Consultant Meeting on Irradiated Vaccines and the Control of Animal Diseases

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The meeting will be held from 11th to 13th May 2009 in Vienna, Austria

Vaccination has been one of the greatest achievements of mankind in enabling the eradication of serious, life-threatening diseases of man and his domesticated livestock. Apart from their efficacy in improving animal health and productivity, vaccines can have another significant impact in a society that increasingly demands accountability from the farmer and food processor in relation to the livestock products they market. Regulatory agencies demand a reduction in the residues of veterinary pharmaceuticals in the food chain, and the use of antibiotics, or coccidiostats, has been severely curtailed in production systems in the EU. Additionally, as the vaccinated animals’ well-being is enhanced, the clamorous animal welfare lobby can be more readily appeased where more intensive production methods are employed.

Although there is a major effort in vaccine development strategies that rely on biotechnology, particularly recombinant molecular techniques, there is still considerable interest in attenuated vaccines, including those that employ irradiation as a means of reducing the capacity of the organism to infect the host. Recent findings show that inactivation by irradiation can be more effective than chemical or heat treatment and that irradiated vaccines generate more effective immune responses. Where genetically engineered vaccines have not proven a major success, specifically for diseases like foot-and-mouth disease, fasciolosis and other helminth infections including gut-dwelling nematodes, theileriosis and neosporosis in cattle, this opens the way to reconsidering our approaches to immunisation. The conventional wisdom on the use of irradiated vaccines was that they were impractical, but these views were formed over 20 years ago, and in the intervening period our knowledge of the immunological processes in host-pathogen relationships, vaccine delivery as well as the actual attenuation requirements has undergone considerable refinement, so that now is a good time to re-evaluate their potential. We need to focus our attention on specific issues and our approach will be driven by the needs of our Member States (MS) in their goal to control major infectious transboundary diseases where there are no vaccines available, or where the vaccines are problematic such as Rift Valley Fever, Contagious Bovine Pleuropneumonia, animal trypanosomoses and gastrointestinal helminths.

Historically, treatment and control of diseases caused by animal parasites has been maintained by the use of chemotherapeutic drugs. They are cheap, safe and effective, although of course they need to be constantly administered to ensure animals will thrive. Their greatest drawback has been in the emergence of drug resistance that reduces their efficacy, or prevents their use; vaccination might therefore become a necessary adjunct to chemotherapy to ensure effective control by reducing the incidence of clinical disease, even if eradication is not easily achievable. A number of vaccines based on use of attenuated live parasites that stimulates a protective immune response similar to that produced by the natural infection are being used for a number of parasitic diseases, and it possible that these could be candidates for radiation-attenuation. Strategies for radiation-attenuation have already been adopted for use in
vaccination against *Plasmodium* and *Schistosoma*, and a vaccine against lungworm, *Dictyocaulus* has been available commercially for nearly 50 years.

Our discussions will focus on identifying areas and diseases where an approach to vaccination utilizing radiation-attenuated vaccines will be most suitable. We will use data gathered from the extensive studies on *Plasmodium*, *Schistosoma* and *Dictyocaulus* to provide some insight into why such vaccines are so effective. Some basic work has already been done on a number of other microbial and parasitic diseases, indicating that they are potential candidates for further work and this could be a basis for selection of suitable candidates. However, we have to factor into our discussion the ease with which candidate vaccines can be produced, their suitability for preservation and their shelf-life. We shall also take into consideration the “One-World-One-Health” concept regarding the human-animal disease interface, and discuss innovative approaches to the control of *S. bovis* in humans by developing an irradiated vaccine to protect cattle and buffalo, the reservoir host of this zoonotic disease. The meeting outcomes will stimulate the adoption of new initiatives to vaccination and control of animal diseases and provide recommendations that can be used in the development of new CRP.