Production of the equine influenza vaccine using a baculovirus expression system in insect cell lines
Part IV: Sustainability analysis and future improvements

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**GLOBAL OBJECTIVE**

Design of an industrial bioprocess plant with the simulator SuperPro Designer for the production of the equine influenza vaccine using a baculovirus expression system in insect cell lines, and subsequent analysis of its sustainability.

### Executive Summary

- **Total Capital Investment**: $92,377,000
- **Operating Costs**: $37,045,000
- **Revenues**: $80,495,000
- **Benefits**: $43,450,000
- **Unit Production Cost**: 4.60 $/Entity
- **Unit Production Revenue**: 10 $/Entity
- **Payback Time**: 5 years
- **IRR**: 27.58%

**NPV (7%)**: $138,762,000

**Cost-effective Process**

- **High initial investment**
- **Short period recovery**: 3.08 years from the production start time
- **Adjustable market price**

### Total Capital Investment

- **Direct Fixed Capital**: 2%
- **Startup Cost**: 10%
- **Royalties**: 13%
- **Up-Front R&D**: 45%

### Operating Costs

- **Raw Materials**: 21%
- **Facility-Dependent**: 4%
- **Miscellaneous**: 1%
- **Labor-Dependent**: 1%
- **Laboratory, Consumables, Waste Treatment & Utilities**: 79%

### Environmentally Sustainable Process

- **Horses health improved**
- **Innovation in the existing production system**
- **Strong acceptance among the society**
- **Optimal security measures and process automation**
- **Quality work respecting international standards**
- **Active competition among operators and high salary**
- **GMP product**

### Socially Acceptable Process

- **Multi-process industry**

### Use of a pFastBac™Dual expression vector

- **Simultaneous expression of 2 proteins of interest thanks to**:
  - 2 strong promoters in opposite direction (p10 and polyhedrin)
  - 2 multiple cloning sites for large inserts

### References