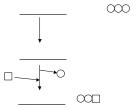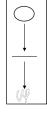## A Problem

- Your lipase-producing strain grows slowly in a small-scale fermenter.
- Yield of lipase, a primary metabolite, is low.
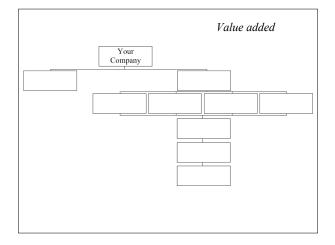- How can you improve the yield?

Objectives

1. Compare and contrast each of the following pairs:
   a. Natural selection and artificial selection
   b. Selective breeding and recombinant DNA
2. Explain how each of the following is used to improve a product: selection; high-throughput screening; enrichment; mutation; directed evolution.
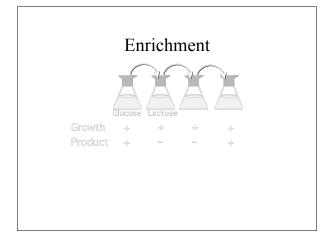3. Describe the process of making rDNA using a plasmid vector.

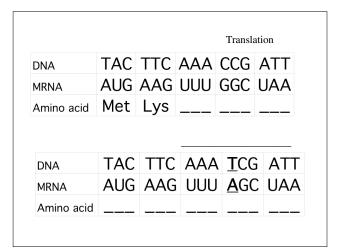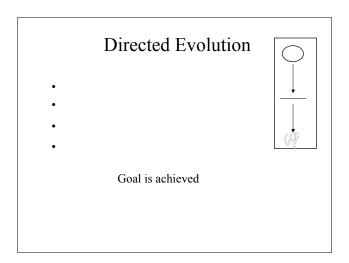## Semi-synthetic products

Value added

Your Company

Enrichment

Glucose   Lactose

Growth	+	+	+	+
Product	+	−	−	+

Evolution

Natural Selection

-
-
-

Artificial Selection

-
-
-
-

Translation

DNA	TAC	TTC	AAA	CCG	ATT
MRNA	AUG	AAG	UUU	GGC	UAA
Amino acid	Met	Lys	___	___	___

_____

DNA	TAC	TTC	AAA	TCG	ATT
MRNA	AUG	AAG	UUU	AGC	UAA
Amino acid	___	___	___	___	___

Directed Evolution

-
-
-
-

Goal is achieved

Selection & Screening
- Select strains
-
-
-
-
-
-
-
-
- Select mutants
                …

Scale-up