The Case for Biorefining SRM Material

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One of the oldest and most enduring challenges to civilization has been the protection of humans and their livestock from infectious diseases. Transmission risks arising from diseased animal carcasses, inedible slaughter materials and odorous rotten food have always alarmed societies, who have responded primarily with burning and burial in order to destroy or remove health risks. The medieval practice of cooking these materials to melt and recover the fats for food and fuel evolved into the modern industry of rendering, which developed, in addition to the valuable fat, dehydrated meat and bone meal products for the livestock industry. Meat and bone meal eventually became a major source of protein for the feed industry and a vital source of income for meat processing and rendering industries. The emergence of new highly resistant pathogenic agents which survive the rendering processes, thereby creating potentially infectious meat meal, has led to global regulations banning risk materials from use for animal feed, creating major health, environmental and economic challenges. In addition, new regulations are being implemented internationally regarding banning “catering waste” originating in commercial institutions as animal feed, including the recently announced CFIA proposal (June 16, 2007) banning “edible residual material” as feed for swine and poultry. These regulatory developments are creating massive tonnage of risk materials imposing serious negative costs on the agricultural economy. The societal need for innovative technologies to provide solutions which are alternatives to destructive incineration and burial, and offer long term economic solutions, is the focus of thermal hydrolysis bio-refining.

The Biorefinex thermal hydrolysis process, employing high temperature and high pressure technology, has been validated for the destruction of all microbiological pathogens in Canada, has been approved by the European Commission for the processing of all Category 2 materials (farm dead-stock) and Category 3 inedible materials from packing plants, and has been approved by the CFIA as a destructive process for the processing of SRM’s, without any restrictions on further use. In addition, the OIE has maintained an Ad Hoc Group on Carcass Disposal, and has expressed serious interest in the Biorefinex process as a technology that would be very beneficial for the international community. Final validation of complete destruction of prions using a mouse bioassay model is nearing completion at the Roslin Institute in Edinburgh, Scotland. Of the CFIA approved methods for destruction and disposal (incineration, cement kiln incineration, alkaline hydrolysis, thermal hydrolysis, landfill) only thermal hydrolysis contributes to a sustainable environment. Thermal hydrolysis can produce safe and valuable organic nutrients that can be recycled. Pollution of air (incineration), land (landfills) and water (chemical leachates) is avoided. In addition, greenhouse gas emissions are reduced (methane) and noxious odours, both from landfills, are eliminated.

Thermal hydrolysis followed by fractionation can result in the development of a wide range of nutrient products. Some fractions can be used as feedstock for anaerobic digestion and methane biogas production. The methane can be used directly for co-generation of green power or as a biofuel for hot water and steam boilers. As a replacement for fossil fuels, this product will also generate economic value from marketable carbon credits, now being introduced by the Government of Alberta, and announced by the Government of Canada. Other fractions can be used in the development of liquid and solid organic fertilizers for food crops. Canada has now joined 40 other countries with national organic food regulations (CFIA - Dec 22, 2006), which creates a need for consistent quality organic fertilizers. Output

materials from thermal hydrolysis, such as hydrolyzed amino acids and bone, meet the criteria for approved substances, which can be used in certified organic crop production markets. A cost-effective organic liquid fertilizer can be used in organic hydroponic greenhouse and viniculture operations. In addition, output materials include natural alternatives to the increasingly expensive synthetic chemical fertilizers for turf grass applications, for sport, recreation and park areas. Limits on chemical fertilizers due to negative environmental impacts on water sheds and soil health, is creating new turf grass market opportunities, especially in applications such as golf courses.

Finally, nutrient fractions have the potential to be used for soil reclamation and remediation of contaminated soils. The large industrial energy projects in Alberta, both at the tar sands and the traditional thermal coal fields, have major mandated soil reclamation requirements. This creates a need for nutrients to accelerate restoration of the land. In addition, the conventional oil and gas sectors have continuing remediation activities requiring organic nutrients. Preliminary testing has indicated the hydrolyzed carcass materials have excellent potential to replace imported products such as Milorganite, dehydrated sewage sludge from the United States.

Continuing destruction and depletion of any organic nutrients from the biosphere is environmental folly. Canada has an opportunity to provide world leadership in transforming negative cost and inedible organic materials, including SRM's, into many new safe, valuable and desirable commercial and industrial products, emulating past decades of research support for creating value-added meat products from the edible portions of the carcass. This international credibility would increase the stature of our meat processing industry, and provide the OIE nations a pool of scientists and engineers to help other countries who are all facing similar problems disposing of growing volumes of carcasses and other animal by-products. The development of this technology would also position Canada to take advantage of the environmental technology export industry in response to the growing international demand for "green" environmental innovations. The Biorefinex thermal hydrolysis process, which is patented in all major industrial countries, is based on Canadian world expertise in pressure vessel and refining technology derived from the oil and gas industries. With private and public sector support, Canada could now provide commercial turnkey bio-refineries throughout the world, contributing an innovative solution to this long standing health and environmental challenge.

[1]Biosphere Technologies Ltd. holds the patent for the Biorefinex technology and has been operating and conducting proprietary research on a variety of organic materials from a pilot plant located in Ponoka, Alberta since 1990. Biosphere Technologies Ltd. will expand their operations in 2008, completing construction on the first commercial scale thermal hydrolysis and fractionation facilities dedicated to SRM materials. For further information, please contact Dr. Erick Schmidt at (403) 704-3493.