Detail chemical concentrations and drug dosages (if applicable).

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* **Animal species (common and scientific name)**

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* **Detail animal numbers, strain, sex, age, source, etc.**

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* Describe housing and oversight of daily care and **disposition of animals during the study**.

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* Describe in detail the **disposition of animals at the termination of the study**.

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* **Complete a Mortality Form** after experimentation has ended**.**

**Potentially Hazardous Biological Agents**: Procedure must include the following items!

* Describe **Biosafety Level Assessment process and resultant BSL determination**.
* Complete appropriate Biosafety Form. **Include source of agent, source of specific cell line**, etc.
* **Detail** safety precautions and **specify methods of disposal**.

**Hazardous Chemicals, Activities & Devices**: Procedure must include the following items!

* **Describe Risk Assessment process.**
* **Detail chemical concentrations and drug dosages.**
* **Describe safety precautions and procedures to minimize risk.**
* **Specify methods of disposal.**

**Procedures (Research Methods)**

Description in detail of method/procedures, risk and safety, and proper disposal if needed. See statements above for more information.

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**Data Analysis**

Describe the procedures you will use to **analyze the data** that answer research question, hypothesis, or engineering goals.

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**Bibliography**

List at least five (5) major references (e.g. science journal articles, books, internet sites) from your literature review. Please use a **variety of sources**, five sources from the internet will not suffice.

* If you plan to use **vertebrate animals**, one of these references must be an animal care reference.
* If you plan on using **human subjects**, one of these references must be from the listing of human subject reference in the ISEF Rules and Guidelines.
* Include MSDS/SDS citation for all **hazardous chemicals** used in experimentation.
* If you plan on using **PHBA**s, one of the references must include aseptic technique.