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Effective disposal and utilization of meat industry byproducts

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India is bestowed with vast livestock wealth and it is growing at the rate of 6% per annum. The contribution of livestock industry including poultry and fish is increasing substantially in GDP of country which accounts for >40% of total agricultural sector and >12% of GDP. This contribution would have been much greater had the animal byproducts been also efficiently utilized. Efficient utilization of by-products has direct impact on the economy and environmental pollution of the country. Non-utilization or underutilization of by-products not only lead to loss of potential revenues but also lead to the added and increasing cost of disposal of these products. Non-utilization of animal by-products in a proper way may create major aesthetic and catastrophic health problems. Besides pollution and hazard aspects, in many cases meat, poultry and fish processing wastes have a potential for recycling raw materials or for conversion into useful products of higher value. Traditions, culture and religion are often important when a meat byproduct is being utilized for food. Regulatory requirements are also important because many countries restrict the use of meat byproducts for reasons of food safety and quality. Byproducts such as blood, liver, lung, kidney, brains, spleen and tripe have good nutritive value. Waste products from the meat processing industries must be efficiently dealt with as the growth of these industries depends largely on waste management. Treated fish waste has found many applications among with which the most important are animal feed, biodiesel/biogas, dietetic products (chitosan) and cosmetics (collagen).

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Leptospirosis vaccines: Current view

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Leptospirosis has in recent years emerged as one of the priority diseases in the country as it is responsible for substantial economic losses to the farmers as a result of various reproductive disorders it causes in animals such as abortions, still birth and repeat breeding including mastitis and agalactia. Research on the development of a suitable vaccine for control of the disease has continued since last 50 years with mixed findings. Presently we have inactivated whole cell vaccines which comprise of one or preferably several *Leptospira* serovars with or without adjuvant to provide a broad range of immunity. Selection of serovars in preparing these vaccines depends on the prevalence of the serovars in the target area or animal population. Repeated vaccinations are required to generate protective immunity in animals which may not last for more than 6 months. A few such multivalent killed commercial vaccines are currently in use in countries such as USA, Australia, New Zealand and UK. Due to short lived immunity generated by these vaccines, development of live vaccines was attempted using highly prevalent serovars, Pomona and *icterohaemorrhagiae.* Though these vaccines generated higher level of immunity in animals, however, the problem of maintenance of the vaccine strains and reversion to the virulent form have been the constraints in their wider acceptability. Subunit vaccines prepared from surface proteins separated from outer cell membrane have been a much accepted option. A few protein sub units targeted for such studies are 39 kDa, Omp L1, Lip41, LipL32 and Lig proteins. Efforts on the expression of some of these proteins for vaccination have been partly successful. Latest approaches for vaccination include use of DNA construct using flaB2 gene and outer membrane protein genes of serovar Lai and Hap1/LipL32 gene of serovar *autumnalis* or Grippotyphosa. Studies on the improvements in the existing vaccines and development of new generation vaccines are continuing.

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