

Generically Manipulated Chickens as Animal Bioreactor. K. NISHIJIMA, H. Kaneoka, and S. Iijima. Department of Biotechnology, Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8603, JAPAN. Email: nishijma@nubio.nagoya-u.ac.jp

Generically manipulated chickens as animal bioreactor

K. Nishijima, H. Kaneoka, S. Iijima

*Department of Biotechnology, Graduate School of Engineering, Nagoya University,
1 Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8603 Japan*

Farm animals may be used as “transgenic bioreactor” or “pharma animals” if they can produce recombinant proteins into milk (transgenic mammals) or eggs (transgenic birds). In spite of the efficient production of eggs that contain high amount of proteins, establishment and application of avian transgenic technology has been delayed. Using highly concentrated retrovirus vectors, we succeeded in the generation of genetically manipulated chickens that produced various proteins, such as single-chained antibody fused to Fc, model antibody, erythropoietin and TNF receptor fused to Fc, into chicken eggs. While N-glycan structures of recombinant proteins produced into serum were similar to those of human serum proteins, N-glycans of egg white proteins lacked terminal galactose and sialic acids. To overcome this problem, we introduced chicken beta1,4-galactosyltransferase gene under the control of actin promoter. It was revealed that the drastic improvement of galactosylation to native egg white proteins as well as exogenous single-chained antibody/Fc. However, we could not confirm the addition of sialic acids in these chickens, suggesting that further manipulation is necessary to produce recombinant proteins with sialic acids. To this end, putative chicken silyltransferases were cloned and expressed in vitro to examine enzyme activities. These might be helpful tools for modification of glycolsylated proteins.