



# Corn Gluten Feed shelf-life Extension

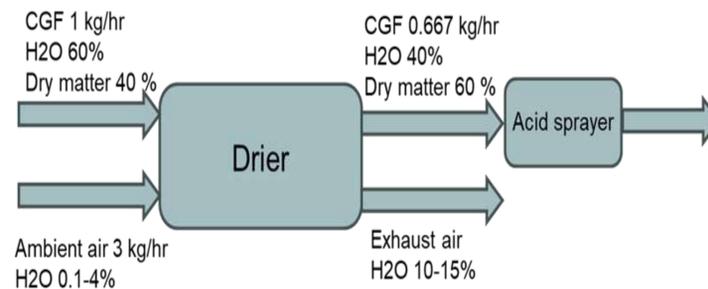
## TEAM 130

### Background

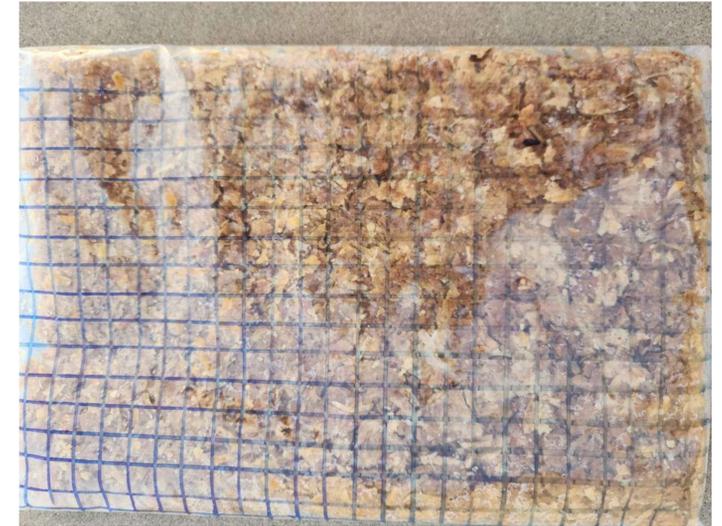
- Corn is processed by milling and refining to produce various products.
- Corn gluten feed (CGF) is a co-product from corn milling process. It is commonly used as feed due to its cheap price and great nutritional value.
- CGF spoils very quickly because of its high moisture content and the presence of some residual starch. For this reason, great quantities of CGF are wasted



### Prototype design



### Mold growth study



### Mathematical Modeling Equations

Component balance (DM):

$$m_{CGF,f} = \frac{x_{DM,i} m_{CGF,i}}{x_{DM,f}}$$

Component balance (water):

$$x_{H2O,i} m_{CGF,i} + x_{Humidity,i} m_{air} = x_{H2O,f} m_{CGF,f} + x_{Humidity,f} m_{air}$$

$$Q_{air} = 3.029 \times 1.006 \times (50 - 25) \div 60^2 = 0.0212 \text{ kJ/hr}$$

$$Cost = 0.0212 \times 1 \times 0.2 = 0.00424 \text{ SAR/hr}$$

### Constraints

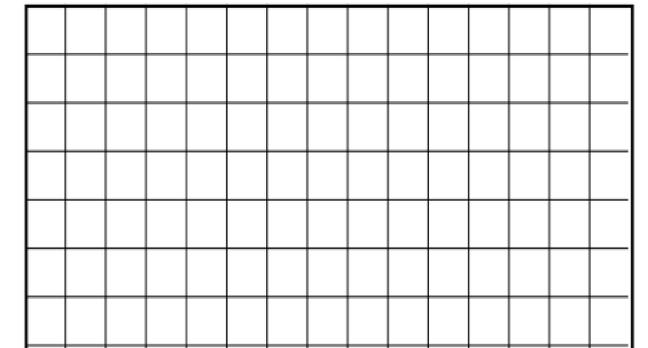
- Higher levels of acid may alter the taste
- Prolonged exposure to acid may affect the stability of certain nutrients.
- The inlet air condition.
- The water content in corn gluten feed is about 50-70% of its weight.

### Specification

- The prototype processes 1 kg/hr of WCGF.
- The process prolongs CGF life for at least 2 weeks.
- The cost of CGF preserved should be no more than 20-50% of the market price of wet CGF.

### Metric Area Grid Template

This 15 x 20 cm gridded sheet can be used to make transparencies, which can be placed on any object and used to measure how many square centimeters the object contains.



Mold Surface Area  
(cm<sup>2</sup>)

Time  
(Day)