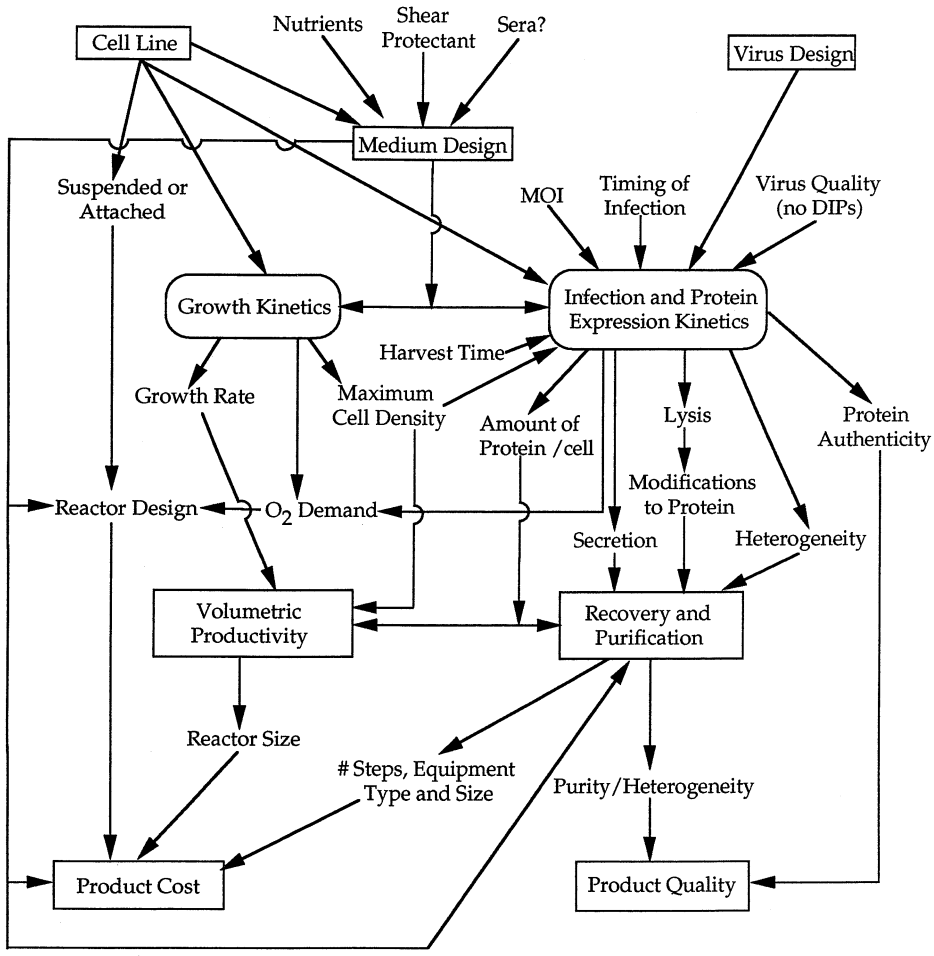

Figure 14.2. Holistic perspective on heterologous protein production with the baculovirus expression system.

are engineered to express the protein and release it into specific fluids, such as milk or urine. High concentrations of complex proteins can be achieved, and such approaches can be cost effective for complex proteins. In these cases the role for the bioprocess engineer is in protein recovery and purification, although significant issues exist for agricultural engineers and animal scientists in devising appropriate systems to obtain the protein-containing fluid (e.g., pig milking stations). While transgenic animals can be developed from many mammals, sheep, goats, and pigs are the primary species used commercially.

There are significant limitations on this technology. In some cases, the protein of interest will cause adverse health problems in the producing animal. The use of animals raises safety concerns with respect to virus or prion transmission. The process to generate and screen for high-producing animals is inefficient and costly (e.g., $100,000 for a goat and $500,000 for a cow). Perhaps surprisingly, not all of the complex posttranslational