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Disposal of Dead Production Animals

1988 - 2006

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Introduction

Methods and processes of dealing with dead animals have always been and continue to be a concern in all animal production operations both large and small, slaughter plants, wildlife managers, and other facilities that have animals. In addition to production systems, recent epidemics of exotic New Castle disease in the US, bovine spongiform encephalopathy (mad cow disease) in Europe and in elk in the US, and foot and mouth disease in the United Kingdom and other parts of the world have raised many questions regarding the proper disposal of domestic and wild animals to control animal and human disease epidemics. Carcass disposal is also a concern when there are major disease outbreaks that affect only wildlife. Road kills and injured animals can also create carcass disposal problems. Proper disposal methods/systems are especially important due to the potential for disease transfer to humans and other animals, and the pollution of soil, air and ground water.

The reported research in this document mainly addresses the disposal of cattle, swine, poultry, sheep, goats, fish, and wild birds. Some of the concerns are pathogen control, pollution control, recycling of nutrients, feed potential, etc.

It was with the above concerns in mind, that the following bibliographic resource of scientific information has been compiled. The information is from a variety of sources and covers the dates 1988 to the present.

How To Use This Document

The document is a list consisting mostly of scientific articles, books, and conference proceedings. The listing is organized by year and alphabetical by author within the year. Most of the papers are in English, but foreign language papers are also referenced. An attempt has been made to provide a translated title for foreign titles. If an English summary is available, that is noted in a "Notes" statement.

Many of the referenced papers are available from the National Agricultural Library. In those instances, an NAL call number is listed with the bibliographic citation. Information on document delivery is available at <http://www.nal.usda.gov/borrow-materials>

I hope that the reader will find the information useful. However if there are important papers that are missing from the document, please feel free to contact us at <http://awic.nal.usda.gov/contact-us>

2006

Bendfeldt, E.S.; Peer, R.W.; Flory, G.A. **In-house composting as a rapid response to avian influenza.** *BioCycle*. 2006; 47 (5): 38-42. ISSN: 0276-5055.

NAL Call No.: 57.8 C734

Descriptors: all birds and bird types, State of Virginia experiences with low-pathogenic avian influenza, 1984-85 and 2002, poultry house structure, in-house composting, preferred and most acceptable method, disease containment, carcass disposal, economics, logistics, poultry manure, waste utilization, poultry litter, Virginia.

Chen, Ten-Hong; Huang, Jiun-Lin. **Anaerobic treatment of poultry mortality in a temperature-phased leachbed-UASB system.** *Bioresource Technology* (England). Aug 2006; 97 (12): 1398-410. ISSN: 0960-8524.

NAL Call No.: TD930.A32

Abstract: Anaerobic digestion has been proposed as an alternative to the conventional disposal methods of burial, incineration, rendering and aerobic composting. A temperature-phased system consisting of one UASB (at 55 degrees C) and three leach-bed reactors (at ambient temperatures) was tested for its efficiencies in treating poultry mortality.

The thermophilic UASB was difficult to start-up. It also showed signs of inhibited methanogenesis. Chemical parameters such as long chain fatty acids, volatile fatty acids and ammonia concentrations were all very high for the thermophilic UASB. Lowering its temperature to 35 degrees C enhanced its stability and improved its performances. Lowering the pH of the 55 degrees C UASB also improved its chemical oxygen demand (COD) reduction efficiency as well as its methane production rate. The results were compared to that of another similar system where the UASB reactor was maintained at 35 degrees C instead of at 55 degrees C.

Descriptors: poultry mortalities, anaerobic digestion system, temperature phased process of a UASB, leach bed reactors, efficiency, pH levels, bioreactors, waste disposal.

Taylor, S. **Emergency on-farm slaughter of animals within the OTMS and OCDS.** *Veterinary Record.* 2006; 158 (1): 31. ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Descriptors: cattle, on the farm slaughter, livestock, emergency carcass disposal, food safety, guidelines and regulations, Europe.

Versfeld, M.J. **Avian influenza - the role of the veterinarian.** *Pluimvee Poultry Bulletin.* February 2006; 54. ISSN: 0257-201X.

Descriptors: infected poultry, avian influenza, serological surveys, disease surveys, disease control, disease surveys, biosecurity concerns, carcass disposal, hygiene, sanitation, role of veterinarians.

Walker, P.M.; Kelley, T.R.; Simmons, R.J.; Wiegand, B.R. **A mobile, spent hen incineration unit.** *Zootecnica International.* 2006; (1): 22-28. ISSN: 0392-0593.

NAL Call No.: SF600.Z6

Descriptors: poultry industry, spent hens, carcass disposal, tissues, infection materials, rendering and other wastes, mobile incineration unit project, propane fueled, modified air-curtain technology, minimizes workers and environmental risks.

2005

Boschetti, A. **Polizze assicurative in studio per gli allevamenti zootecnici. [Insurance policies in studies of animal husbandry.]** *Informatore Agrario.* 2005; 61 (13): 39-41. ISSN: 0020-0689. Note: In Italian.

NAL Call No.: S469.I8V47

Descriptors: dairy cattle, buffalo, beef cattle, compensation payments, animal husbandry, forces slaughter, reduced profits, costs of carcass disposal, planning eradication of bovine tuberculosis, leucosis, brucellosis, non-assisted policies, repeal or suspension of sanitary status, blockades of movement for infections diseases, ban on marketing animal-based products, Italy.

Bush, J.; Phillimore, P.; Pless-Mulloli, T.; Thompson, C. **Carcass disposal and siting controversy: risk, dialogue and confrontation in the 2001 foot-and-mouth outbreak.** *Local Environment.* 2005; 10 (6): 649-664. ISSN: 1354-9839. Note: Abstract.

Descriptors: foot and mouth disease of 2001, carcass disposal, policy, 6 million animals, public opposition, two ex-mining sites, mass carcass burial sites, northeast England, local liaison committees to manage dialogue, differences between public and authorities, operation of slaughter policy, cursory public consultation, United Kingdom.

Corradini, E. **Quanto costa all'allevatore smaltire le carcasse. [How much does carcass disposal cost the farmer?]** *Rivista di Suinicoltura.* 2005; 46 (9): 26-31. ISSN: 0035-662X. Note: In Italian.

NAL Call No.: 46.8 Su3

Descriptors: pigs, on farm mortalities, carcass disposal, economics, Italy.

DeRouche, J.M.; Harner, J.P.; Murphy, J.P. **Catastrophic mortality composting: is it safe and effective?** *Journal of Applied Poultry Research.* 2005; 14 (2): 414-416. ISSN: 1056-6171.

NAL Call No.: SF481.J68

Descriptors: poultry mortalities, dead animals, carcass disposal, composting, burial, infectious diseases control, public health hazards, water table, frozen soil, soils, biosecurity, biosafety, literature reviews.

Farrell, M. **Composting helps manage avian bird flu outbreak.** *BioCycle*. 2005; 46 (5): 50-54. ISSN: 0276-5055.
NAL Call No.: 57.8 C734

Descriptors: avian influenza, poultry mortalities, carcass disposal, composting process, animal manures, disease outbreaks, waste disposal, waste management, British Columbia, Canada.

Gonzalez, J.L.; Sanchez, M. **Treatment of poultry mortalities on poultry farms.** *Compost Science & Utilization*. 2005; 13 (2): 136-140. ISSN: 1065-657X.

NAL Call No.: TD796.5.C58

Descriptors: poultry, dead animals, poultry carcasses, carcass disposal, cardboard, non-marketable eggs, composting, compost quality.

Griffiths, I. **Postmortem examination of cattle and sheep.** *In Practice*. 2005; 27 (9): 458-463, 465. ISSN: 0263-841X.

NAL Call No.: SF601.I4

Descriptors: cattle, sheep, clinical examination, postmortem changes, carcass disposal, dead animals, disease diagnosis, veterinary equipment, necropsy, United Kingdom.

Jones, W.E. **Dead horse disposal.** *Journal of Equine Veterinary Science*. 2005; 25 (1): 40. ISSN: 0737-0806.

NAL Call No.: SF951.J65

Descriptors: dead horses, carcass disposal.

Kains, F. **Composting dead pigs.** *Advances in Pork Production: Proceedings of the Banff Pork Seminar*. 2005; 16: 269-278. ISSN: 1489-1395. Note: Seminar held January 18-21, 2005.

NAL Call No.: SF391.3.B36

URL: <http://www.afns.ualberta.ca/bps/index.html>

Descriptors: swine, dead animals, carcass disposal, Canada.

Kalbasi, A.; Mukhtar, S.; Hawkins, S.E.; Auvermann, B.W. **Carcass composting for management of farm mortalities: a review.** *Compost Science & Utilization*. 2005; 13 (3): 180-193. ISSN: 1065-657X. Note: In English.

NAL Call No.: TD796.5.C58

Descriptors: carcass disposal, dead animals, livestock mortalities, composting system, meat carcasses, soil pollution, groundwater contamination, literature reviews.

McQuiston, J.H.; Garber, L.P.; Porter-Spalding, B.A.; Hahn, J.W.; Pierson, F.W.; Wainwright, S.H.; Senne, D.A.; Brignole, T.J.; Akey, B.L.; Holt, T.J. **Evaluation of risk factors for the spread of low pathogenicity H7N2 avian influenza virus among commercial poultry farms.** *Journal of the American Veterinary Medical Association*. 2005; 226 (5): 767-772. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: poultry mortalities, disposal methods, prevention of disease, risk factors, commercial farms, low pathogenic avian flu virus.

Pozio, Edoardo; Owen, Ifor L.; Marucci, Gianluca; La Rosa, Giuseppe. **Inappropriate feeding practice favors the transmission of *Trichinella papuae* from wild pigs to saltwater crocodiles in Papua New Guinea.** *Veterinary Parasitology* (Netherlands). Feb 28, 2005; 127 (3-4): 245-251. ISSN: 0304-4017.

NAL Call No.: SF810.V4

Abstract: The recent discovery of *Trichinella zimbabwensis* in farmed crocodiles (*Crocodilus niloticus*) of Zimbabwe and its ability to infect mammals, and the development of both *T. zimbabwensis* and *Trichinella papuae* in experimentally infected reptiles led to an investigation of *Trichinella* infection in saltwater crocodiles (*Crocodylus*

porosus) and in wild pigs (*Sus scrofa*) of Papua New Guinea, to see if *T. papuae* also, is present in both cold- and warm-blooded animals. Of 222 crocodiles examined, 47 animals (21.2%), all from Kikori, Gulf Province, were positive for non-encapsulated larvae in the muscles. The greatest number of larvae was found usually in the biceps, with an average of 7 larvae/g. One isolate from a crocodile infected successfully both laboratory rats and mice. Of 81 wild pigs examined, 9 from Bensbach river area (Western Province) and 1 from Kikori area (Gulf Province) were positive for non-encapsulated larvae in the muscles. *Trichinella* larvae from both saltwater crocodiles and wild pigs have been identified by multiplex-PCR analysis as *T. papuae*. The sequence analysis of the region within the large subunit ribosomal DNA, known as the expansion segment V, has shown the presence of a molecular marker distinguishing *T. papuae* isolates of Bensbach river area from those of Kikori area. This marker could be useful to trace back the geographical origin of the infected animal. The epidemiological investigation carried out in the Kikori area has shown that local people catch young crocodiles in the wild and keep them in holding pens for several months, before sending them to the crocodile farm in Lae (Morobe Province). They feed the crocodiles primarily with wild pig meat bought at the local market and also with fish. These results stress the importance of using artificial digestion for routinely screening of swine and crocodiles, and of adopting measures for preventing the spread of infection, such as the proper disposal of carcasses and the adequate freezing of meat.

Descriptors: alligators, *Crocodilus niloticus*, *Trichinella zimbabwensis*, crocodiles, *Crocodylus porosus*, farmed/captive animals, animal feeds, *Trichinella papuae*, trichinosis, swine parasite, infected swine used as reptile food, cross species parasite transmission and infection, *Sus scrofa*, wild pigs as parasite source, improper handling of carcasses, public health concern, Papua, New Guinea.

Rassow, D. **Contingency planning and simulation exercises for the control of epizootics.** *21st Conference of the OIE Regional Commission for Europe, Avila, Spain, 28 September-1 October 2004. Compendium of Technical Items Presented to the International Committee or to Regional Commissions of the OIE.* 2005; 113-130. ISBN: 92-9044-654-4. Note: In English, French and Russian.

Descriptors: contingency planning, domestic infectious animal diseases, stamping out outbreaks of epizootic diseases, animal welfare, culling, disease prevalence, disease transmission, epidemiology, international cooperation, Office International des Epizooties, outbreaks, simulations, zoonoses, Europe.

United States Department of Agriculture. **Poultry '04. Part I: Reference of Health and Management of Backyard/Small Production Flocks in the United States, 2004.** USDA. APHIS:VS:CEAH NRRC Building B, M.S. 2E7, 2150 Centre Avenue, Fort Collins, CO 80526-8117, USA. August 2005; 85 pp.

Abstract: This report contains information on the management, health and health care, biosecurity, bird movement, carcass and litter disposal, and producer characteristics of backyard/small production flocks in the USA in 2004. Data were collected from owners of backyard flocks in 18 major poultry producing states.

Descriptors: animal health, animal husbandry, animal production, health care, mortality, movement, poultry, United States.

United States. Department of Agriculture. **Poultry '04. Part IV: Reference of Health and Management of Backyard/Small Production Flocks and Gamefowl Breeder Flocks in the United States, 2004.** Dec. 2005; 41 pp.

Abstract: The health and management of backyard/small production flocks and gamefowl breeder flocks in the US. The information was collected from backyard flock producers and gamefowl breeders. The first section discusses general management, health and health care, biosecurity, bird movement, carcass and litter disposal and producer characteristics. The second section explains methods used for data collection and analysis.

Descriptors: gamefowl breeding, game birds, poultry, animal health, biosecurity, animal housing, carcass waste disposal, farm management, methodology, transport of animals, vaccination, USDA, APHIS, Veterinary services, US.

Yamanishi, T.; Matsumoto, Y.; Kuniyoshi, S.; Matsuda, S. **Preventive measures against high-pathogenicity avian influenza virus in Yamaguchi Prefecture.** *Yamaguchi Journal of Veterinary Medicine.* 2005; (32): 31-36. ISSN: 0388-9335.

Descriptors: poultry mortalities, high pathogenic avian influenza, burial of dead birds, 10 days, preventive measures, zoonotic disease potential, recommends development of large scale disposal methods, Yamaguchi Prefecture, Japan.

Yeske, P. **Considerations for writing biosecurity protocols for swine herds.** In: *Large Animal. Proceedings of the*

North American Veterinary Conference, Orlando, Florida, USA, 8-12 January, 2005. Eastern States Veterinary Association. Gainesville, USA. 2005; 19: 355-358.

Descriptors: swine, developing and writing biosecurity protocols, carcass disposal, potential mass euthanasia and carcass management.

2004

Benbow, S. Mary P. **Death and Dying at the Zoo.** *Journal of Popular Culture.* 2004; 37 (3): 379-98.

Descriptors: dead zoo animals, social responses, various options for disposal of carcasses.

Bingham, P. **Mass carcass disposal a logistical challenge.** *Biosecurity.* 2004; (55): 8. ISSN: 1174-4618.

NAL Call No.: SF722.2.B46

Descriptors: livestock mortalities, biosecurity, infectious disease control, transport of animals, slaughter, carcass disposal, burning composting, incineration, burial, heat treatment, rendering, New Zealand.

Carr, J. **Lessons learned: what have international experiences in large livestock disease outbreaks taught us? Some personal insights.** *Journal of Veterinary Medical Education.* 2004; 31(4): 387-390. ISSN: 0748-321X.

NAL Call No.: SF601.J62

Descriptors: foot and mouth disease outbreak in 2001, large animal mortalities, social implication, costs, disease prevalence, disease transmission, epidemiology, mass euthanasia programs, veterinary medicine, United Kingdom.

Chen ShuiJen; Hung MingCheng; Huang KuoLin; Hwang WenIng. **Emission of heavy metals from animal carcass incinerators in Taiwan.** *Chemosphere.* 2004; 55 (9): 1197. ISSN: 0045-6535.

NAL Call No.: TD172.C54

Descriptors: incineration process, pigs, domestic animals, carcass disposal, three incinerators, variable heavy metal emissions, varying feedstock rate, environmental concerns, ash, cadmium, chromium, iron, lead, nickel, zinc, copper, manganese, Taiwan.

Garavaglia, V.; Guarino, M.; Navarotto, P. **La nuova regolamentazione sui rifiuti di origine animale. [The new regulations on waste of animal origin.]** *Obiettivi e Documenti Veterinari.* 2004; 25 (1): 33-37. ISSN: 0392-1913.

Note: In Italian.

Descriptors: European Union regulations, animal wastes, carcass disposal, Italy.

Geale, D. **Options for carcass disposal explored.** *Biosecurity.* 2004; (49): 14-15. ISSN: 1174-4618.

NAL Call No.: SF722.2.B46

Descriptors: biosafety, biosecurity, foot and mouth disease, natural disasters, carcass disposal, planning, disposal options, New Zealand.

Goldstein, N. **Static piles succeed as "downer" cattle disposal option.** *BioCycle.* 2004; 45 (5): 27-28. ISSN: 0276-5055.

NAL Call No.: 57.8 C734

Descriptors: downer cattle, poultry mortalities, livestock production mortalities, carcass disposal, waste management, composting, 21 test piles, 42 tons of carcasses, biosecurity testing, avian vaccine viruses as viability test, inactivation of viruses in 3-4 weeks in cold weather and days in warm weather, covering materials—maize silage, ground cornstalks, dry/moist manure capped with ground straw, 3 year study, Iowa.

Honhold, N.; Taylor, N.M.; Mansley, L.M.; Paterson, A.D. **Relationship of speed of slaughter on infected premises and intensity of culling of other premises to the rate of spread of the foot-and-mouth disease epidemic in Great Britain, 2001.** *Veterinary Record.* 2004; 155 (10): 287-294. ISSN: 0042-4900.

NAL Call No.: SF992.H56G53

Descriptors: foot and mouth disease epidemic, disease control and prevention measures, risks, dangerous contact areas, contiguous and non-contiguous areas, Cambria, Settle/Clitheroe areas, epidemiology, spread of disease, culling of livestock animals, carcass disposal, correlation analysis, regression analysis, geographical distribution, United Kingdom.

Husnjak, M.; Kruselj, M.; Malogorski, L.J.; Zigman, S.; Crnjac, J.; Horvat, B. Procedure and treatment of carcasses in Krapina-Zagorje county. **Zbrinjavnje zivotinjskih lesina u Krapinsko-zagorskoj zupaniji. [Procedure and treatment of carcasses in Krapina-Zagorje county.]** In: Conference title: *Priopcenja 5. Znanstveno strucni skup iz DDD-a s meunarodnim sudjelovanjem. Pouzdan put do zdravlja zivotinja, ljudi i njihova okolisa, Mali Losinj, Hrvatska, 5-8. svibnja 2004.* Veterinarski Fakultet Sveucilista u Zagrebu (Faculty of Veterinary Medicine, University of Zagreb) Zagreb, Croatia. 2004; 319-322. ISBN: 953-98673-4-7. Note: In Croatian with an English summary.

Descriptors: animal mortalities and waste, carcass disposal, environmental protection, veterinary stations, integrated system, plans for 2-3 collection services, 2-3 cooled collection areas, public health, Croatia.

Lenz, T.R. **An overview of acceptable euthanasia procedures, carcass disposal options, and equine slaughter legislation.** *Proceedings of the 50th Annual Convention of the American Association of Equine Practitioners, Denver, Colorado, USA, 4-8 December, 2004.* 2004; 191-195.

NAL Call No.: SF601.F46

Descriptors: horse euthanasia, horse slaughter, guidelines and legislation, welfare aspects, barbiturates, pentobarbital, captive bolts, shooting, carcass disposal, composting.

Madani, A.; Gordon, R.; Stratton, G. **Agricultural water quality research.** *Proceedings of ICID Interregional Conference on Food Production and Water: Social and Economic Issues of Irrigation and Drainage, Moscow, Russia, 5-11 September 2004.* International Commission on Irrigation and Drainage (ICID) New Delhi, India. 2004; 2.2.1.

Note: An abstract.

Descriptors: pig mortalities, carcass disposal, layered open static piles, assuring subsurface and surface water pollution, coverings, manure, sawdust, solid manure plus tarp, water quality in unlined piles, quality and usefulness as agricultural soil conditioner.

Murari, Prasad. **Biosafety and alternatives for sanitary disposal of dead animals and condemned carcasses.**

Livestock International. 2004; 8 (9): 20-23.

NAL Call No.: SF1.L57

Descriptors: dead animals, condemned carcasses, carcass disposal, incineration, burying/landfill, disinfection surrounding guidelines, segregation by risk, advantages and disadvantages of rendering, India.

Murphy, James P.; Harner, Joseph P.; Strahm, Trent; DeRouchey, Joel. **Composting cattle mortalities.** *ASAE Annual International Meeting 2004 Ottawa, ON, Canada, August 1-August 4, 2004.* 2004; E.I Conference No. 66322.

Descriptors: cattle mortalities, composting, efficiency needs to be carefully manages, best management practices, university demonstration, extension visits of cattle operation discussed.

Myer, R.O.; Brendemuhl, J.H.; Leak, F.W.; Hess, J.B. **Evaluation of a rendered poultry mortality-soybean meal product as a supplemental protein source for pig diets.** *Journal of Animal Science.* 2004; 82 (4): 1071-1078.

ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: Dehydrated/rendered broiler mortality-soybean meal products (DPS) were evaluated in two trials as high-protein feedstuffs for pig diets. Broiler mortalities, collected and frozen on-farm and transported to a central facility, were minced, blended with soybean meal, and dried with a final product temperature of 120 to 130 degrees C. The final DPS products used contained approximately 30 and 45% (DM basis) dried broiler mortality for the first and second trials, respectively (DPS1 and DPS2). The first trial involved 50 young, growing pigs (9 to 26 kg) and the second, 72 growing and finishing pigs (27 to 111 kg). The trials compared corn-based diets containing either soybean meal (SBM; 48%) or DPS products as the supplemental protein source. The DPS products averaged 50% CP and 2.9% total lysine; crude fat content of DPS used in the first trial was 8%, and for the second, 14.6% (as-fed basis). The ADG

of pigs fed the DPS diets in either trial was similar to that of pigs fed the SBM control diets. In the second trial, pigs fed DPS2 had an overall average G:F ratio that was 9% better ($P < 0.01$) than that of pigs fed the SBM control diets. Carcass characteristics and pork quality from pigs of the growing-finishing trial were not affected by dietary treatment. Subjective carcass fat firmness scores indicated slightly softer fat ($P < 0.05$) from pigs fed DPS2. The mincing, blending with SBM, and dehydration of frozen stored on-farm broiler mortalities produced a safe and nutritious protein feedstuff for pigs, while also offering a viable disposal option.

Descriptors: broiler chicken mortality, carcass disposal, rendering/dehydrated-soybean feed product for swine, process described, composition of final product, swine feeding study, swine carcass characteristics, pork quality, carcass fat firmness, viable carcass disposal option.

National Wildlife Health Center. *Chronic Wasting Disease in Deer and Elk*. Wildlife Information Network. Atherstone, UK. 2004. ISBN: 0-9547185-4-2. Note: CD ROM, unpaginated.

Descriptors: *Cervus elaphus canadensis*, elk, deer, life cycles, susceptibility to prion diseases, prion protein, diagnosis, spongiform encephalopathies, case studies, disease detection, disease diagnosis and control, incubation, disease transmission, contaminated animals, culling, necropsy, detection, disinfection, carcass disposal, diversity; education; genetics; geographical distribution, hosts, identification, imports, inactivation, management, mortalities, pathology, persistence, animal quarantine, treatment, vaccination, UK.

Olivia, Renville County. *Minnesota Public Health Assessment for Valadco Confined Livestock Operations (a/k/a/ Valadco Sites)*. Minnesota Dept. of Health, Minneapolis. 15 Jan 2004. Note: Sponsor: Agency for Toxic Substances and Disease Registry, Atlanta, GA. Available in print and one CD-ROM contains 140 page document. NTIS Accession Number: PB2004-105049/XAB. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

Abstract: The U.S. Agency for Toxic Substances and Disease Registry (ATSDR) and the Minnesota Department of Health (MDH) have written a Public Health Assessment of the former ValAdCo livestock feeding facilities (ValAdCo) in Renville County, in response to a citizen petition. The assessment evaluates whether residents living near the facilities have been exposed to harmful substances related to activities at the facility and, if so, whether these exposures may have caused negative health effects. The environmental media that were evaluated for possible exposure were: air; ground water; and surface water. Dead animal disposal was also considered, but no specific information was available to allow for an actual assessment of potential exposures to infectious agents or other toxins associated with dead animals.

Descriptors: dead animal disposal, disease exposure, livestock feeding operation, environmental factors, air quality, waste storage, surface and ground water, land application, public health assessment, former ValAdCo livestock feeding facilities, Minnesota.

Pares, R. **La gestion de los cadaveres en las explotaciones porcinas. [The management of cadavers in pig farms.]** *Albeitar*. 2004; (76): 30-32. Note: In Spanish.

Descriptors: swine, pig mortalities, carcass disposal, on the farm disposal, biosecurity, handling, containers, transport, legislation, disposal systems, incineration, European Union.

Prince, M. **BABs, BARBs and beyond - a perspective on BSE.** *State Veterinary Journal*. 2004; 14 (1): 11-16. ISSN: 0269-5545.

NAL Call No.: SF601.S8

Descriptors: cattle, calves, BSE, bovine spongiform encephalopathy, prion disease incidence, prevention and control, contaminated carcass disposal, epidemiology, meat and bone meal, regulations, risk factors, United Kingdom.

Reynolds, J. **Euthanasia of livestock: why, when and how.** In: *Large Animal. Proceedings of the North American Veterinary Conference, Orlando, Florida, USA, 17-21 January 2004*. Eastern States Veterinary Association, Gainesville, FL. 2004; 18: 60.

NAL Call No.: SF605.N672

Descriptors: livestock, euthanasia, carcass disposal, euthanasia, techniques, situation where euthanasia is appropriate, diseases, conditions.

Saskatchewan. Saskatchewan Agriculture, Food and Rural Revitalization. **Managing livestock mortalities. Rev. Oct. 2004.** *Farm Facts* (Regina, Sask.) Saskatchewan Agriculture, Food and Rural Revitalization. 2004. 11 p.: ill., maps. *Descriptors:* dead animals, livestock mortalities, dead animal disposal, management systems.

Tomasic, A.; Kralj, Z.; Lenic, J. **Neskodljivo uklanjanje leseva zivotinja i klaonickog otpada u Republici Sloveniji. [Harmless elimination of animal carcasses and slaughter waste in Republic Slovenia.]** In: *Priopcenja 5. Znanstveno strucni skup iz DDD-a s meunarodnim sudjelovanjem. Pouzdan put do zdravlja zivotinja, ljudi i njihova okolisa, Mali Losinj, Hrvatska, 5-8. svibnja 2004.* Veterinarski Fakultet Sveucilista u Zagrebu (Faculty of Veterinary Medicine, University of Zagreb) Zagreb, Croatia. 2004; 301-306. ISBN: 953-98673-4-7. Note: In Croatian with an English summary.

Descriptors: carcass and animal waste disposal, collection, Slovenia.

Vos, V. de; Turnbull, P.C.B. **Anthrax.** In: Coetzer, J.A.W.; Tustin, R.C. (Editors) *Infectious Diseases of Livestock.* Volume Three Oxford University Press, Oxford, UK. (Edition 2). 2004; 1788-1818. ISBN: 0-19-576171-5.

NAL Call No.: SF781.I525 2004

Descriptors: livestock diseases, anthrax, *Bacillus anthracis*, clinical aspects, differential, diagnosis, bacterial spores, etiology, antibacterial agents, burning, carcass disposal, clinical aspects, disease prevention and control, disease transmission, disinfection, drug therapy, epidemiology, histopathology, immunization, livestock, microbial contamination, morphology, pathogenesis, quarantine, septicemia, vaccination, vaccines, wild animals, zoonoses.

Vucemilo, M. **Zbrinjavanje zivotinjskih leseva i konfiskata. [Disposal of animal carcasses and confiscated material.]** *Meso.* 2004; 6 (4): 52-57. ISSN: 1332-0025. Note: In Croatian with an English summary.

Descriptors: animal carcass disposal, condemned material, zoonotic diseases, temporary storage, heat treatment, rendering of fats and proteins, waste collection and transport, documentation, ecologically safe, legislation, waste disposal, Croatia.

Wang, FengJehng; Wu ChungHsing. **An estimation and models development on the heating value for the sick-and-dead pigs.** *Journal of Agriculture and Forestry.* 2004; 53(4): 317-323. ISSN: 0550-3744.

Descriptors: pigs, carcass disposal, carcasses, physicochemical composition, moisture content, incineration, combustion for destruction of animals, value for heating homes, estimation of heat, mathematical models.

Wilson, J.M.; Robson, S. **Blackleg in cattle.** *Agfact - NSW Agriculture A0.9.22* (3rd Edition) 2004; p. 4. ISSN: 0725-7759.

Descriptors: young cattle, *Clostridium chauvoei*, *C. septicum*, Blackleg, fatal bacterial disease, epidemiology, etiology, transmission, clinical signs, proper carcass disposal.

2003

Brstilo, M.; Lojkic, M.; Lamer, D.; Gaspar, A. **Legislativa u zbrinjavanju otpada stocarske proizvodnje. [Legislative regulations concerning safe disposal of waste in livestock production.]** In: *Veterinarski dani 2003, Sibenik, Hotelsko Naselje Solaris, Croatia, 9-12 Listopada 2003.* Zbornik Radova. Hrvatska veterinarska komora. Zagreb, Croatia. 2003; 53-61. ISBN: 953-98673-3-9. Note: In Croatian with an English summary.

Descriptors: intensified agricultural production systems, livestock mortalities, disposal of wastes, risk to human health, amendments to existing legislation, EU Regulation 1774/2002, Common Waste Management Strategy in the Republic of Croatia.

de Klerk, P.F. **Carcass disposal: lessons from the Netherlands after the foot and mouth disease outbreak of 2001.** *Revue Scientifique et Technique - Office International des Epizooties.* 2003; 21 (3): 789-796. ISSN: 0253-1933. Note: In English with summaries in French and Spanish.

NAL Call No.: SF781.R4

Descriptors: foot and mouth disease, livestock, culling for disease control, carcass disposal, The Netherlands.

Downs, K.M.; Hess, J.B.; Blake, J.P.; Norton, R.A.; Kalinowski, A.; Corzo, A.; Parsons, C.M. **Suitability of a dehydrated poultry mortality-soybean meal product for use in broiler chicken diets.** *Journal of Applied Poultry Research*. 2003; 12 (2): 222-228. ISSN: 1056-6171.

NAL Call No.: SF481.J66

Descriptors: poultry mortalities, carcass disposal, efficacy of 60 % dehydrated mortalities-41% soybean oil meal plus a preservative amendment, for use in broiler diets, broiler grow out study, various levels of the experimental diet meal, starter and grower diets, useful as a partial substitution for soybean oil meal, alternative disposal method.

Fonstad, T.A.; Meier, D.E.; Ingram, L.J.; Leonard, J. **Evaluation and demonstration of composting as an option for dead animal management in Saskatchewan.** [electronic resource] Canadian Biosystems Engineering = Le genie des Biosystemes au Canada : *La Revue de la Societe Canadienne de Genie Agroalimentaire et Biologique*. 2003; 45. ISSN: 1492-9058. Note: In English with a French summary. Annual cumulative print format also available.

URL: <http://www.engr.usask.ca/societies/csae/c0129abstract.pdf>

NAL Call No.: S671.C36

Descriptors: swine, dead animals, carcass disposal, pig manure, straw, mixtures, composting, temperature, oxygen, moisture content, nutrients, volume, composts, compost quality, volume reduction.

Gingerich, Eric N. **Waste management: The poultry industry.** *Journal of the American Veterinary Medical Association*. 2003. 223 (1): 55. ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Descriptors: poultry carcasses, animal waste management, air and water pollutants, composting, applied and field techniques, rendering, poultry house emissions.

Haskell, Scott R.R.; Ormond, Carol J. **Waste management: equine carcass disposal.** *Journal of the American Veterinary Medical Association*. 2003; 223(1): 48-9. ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Descriptors: horses, carcass disposal method, dead animal waste management, waste products, burial, incineration, animal feeds, United States Environmental Protection Agency, United States.

Johnston, L.J.; Clanton, C.J.; Ajariyakhajorn, C.; Goyal, S.M. **Survival of pathogenic indicator organisms in stored swine manure containing ground piglet carcasses during cold temperatures.** *Applied Engineering in Agriculture*. 2003; 19 (4): 491-497. ISSN: 0883-8542.

NAL Call No.: S671.A66

Descriptors: swine production mortalities, homogenized swine carcasses, liquid swine manure, effects of cold temperature on pathogen survival, liquid/frozen manure/carcass mixtures, inoculums, T SUB 1 coliphage and *Salmonella anatum*, differing levels of 6%, outdoor storage, Dec-June, Minnesota, microbe survival, seasonal differences.

Jones, G.M. **Food safety for animal agriculture: What producers need to know about HACCP and management practices.** *Journal of Dairy Science*. 2003; 86 (Supplement 1): 6. ISSN: 0022-0302. Note: Joint Annual Meeting of the American Dairy Science Association, the American Society of Animal Science and the Mexican Association of Animal Production, Phoenix, Arizona, USA. June 22-26, 2003. Meeting abstract.

NAL Call No.: 44.8 J822

Descriptors: livestock production, animal handling and transport, biosecurity, contamination of animal based products, quality assurance program, mortalities, dead animal management.

Kebus, Myron J. **Waste management: Aquaculture and fisheries.** *Journal of the American Veterinary Medical Association*. 2003; 223 (1): 56-57. ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Descriptors: fisheries waste, carcass disposal, burial, composting on farm land, disease transmission, water pollution concerns, leaching, odors, animal feeds, landfill, composting.

Kim, W.K.; Patterson, P.H. **In situ evaluation of hen mortality meal as a protein supplement for dairy cows.**

Journal of Dairy Science. 2003; 6(10): 3337-3342. ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: A study was conducted to evaluate the nutritional composition and in situ degradation of hen mortality meals.

There were four treatments: control autoclaved hen meal (C-HM), enzyme-treated, fermented, autoclaved hen meal (E-HM), NaOH-treated, fermented, autoclaved hen meal (NaOH-HM), and soybean meal (SBM). For the E-HM or NaOH-HM, hen mortality was treated with a feather digesting enzyme or NaOH to improve digestibility of feathers on the carcass. After the enzyme or NaOH treatment, treated hen mortality was preserved by a fermentation procedure. The crude protein levels of the C-HM and SBM were higher than the E-HM and NaOH-HM, and the concentration of fat in the C-HM was higher than the other treatments. Levels of Lys, Thr, Arg, Ile, Leu, Val, and Phe for the C-HM and SBM were higher than in the E-HM and NaOH-HM. The Met, Cys, and Gly levels in the C-HM were higher than the soybean meal. In situ ruminal degradation data showed that the C-HM had lower dry matter and crude protein degradation than the other treatments, whereas the E-HM or NaOH-HM was more susceptible to ruminal degradation.

These results indicate that the C-HM has higher levels of crude protein, amino acids, and resistance to ruminal degradation, whereas the E-HM or NaOH-HM was more digestible to ruminal microorganisms.

Descriptors: dairy cows, cow feeding, poultry offal meal, animal byproducts, spent hens, carcass disposal, animal feeding, protein supplements, feed supplements, forage and feed science, feed processing, enzymatic treatment, alkali treatment, soybean meal, nutritive value, amino acid composition, digestible protein, rumen fermentation.

Koebel, G.; Morris, J.R.; Rafail, A. **On-farm composting of livestock and poultry mortalities.** Revised edition. *Fact Sheet.* Agriculture & Rural Division, Guelph, c2003. 39 p. Note: Text in English and French. French edition on the same fiche. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

Abstract: This fact sheet provides an overview of the composting process and how it can be applied to the disposal of dead poultry & livestock on the farm. The information presented is based on the bin-type composting unit. Topics covered include the advantages of composting mortalities, planning & sizing the unit, designing & constructing the unit, getting ready to compost, choosing the compost substrate, the composting cycle, and managing the composting process. Appendices include a worksheet for sizing the unit, a table of estimated mortality rates & weight of various animals, and a composting record sheet.

Descriptors: carcass of production animal mortalities, poultry, livestock, bin-type composting, planning, design, construction, system cycle, Canada.

Koebel, G.; Morris, J.R.; Rafail, A. **On-farm composting of livestock and poultry mortalities.** *Fact Sheet.* Ontario. Ministry of Agriculture & Food, Guelph. c2003. 20 p. Note: NTIS Accession Number: MIC-104-02361/XAB. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

Abstract: This fact sheet provides an overview of the composting process and how it can be applied to the disposal of dead poultry & livestock on the farm. The information presented is based on the bin-type composting unit. Topics covered include the advantages of composting mortalities, planning & sizing the unit, designing & constructing the unit, getting ready to compost, choosing the compost substrate, the composting cycle, and managing the composting process. Appendices include a worksheet for sizing the unit, a table of estimated mortality rates & weight of various animals, and a composting record sheet.

Descriptors: dead animal carcass disposal, mortality composting, planning, design, substrates, system cycle, environmental factors, Canada.

Larson, Jean A. **Disposal of Dead Production Animals 1988-2002.** Animal Welfare Information Center (U.S.) Beltsville, MD. Animal Welfare Information Center, U.S. Dept. of Agriculture, Agricultural Research Service, National Agricultural Library, Beltsville MD [2003]. Note: A bibliography.

URL: <http://nal.usda.gov/awic/pubs/carcass.htm>

Abstract: Addresses questions regarding the proper disposal of domestic and wild animals to control animal and human disease epidemics. Proper disposal methods/systems are especially important due to the potential for disease transfer to humans and other animals, and the pollution of soil, air and ground water. The reported research in this document mainly addresses the disposal of cattle, swine, poultry, sheep, goats, fish, and wild birds. Some of the concerns are pathogen control, pollution control, recycling of nutrients, feed potential, etc. The information is from a variety of sources and covers the dates 1988 to the present.

Descriptors: bibliography, disposal of animal carcasses, methods, pathogen control, pollution control, recycling of nutrients, methods, systems.

Richmond, J.Y.; Hill, R.H.; Weyant, R.S.; Nesby-O'Dell, S.L.; Vinson, P.E. **What's hot in animal biosafety?** *ILAR Journal*. 2003; 44(1): 20-27. ISSN: 1084-2020.

NAL Call No.: QL55.A1I43

Descriptors: animal technicians, researchers, biosafety, biosecurity, pathogens, bioterrorism, arthropod-borne diseases, disease control programs, livestock, wild animals, laboratory animals, occupational health and safety, health hazards, risk reduction, toxins, prions, guidelines, carcass disposal, Poliovirus, zoonoses, animal diseases.

Rynk, R. **Large animal mortality composting goes mainstream.** *BioCycle*. 2003; 44 (6): 44-50. ISSN: 0276-5055.

NAL Call No.: 57.8 C734

Descriptors: large animal mortalities, carcass disposal, composting in bins, splaying and grinding, contained composting system, conventional windrows, Colorado.

Schlenker, Gerd **TSE: Stoffkreislaeufe in der Tierproduktion: Arbeitsweise der Tierkoerperbeseitigungsanstalten.** [TSE: tissue cycles in the animal production and mode of operation of carcass disposal plants.] *Fleischwirtschaft*. 2003; 83 (6): 112-114. ISSN: 0015-363X. In German with an English summary.

NAL Call No.: 280.38 F62

Descriptors: BSE/vCJD, spongiform encephalopathies, routes of transmission, animal production systems, processing operations, carcass disposal plants.

Shaikenov, B.S.; Torgerson, P.R.; Usenbayev, A.E.; Baitursynov, K.K.; Rysmukhambetova, A.T.; Abdybekova, A.M.; Karamendin, K.O. **The changing epidemiology of echinococcosis in Kazakhstan due to transformation of farming practices.** *Acta Tropica*. 2003; 85(2): 287-93, ISSN: 0001-706X.

NAL Call No.: 475 Ac8

Abstract: In recent years there has been a substantial increase in cystic echinococcosis in Kazakhstan. There are several factors that have contributed to this change in the epidemiology of the disease. The primary reason was the degradation of traditional nomadic system of livestock breeding and closing of large collective farms. Small private farms have started to keep stock year round in closer proximity to permanent human habitation. Furthermore, routine anthelmintic prophylaxis of dogs has been abandoned and there is inadequate control over the use and disposal of animal carcasses.

Large mechanized slaughterhouses are no longer operational. Now more people (7-8 times) and more dogs (8-10 times) participate in the husbandry of 1000 sheep, than during Soviet administration. Because of the close association of dogs with man there is the potential for a substantial increase in eggs and of *Echinococcus* in immediate environment of inhabited houses. Soil samples taken from 61% of yards of village homes contained taeniid eggs and from 35% of yards from around farmsteads. During an examination of 1464 village dogs the average rate of infection with *Echinococcus granulosus* was 5.8%, whilst the prevalence in 607 shepherd dogs was 23.2%. At present, these dogs represent a major source of infection for people with this dangerous parasite. Examination of hospital records suggested that children and people in occupations associated with animal husbandry were at most risk of infection.

Descriptors: infection rates of dogs, sheep husbandry, *Echinococcus granulosus*, zoonotic parasite, inadequate disposal of animal carcasses, slaughter houses defunct, farm soil sampling show taeniid eggs, public health concern, epidemiology, Kazakhstan.

Straub, O.C. **Maul und Klauenseuche: Status quo. Kapitel 8. Konsequenzen fuer die Umwelt.** [Foot and mouth disease: The status quo. Chapter 8. Consequences for the environment.] *Tieraerztliche Umschau*. 2003; 58(1): 637-638. ISSN: 0049-3864. Note: In German.

NAL Call No.: 41.8 T445

Descriptors: foot and mouth disease, disease control, carcass disposal after epidemics, infectious diseases, disease mortalities, environmental risks and consequences, prevention of transmission, manure disposal, milk disposal, disinfection of sites, The Netherlands, United Kingdom.

Vucemilo, M.; Vinkovic, B.; Grlic, D.; Grlic, I.; Vrabac, N.; Tofant, A.; Matkovic, K. **Uklanjanje animalnog otpada preradom u kafileriji. [Elimination of animal waste by recycling in a rendering plant.]** In: *Veterinarski dani 2003, Sibenik, Hotelsko Naselje Solaris, Croatia, 9-12 Listopada 2003. Zbornik Radova.* Hrvatska Veterinarska Komora. Zagreb, Croatia. 2003; 62-67. ISBN: 953-98673-3-9. Note: In Croatian with an English summary.
Descriptors: animal wastes, carcass disposal, waste utilization, meat and bone meal, rendering plant, recycling, Croatia.

Willis, N.G. **Animal carcass disposal.** In: *Compendium of Technical Items Presented to the International Committee or to Regional Commissions, 2003.* Office International des Epizooties Paris, France. 2003; 149-159. ISBN: 92-9044-625-X.

Descriptors: prion diseases, disease outbreaks, laws and regulations, disease control, animal slaughter, animal carcass disposal, composting technology and methods, disease control, review.

2002

Agricultural Engineering Branch. Livestock Engineering Unit, Edmonton. Alberta. Alberta Agriculture, Food & Rural Development. Information Packaging Centre. **Livestock Mortality: Burial Techniques.** c2002. 11 p. Note: Order MIC-102-05567/XAB from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

Abstract: This publication discusses burial as an option for on-farm disposal of livestock or poultry mortalities. Issues of concern and measures to address those issues are discussed with regard to groundwater contamination, surface water contamination, and the suitability of land for burial. Guidelines are then presented for burial rates, burial site spacing, burial depth & cover, separation distances from wells & other facilities, digging a proper burial hole, and record keeping. The appendix contains a table showing typical mortality rates for different livestock species.

Descriptors: dead animal disposal, farm mortalities, livestock industry, environmental aspect, ground water contamination, surface water pollution, suitability of burial, guidelines for burial site.

Agricultural Engineering Branch. Livestock Engineering Unit, Edmonton. Alberta. Alberta Agriculture, Food & Rural Development. Information Packaging Centre. **Livestock Mortality Management (Disposal)** c2002. 16 p. Note: Order MIC-102-05566/XAB from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

Abstract: The inevitability of losses (mortality) in livestock production means that producers must face the need to properly dispose of animal carcasses. This document describes options for disposal, including burial, rendering, processing of rendered carcasses, and composting. Advantages & disadvantages of each method are noted.

Appendices include a table showing typical rates of mortality of livestock species and an excerpt from relevant Alberta legislation.

Descriptors: livestock mortalities, dead animal disposal, disposal options, burial, rendering, processing of rendered carcasses, composting, pros and cons, Canada.

Agricultural Engineering Branch. Livestock Engineering Unit, Edmonton, Alberta. Alberta Agriculture, Food & Rural Development. Information Packaging Centre. **Poultry Mortality Composting** c2002. 18 p. Note: Order MIC-102-05501/XAB from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

Abstract: Alberta regulations require disposal of dead animals within 48 hours of death. Composting of livestock mortalities is an option now available as an innovative disposal method that responds to today's environmental concerns. This report provides information on poultry composting. It begins with a chapter reviewing the basics of

composting and the factors affecting composting success, such as material mix and temperature. Chapter 2 discusses matters that must be taken into account when planning a composting operation for dead animals, such as location, storage requirements, and facility sizing. The last two chapters describe poultry mortality composter design and compost production management. The appendix contains an excerpt from the Alberta Livestock Diseases Act.

Descriptors: poultry mortalities, dead animal disposal, Alberta regulations, environmental concerns, composting, design, location, storage, management, Canada.

Agricultural Engineering Branch. Livestock Engineering Unit, Edmonton. Alberta. Alberta Agriculture, Food & Rural Development. Information Packaging Centre. **Swine Mortality Composting**. c2002. 27 p. Note: Order MIC-102-04437/XAB from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

Abstract: Alberta regulations require disposal of dead animals within 48 hours of death. Composting of livestock mortalities is an option now available as an innovative disposal method that responds to today's environmental concerns. This report provides information on two general approaches to livestock composting allowed in Alberta, enclosed or bin systems. It begins with a chapter reviewing the basics of composting and the factors affecting composting success, such as material mix and temperature. Chapter 2 discusses matters that must be taken into account when planning a composting operation for dead animals, such as location, storage requirements, and facility sizing.

The last two chapters describe swine mortality composter design and compost production management. Worksheets to assist in composter design are appended.

Descriptors: livestock mortalities, composting of carcasses, basics of composting, planning of composting, location, storage requirements, Alberta legal requirements, pollution control.

Balander, R.; Ocello, P.; Napolitano, N. **Disposal of dead poultry by feeding the carcasses to dermestid beetles.** *Poultry Science*. 2002; 81 (Supplement 1): 6. ISSN: 0032-5791. Note: 91st Annual Meeting of the Poultry Science Association, Newark, DE, USA, August 08-11, 2002.

NAL Call No.: 47.8 Am33P

Descriptors: methods, carcass disposal methods, poultry waste management, dermestid beetles.

De Klerk, P.F. **Carcass disposal: Lessons from the Netherlands after the foot and mouth disease outbreak of 2001.** *Revue Scientifique et Technique Office International des Epizooties*. December 2002; 21 (3): 789-796. ISSN: 0253-1933.

NAL Call No.: SF781.R4

Abstract: The main logistical problems of the foot and mouth disease (FMD) outbreak that occurred in the Netherlands in 2001 were a lack of culling and rendering capacity. Suppressive vaccination formed the basis for the solution to both problems and was primarily used to halt the possible spread of the virus. This allowed culls to take place on vaccinated farms when sufficient culling capacity eventually became available. In addition, the vaccinated cloven-hoofed animals could be removed alive and then killed in central culling places fourteen or more days after vaccination. Using slaughterhouses as central culling places meant that parts of carcasses could be deep-frozen--which solved the lack of rendering capacity. The deep-frozen carcass parts were destroyed later, when rendering capacity became available. To guarantee that all vaccinated, culled and temporarily deep-frozen cloven-hoofed animals were eventually destroyed, a balanced audit trail, partly based on kilogram records, was vital in this situation.

Descriptors: foot and mouth disease outbreak, carcass disposal of diseased animals, lack of culling and rendering capacity, suppressive vaccination, prevention of virus spread, euthanized at central slaughterhouses, deep freezing of carcasses, later rendering, audit trail, The Netherlands.

Heilemann, M. **Entsorgung von Schlachtnebenprodukten, verendeten und getoeteten Tieren. [Disposal of animal byproducts, perished and slaughtered animals.]** *Deutsche Tieraerztliche Wochenschrift*. August, 2002; 109 (8): 354-357. ISSN: 0341-6593. Note: In German with an English summary.

NAL Call No.: 41.8 D482

Descriptors: feeds, carcass disposal, diseases animals, public health safety, BSE, bovine spongiform encephalopathy, disease prevention and control, slaughter house waste, ruminants, rendering industry, energy source, legislation, Europe.

Hickman, G.; Hughes, N. **Carcass disposal: a major problem of the 2001 FMD outbreak.** *State Veterinary Journal.* 2002; 12 (1): 27-32. ISSN: 0269-5545.

NAL Call No.: SF601.S8

Descriptors: foot and mouth disease epidemic of 2001, livestock, carcass disposal, carcasses, environmental concerns for mortality disposal, public health concerns, United Kingdom.

Kay, R.M. **Practical problems of carcass disposal. Proceedings of the Pig Veterinary Society Meeting, Bosworth Park Hotel, Market Bosworth, Warwickshire, 4-5 May 2000.** *Pig Journal.* 2000; 46: 95-103. ISSN: 1352-9740.

NAL Call No.: SF971.P5

Descriptors: pig carcass disposal, regulations, United Kingdom legislation.

Keener, Harold M.; Foster, Stephen S.; Moeller, Steven J.; Elwell, David L. **Dealing with dead livestock.** *Engineering and Technology for Sustainable World.* August 2002; 9 (8): 9-10. ISSN: 1076-3333.

NAL Call No.: S671.A3

Descriptors: carcass disposal, dead livestock, composting, static pile, open piles, enclosed bins, carbon sources from surrounding amendment for microbes and as a biofilter, methods are economical and environmentally sound.

Kitching, P.; Morilla, A.; Yoon, K.J.; Zimmerman, J.J. **Swine as the origin of the foot-and-mouth disease in the United Kingdom, 2001.** In: Morilla, A.; Yoon, K.J.; Zimmerman, J.J. (Editors). *Trends in Emerging Viral Infections of Swine.* 2002; 193-196. Iowa State Press; Ames, Iowa, USA. ISBN: 0-8138-0383-7.

NAL Call No.: SF977.V57T74 2002

Descriptors: pigs, swine, foot and mouth disease, disease origins, epidemics, carcass disposal, control programs, disease transmission concerns, disease epidemiology, outbreaks, vaccination, aphthovirus in pigs, United Kingdom.

Sander, J.E.; Warbington, M.C.; Myers, L.M. **Selected methods of animal carcass disposal.** *Journal of the American Veterinary Medical Association.* Apr. 1, 2002; 220 (7): 1003-1005. ISSN: 0003-1488.

URL: <http://www.avma.org>

NAL Call No.: 41.8 Am3

Descriptors: carcasses, dead animal carcass disposal, rendering, composting, burning, pit burial.

Scudamore, J.M.; Pritchard, D.G.; Whitmore, G.M. **Comments on the paper: 'animal welfare consequences in England and Wales of the 2001 epidemic of foot and mouth disease'.** *Revue Scientifique et Technique - Office International des Epizooties.* 2002; 21 (3): 869-876. Note: In English with summaries in French and Spanish.

NAL Call No.: SF781.R4

Descriptors: foot and mouth disease, epidemic of 2001, animal welfare, livestock carcass disposal, disease control, Wales, England.

Scudamore, J.M.; Harris, D.M. **Control of foot and mouth disease: Lessons from the experience of the outbreak in Great Britain in 2001.** *Revue Scientifique et Technique Office International des Epizooties.* December 2002; 21 (3) 699-710. ISSN: 0253-1933.

NAL Call No.: SF781.R4

Abstract: An epidemic of foot and mouth disease occurred on an unprecedented scale in Great Britain in 2001. This was characterized by widespread dissemination of disease in sheep due to infection being present but unreported for at least three weeks before the first case was identified. As envisaged by the contingency plans, existing procedures dealt rapidly with disease in many parts of the country where outbreaks were reported. Elsewhere, the scale and speed of disease spread was so great that veterinary resources had to be supplemented on the operational front by a large influx of military and administrative support. At the time of writing (June 2002), the United Kingdom Government has already identified a number of key lessons, and will learn further from this experience and from the findings of inquiries, how a future outbreak of this unprecedented nature and extent could be handled. Lessons identified so far relate to the improvement of contingency plans, the wider impact on rural businesses and communities, reassessing the possible use of emergency vaccination, the availability of serological capacity, better animal identification and

movement controls, carcass disposal, communications, data handling and management information. The authors present the initial lessons learned and which formed the basis of official submissions to the inquiries. Further lessons will be learned from the findings of those inquiries.

Descriptors: contingency plans, epidemic, disease spread, culling of animals, emergency vaccinations, animal identification, movement controls, carcass disposal, communications, data handling.

Scudamore, J.M.; Trevelyan, G.M.; Tas, M.V.; Varley, E.M.; Hickman, G.A.W. **Carcass disposal: Lessons from Great Britain following the foot and mouth disease outbreaks of 2001.** *Revue Scientifique et Technique Office International des Epizooties*. December 2002; 21 (3): 775-787. ISSN: 0253-1933.

NAL Call No.: SF781.R4

Abstract: The foot and mouth disease (FMD) outbreak that occurred in the United Kingdom in 2001 was of an unprecedented scale and severity and presented a massive logistical challenge to Government. Over 6.5 million animals were slaughtered and disposed of, over 4 million as a direct result of disease and a further 2.5 million on welfare grounds. On-farm burial and on-farm burning were the principal routes for disposal at the commencement of the outbreak. On-farm burial was limited by legislation to protect groundwater supplies and pyre burning came increasingly under attack from local communities concerned about health risks from smoke and emissions. Burning also painted a vivid but distressing picture of the war against disease. Increasingly, rendering capacity made an important contribution to disposal. The peak of the outbreak could only be managed by the development of a new disposal route--mass burial in engineered sites and by using licensed landfill where available. During the course of the outbreak, a disposal hierarchy was developed to reflect environmental and public health concerns, namely: rendering and incineration ranked first, licensed landfill next, followed by burning with mass burial or on-farm burial as the least preferred options. However, the campaign against the disease could not have been won without the tactical use of mass burial in addition to all the other available disposal routes. The authors describe the development and deployment of the disposal routes used in the 2001 outbreak.

Descriptors: logistical problems of carcass disposal, over 1 billion animals culled, on-farm burial, on-farm burning, ground water protection legislation, new disposal routes, mass burial in engineered sites, licensed landfills where available, description of development and deployment of disposal routes, 2001 outbreak, United Kingdom.

Simpson, E.H.; Blake, J.P.; Donald, J.O.; Norton, R.A. **Evaluation of incineration for disposal of poultry mortalities.** *Poultry Science*. 2002; 81 (Supplement 1): 6. ISSN: 0032-5791. Note: 91st Annual Meeting of the Poultry Science Association, Newark, DE, USA, August 08-11, 2002. Meeting abstract.

NAL Call No.: 47.8 Am33P

Descriptors: poultry mortalities, incineration system, carcass disposal, efficacy, cost efficiencies.

Sterneberg, T.; Choraine, P. **Foot and mouth disease.** *Dansk Veterinaertidsskrift*. 2002; 85 (21): 6-11. ISSN: 0106-6854.

Descriptors: foot and mouth disease, outbreaks in livestock, rare breeds, zoo animal, ethics, welfare aspects, effect on bloodlines and pedigrees, social effects, environmental impacts, carcass disposal, movement and monitoring of livestock, veterinary services and resources, public education, international trade, import controls, policies, crisis management, role of the EU in management of the crisis, United Kingdom, The Netherlands, France, Ireland.

Suzuki Fumio; Watanabe Kazuo; Furuya Hiroshi; Shimamura Yuri; Horikita Tetsuya. **Case study of nitrate poisoning in fed pigs in a farm.** *Jui Ekigaku Zasshi = Journal of Veterinary Epidemiology*. 2002; 6 (1): 25-28. ISSN: 1343-2583. In Japanese.

Descriptors: nitrate poisoning, fed pigs, intake of aerated disposal excreta water, high nitrite, nitrogen, clinical signs, animal waste management, food poisoning, contaminated meat.

Tromans, S. **Silence of the lambs: the foot-and-mouth crisis - litigation and environmental implications.**

Environmental Law & Management. 2002; 14 (4): 197-207. ISSN: 1067-6058.

Descriptors: foot and mouth disease, epidemic, epidemiology, livestock animals, slaughter, carcass disposal, public health concerns, public health legislation, United Kingdom.

United Kingdom. Department for Environment, Food and Rural Affairs. **Foot and mouth disease. Special edition.** *State Veterinary Journal*. 2002; 12 (1): 40. ISSN: 0269-5545.

NAL Call No.: SF601.S8

Descriptors: issue on foot and mouth disease outbreak 2001, cattle, livestock euthanasia and deaths, carcass disposal articles cover serology, immunodiagnosis, immunological techniques, diagnosis, disease control and prevention, vaccination, animal welfare concerns, United Kingdom.

Wiemer, U. **Veterinarrechtliche Schutzmassnahmen im Hinblick auf BSE. [Protective measures taken with regard to BSE under veterinary law.]** *Berliner und Munchener Tierarztliche Wochenschrift*. 2002; 115 (3-4): 134-139. Note: In German with an English summary.

NAL Call No.: 41.8 B45

Descriptors: BSE, bovine spongiform encephalopathy, carcass disposal, dead animal management, disease prevention and control, cattle, goats, sheep, slaughtered animals, destruction of animals, risk assessment, German laws.

2001

British Deer Society. **Road traffic accidents/deer carcass disposal: notes on best practice during foot and mouth outbreak. BDS Advice Note released on 5 March 2001.** *Deer, Journal of the British Deer Society*. 2001; 11: 10, 556-557. ISSN: 0141-4259.

Descriptors: carcass disposal, clinical aspects, disease control, foot and mouth disease, FMD, United Kingdom legislation, disease lesions, epidemics, traffic accidents involving diseased animals, deer, aphthovirus, United Kingdom, England, Scotland, Wales.

Damron, B.L.; Ouart, M.D.; Christmas, R.B. **Rendered whole-bird layer mortality as an ingredient in layer diets.** *Journal of Applied Poultry Research*. Winter 2001; 10 (4): 371-375. ISSN: 1056-6171.

NAL Call No.: SF481.J68

Descriptors: hen carcasses, waste disposal, rendering for use in feeds, nutritive value, diets, performance as a feed, egg production, feed intake, feed conversion efficiency, egg weight, specific gravity, liveweight.

Elwell, D.; Keener, H.; Moeller, S. **Composting animal mortalities.** *BioCycle*. 2001; 42 (5): 67-68. ISSN: 0278-5055.

NAL Call No.: 57.8 C734

Descriptors: composting system, moisture control, training farmers, carcass disposal, Ohio.

Garcia Siera, J.; Rozeboom, D.W.; Straw, B.E.; Thacker, B.J.; Granger, L.M.; Fedorka Cray, P.J.; Gray, J.T. **Studies on survival of pseudorabies virus, *Actinobacillus pleuropneumoniae*, and *Salmonella* serovar *Choleraesuis* in composted swine carcasses.** *Journal of Swine Health and Production*. 2001; 9 (5): 225-231. ISSN: 1066-4963.

NAL Call No.: SF971.N472

Descriptors: experimental infection, composting variable number of days, method feasibility, pig carcass disposal methods, composting, disease control, temperature, *Actinobacillus pleuropneumoniae*, pigs, *Salmonella choleraesuis*, composting, pathogen survival.

Gloster, J.; Hewson, H.; Mackay, D.; Garland, T.; Donaldson, A.; Mason, I.; Brown, R. **Spread of foot-and-mouth disease from the burning of animal carcasses on open pyres.** *Veterinary Record*. May 12, 2001; 148 (19): 585-586. ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Descriptors: foot and mouth disease, aphthovirus, safe carcass disposal, burning may spread airborne infection.

Gunn, M. **Observations on disposal of BSE-infected carcasses.** *Irish Veterinary Journal*. 2001; 54 (4): 192-193. ISSN: 0368-0762.

NAL Call No.: 41.8 IR4

Descriptors: BSE, bovine spongiform encephalopathy, diseased brain tissue, carcass disposal, livestock carcasses,

reviews, risk analysis.

Mul, M.F.; Bokma-Bakker, M.H.; Eijck, I.A.J.M. **Risicoanalyse afvoer varkenskadavers lichter dan 40 kg. [Risk analyses of disposal of pig carcasses smaller than 40 kg in the Netherlands.]** Lelystad (Netherlands). *Rapport Praktijkonderzoek Veehouderij*. 2001; 44 p. ISSN: 0169-3689. Note: In Dutch with an English summary. Available from: PUDOC-DLO, POB 9100, 6700 HA Wageningen, The Netherlands. Email: Bluwpudoc@secr.bib.wau.nl.
Descriptors: carcasses waste disposal, destruction of animals, swine, Netherlands, dead animal disposal, carcasses, risk of disease transmission, disease control.

Shafer, D.J.; Burgess, R.P.; Conrad, K.A.; Prochaska, J.F.; Carey, J.B. **Characterization of alkaline hydroxide-preserved whole poultry as a dry byproduct meal.** *Poultry Science*. Nov 2001; 80 (11): 1543-1548. ISSN: 0032-5791.

NAL Call No.: 47.8 Am33P

Abstract: Studies were conducted to examine the chemical preservation of whole broiler carcasses by using aqueous alkaline hydroxide solutions. Conversion of the preserved carcasses and solutions into an acceptable poultry byproduct meal was examined. Carcasses and alkaline solutions at a 1.1 ratio were blended and freeze-dried to produce a high fat whole poultry byproduct meal. The dry meal was analyzed for nutrient composition, true metabolizable energy, and amino acid content. Viable bacteria were not recovered after inoculation of the experimental meal with *Salmonella enteritidis*. The meal was incorporated at 5 and 10% of chick starter diets. Chicks found the meal-containing diets acceptable. Feed consumption, water consumption, BW, and mortality were not significantly different among the dietary treatments in either of the two feeding trials. Necropsy samples revealed no pathological or histological differences attributable to consumption of the alkaline poultry byproduct and blood serum evaluation found no variation in blood chemistry. Alkaline treatment of whole broiler carcasses was an effective preservation method and acceptable as a dry poultry byproduct meal.

Descriptors: broilers, carcass meal, carcass disposal, estimated costs, alkali-treatment, emulsifying, feed of animal origin, feed formulation, chemical composition, amino acids, chicks, feed intake, water intake, body weight, mortality, production costs.

2000

Anderson, P.L. **Composting: a method of dead animal disposal.** *Innovative Technologies for Planning Animal Feeding Operations Comprehensive Nutrient Management Planning Program and Proceedings the Renaissance Denver Hotel, December 4-5-6, 2000, Denver, Colorado*. 2000; 164-166.

NAL Call No.: TD899.F4I55 2000

Descriptors: composting for carcass disposal, organic fertilizers, application to land, Minnesota.

Blake, J.P.; Roden, R.M.; Scott, J.T.; Conner, D.E. **Fermentation as a method for carcass disposal.** *Proceedings of the Western Poultry Disease Conference. University of California, Davis, CA*. 2000; (49th): 71-75. Note: Meeting held on Mar 5-7, 2000, Sacramento, CA.

NAL Call No.: SF995.W4

Descriptors: poultry, carcass disposal via a fermentation method.

Chen, T.H. **Evaluation of an anaerobic system for treating poultry mortalities.** *Transactions of the ASAE*. Nov/Dec 2000; 43 (6): 1781-1788. ISSN: 0001-2351.

NAL Call No.: 290.9 Am32T

Abstract: An anaerobic digestion system was evaluated as an alternative for poultry mortality disposal. The bench-scale system consisted of an upflow anaerobic sludge blanket (UASB) reactor and three leachbeds (LB). The LBs were batch-loaded with dead chickens and sequentially started at an average interval of 50 days. Only one LB was connected to the UASB to form a closed-loop at any one time. Leachate from the LB was fed to the UASB as influent while effluent from the UASB overflowed to the LB to maintain constant liquid volumes in both reactors. The LB-UASB pair initially functioned as a two-phase system, with the LB serving as the hydrolysis/acidification phase and the UASB

serving as the methanogenic phase. Through repeated liquid recycle between the LB and the UASB, the LB eventually accumulated enough methanogens to become methanogenic as well. Leachate concentrations from the methanogenic LB dropped rapidly. When the leachate was no longer able to sustain the UASB at high loading rates (LR), the next LB with another dead chicken was connected to the UASB. Digestion of the mortality was considered complete when methane production rate from the off-line LB became marginal. When digestion in an LB was complete, the fermentation fluid in the LB was reused to start up the next LB. The first cycle ended when digestion in the third LB was complete. Two cycles were completed during this study. The system satisfactorily completed treatment of seven consecutive batches of mortalities in 432 days. The average CH₄ yield was 0.679 m³ (kg dry)-¹ [or 0.254 m³ (kg wet)-¹]. However, timings of the start-up of an LB and its subsequent connection to the UASB need to be improved to sustain the system at peak treatment efficiency. Alternatively, the system could include a fourth LB to allow more flexibility in scheduling. Additionally, a fifth LB reactor would simplify restarting of an LB from its preceding LB being terminated. Cost estimates based on systems with one UASB and five LBs ranged from US\$118 (10(3) kg live wt sold)-¹ for a 10,000 bird poultry farm to US\$28 (10(3) kg live wt sold)-¹ for a farm with 100,000 chickens.

Descriptors: poultry, anaerobic digestion for carcass disposal, waste disposal, destruction of animals.

Fulhage, C. **Composting dead animals.** *Innovative Technologies for Planning Animal Feeding Operations: Comprehensive Nutrient Management Planning. Program and Proceedings. The Renaissance Denver Hotel, December 4-5-6, 2000, Denver, Colorado.* 2000: 167-170.

NAL Call No.: TD899.F4I55 2000

Descriptors: composting for carcass disposal, pigs, cattle, nitrogen, carbon, sawdust, Missouri.

Gustafsson, B.; Andersson, I.; Svendsen, L.S.; Moore, J.A. **Handling of farm mortalities in major emergency situations: an international review.** *Animal, Agricultural and Food Processing Wastes. Proceedings of the Eighth International Symposium, Des Moines, Iowa, USA, 9-11 October, 2000.* 2000; 289-296. Note: Published by the American Society of Agricultural Engineers.

NAL Call No.: TD930 I58 2000

Descriptors: carcass disposal, disaster emergencies, cattle, pigs, sheep, poultry, mortalities, public health concerns, slaughter.

Hofmann, M.E.; Wilson, J.F. **What veterinarians should know about pet cemeteries and crematoriums.** *Journal of the American Veterinary Medical Association.* Mar 15, 2000; 216 (6): 844-847. ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Descriptors: pet carcass disposal, veterinarians, laws in USA.

Keener, H.M.; Elwell, D.L.; Monnin, M.J. **Procedures and equations for sizing of structures and windrows for composting animal mortalities.** *Applied Engineering in Agriculture.* Nov 2000; 16 (6): 681-692. ISSN: 0883-8542.

NAL Call No.: S671.A66

Descriptors: composting for carcass disposal, calves, poultry, pigs, decomposition, time, equations, windrowing, design, size, sawdust, bins, structures, windrow composting, pile composting, bin composting.

Kleinhanss, W.; Uhlmann, F.; Berk, A.; Haneklaus, S.; Haxsen, G.; Hinrichs, P.; Probst, F.W.; Weiland, P. **Folgenabschaetzung alternativer Entsorgungsverfahren fuer Tierkoerper und Schlachtabfaelle bei einem Verwendungsverbot zur Futtermittelherstellung. [Assesment of alternative waste disposal methods for animal carcasses and abattoir offals under an application ban in animal feed production].** *Bundesforschungsanstalt fuer Landwirtschaft, Braunschweig (Germany). Inst. fuer Betriebswirtschaft, Agrarstruktur und laendliche Raeume. Landbauforschung Voelkenrode. Sonderheft (Germany).* 2000; No. 209, 118 p. ISSN: 0376-0723. Note: In German.

NAL Call No.: 18 L2353 Suppl.

Descriptors: abattoir byproducts, dead animal waste disposal, waste utilization, recycling, incineration, combustion, biogas energy sources, fertilizers, cost analysis, feed industry, compound feeds, prices.

Morrow, W.E.M.; Ferket, P.R.; Middleton, T. **Alternative methods of carcass disposal. Proceedings of the Pig Veterinary Society Meeting, Bosworth Park Hotel, Market Bosworth, Warwickshire, 4-5 May 2000.** *Pig Journal.*

2000; 46: 104-112. ISSN: 1352-9740.

NAL Call No.: SF971.P5

Descriptors: pig carcass disposal; carcasses, public health risks, hygiene, environmental pollution concerns.

Sherman Huntoon, R. **Composting animal mortalities in North Carolina.** *BioCycle*. 2000; 41 (12): 57-59. ISSN: 0278-5055.

NAL Call No.: 57.8 C734

Descriptors: carcass disposal, dead animal carcasses, composting process, North Carolina, USA.

Stanford, K.; Larney, F.J.; Olson, A.F.; Yanke, L.J.; McKenzie, R.H. **Composting as a means of disposal of sheep mortalities.** *Compost Science & Utilization*. Spring 2000; 8 (2): 135-146. ISSN: 1065-657X.

NAL Call No.: TD796.5.C58

Descriptors: animal wastes, carcasses, sheep, lambs, composting, temperature, waste disposal, methodology, pollution control, time requirements, Canada.

Wu, Chung Hsing; Dai, Chih Yang; Wu, C.H.; Dai, C.Y. **Numerical simulation of incinerator for illness pig bodies. 2000-ASAE Annual International Meeting, Milwaukee, Wisconsin, USA, 9-12 July, 2000.** *Paper American Society of Agricultural Engineers*. 2000; No. 003119: 1-25.

NAL Call No.: S671.3.A54

Descriptors: diseased pig mortalities, carcass disposal, incineration methods, disease control, cylindrical combustion chamber design, air circulation, Taiwan.

1999

Andersson, I.; Steen, S.L.; Gustafsson, B. **The care of farm animals in emergency situations. Management, slaughter, carcass, destruction and risk of contagion. Survey of literature, practical experience, legislation and information related to emergency preparedness, and mitigation. Case histories.** *Oeverstyrelsen foer Civil Beredskap*, Stockholm (Sweden). Oeverstyr. foer Civil Beredskap. 1999; 275 p. ISBN 91-7097-062-9. Note: In English with a Swedish summary.

Descriptors: natural disasters, flooding, snow, storms, animal housing, animal husbandry, emergency relief, disposal of animal carcasses, waste disposal, infectious diseases, veterinary medicine, medical sciences, case studies.

Chen, Ten Hong, Chen, T.H. **Anaerobic treatment of poultry mortalities in a modified LB-UASB system.** *Journal of Environmental Science and Health. Part B, Pesticides, Food Contaminants, and Agricultural Wastes*. 1999; 34 (3): 527-547.

NAL Call No.: TD172.J61

Descriptors: carcass disposal, dead animal waste disposal system, methane production, anaerobic digesters, waste utilization, poultry, China.

Clanton, C.J.; Johnston, L.J.; Robinson, R.A. **Odor emission from mixtures of ground swine carcass material and liquid swine waste.** *Applied Engineering in Agriculture*. July 1999; 15 (4): 331-335. ISSN: 0003-1488.

NAL Call No.: S671.A66

Abstract: Mixing ground swine carcasses with the manure waste stream is a new concept currently being researched as an alternative carcass-disposal method. A concern has been raised with this method regarding increased odor and hydrogen sulfide emissions. Four pairs of 750-L (200-gal) polyethylene tanks were filled with swine waste and ground swine carcass material. Each pair received carcass material at the rate of 1%, 2%, or 4% (dry-matter basis) of the swine waste or received no carcass material (control). Odor analysis was determined using a dynamic olfactometer. Hydrogen sulfide gas concentration was determined using a Jerome meter. Statistical analysis was performed over the complete data set and in numerous subsets. There were no significant differences in odor unit or hydrogen sulfide concentration across any of the four treatments. The data suggests that ground carcasses can be mixed into the manure stream at a rate up to 4% (dry-matter basis) without significantly increasing odor emission above existing swine manure emission, as

indicated by odor unit and hydrogen sulfide concentration. However, a more reasonable upper limit of inclusion might be 2% carcass material (dry-matter basis), based on analysis of the air samples collected five days after the initial addition of carcass material to swine waste.

Descriptors: carcass disposal, carcass waste, liquid wastes, pig manure, mixtures, odor emissions, hydrogen sulfide, gas production.

Evans, T. **Tackling fish scraps and animal mortalities.** *Biocycle*. May 1999; 40 (5): 79-80. ISSN: 0276-5055.

NAL Call No.: 57.8 C734

Descriptors: fish scrap, dead animals, road kill, composting for carcass disposal, Kansas.

Foster, K. **The costs of raze-ing the dead.** *Pork*. 1999; 19 (8): 22, 24. ISSN: 0745-3787.

NAL Call No.: HD9435.P5

Descriptors: pig carcass disposal, dead animal waste disposal, destruction of animals, composting method, costs.

Hannotte, G. **L'incineration des animaux familiers. [The cremation of domestic animals.]** *Pratique Medicale and Chirurgicale de l'Animal de Compagnie. [Applied medicine and Surgery of Farm Animals.]* 1999; 34 (Suppl.): 17-23.

Note: In French.

NAL Call No.: SF981.A5

Descriptors: pets, cats, dogs, cremation, carcass disposal, veterinary practices.

Lawson, M.J.; Keeling, A.A. **Production and physical characteristics of composted poultry carcasses.** *British Poultry Science*. Dec 1999; 40 (5): 706-708. ISSN: 0007-1668.

NAL Call No.: 47.8 B77

Descriptors: carcasses, hens, composting, duration, bins, heat production, poultry manure, wheat straw, water content, electrical conductivity, pH, nitrogen content, carbon, ratios, potassium, copper, zinc, carcass disposal, organic fertilizers, United Kingdom.

Lopez-Moreno, M.C.; Pezza, F.; Ruffo, G.C. **Le spoglie animali provenienti da un allevamento bovino e la definizione di "rifiuto ecologico". [Disposal of carcasses from a cattle herd, and the definition of 'ecological waste'.]** *Congresso Nazionale, Marina di Ragusa, Italy, June 1999. Atti della Societa Italiana di Buiatria*. 1999; 31: 107-111. Note: In Italian.

Descriptors: cattle carcass disposal, waste disposal, legislation, Italy.

Stanford, K.; Larney, F.J.; Olson, A.F.; Yanke, L.J. **Composting as a means of disposal of sheep mortalities.**

Canadian Journal of Animal Science. Dec. 1999; 79 (4): 576. ISSN: 0008-3984. Note: 1999 Annual Meeting of the Canadian Society of Animal Science, Charlottetown, Prince Edward Island, Canada.

NAL Call No.: 41.8 C163

Descriptors: animal wastes, carcasses of sheep, composting, pollution control, time requirements, Canada

Wu, Chung Hsing; Chang, Shih Tsung; Wu, C.H.; Chang, S.T. **The temperature effects on the reduction in polycyclic aromatic hydrocarbons emission for the burning of pigs.** *ASAE-CSAE-SCGR Annual International Meeting, Toronto, Ontario, Canada, 18-21 July 1999. Paper American Society of Agricultural Engineers*. No. 994028. 1999: 15 p.

NAL Call No.: S671.3.A54

Descriptors: polycyclic aromatic hydrocarbons levels, various temperature effects, tube furnace, exhaust gas sampling, foot and mouth disease, landfills, pollutants of burning animal wastes, air pollution, pig carcass waste disposal, Taiwan.

Yang, P.C.; Chu, R.M.; Chung, W.B.; Sung, H.T. **Epidemiological characteristics and financial costs of the 1997 foot-and-mouth disease epidemic in Taiwan.** *Veterinary Record*. 1999; 145 (25) 731-734. ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Descriptors: foot and mouth disease epidemic, disease mortality, piglets, pigmeat, pork, serotypes, vaccination program for disease prevention and control, disease outbreaks, losses, pig industry costs, animal viral diseases, Taiwan.

1998

Blake, J.P.; Roden, R.M.; Scott, J.T. **Feasibility and economics of on-farm poultry carcass fermentation.** *Poultry Science*. 1998; 77 (Suppl. 1): 97. ISSN: 0032-5791. Note: Eighty-seventh Annual Meeting of the Poultry Science Association, Inc., University Park, Pennsylvania, USA, August 2-5, 1998.

NAL Call No.: 47.8 AM33P

Descriptors: carcass disposal methods, cost and returns, fermentation method.

Chen, T.H.; Wang, J.C. **Performances of mesophilic anaerobic digestion systems treating poultry mortalities.** *Journal of Environmental Science and Health. Part B, Pesticides, Food Contamination and Agricultural Wastes*. 1998; B33 (4): 487-510. ISSN: 0360-1234.

NAL Call No.: TD172.J61

Descriptors: poultry carcass disposal, anaerobic digestion, methane production, waste treatment, chemical oxygen demand, biodegradation.

Chen, T.H. **Performance of a mesophilic anaerobic digestion system treating poultry mortalities.** *ASAE Annual International Meeting, Orlando, Florida, USA, 12-16 July, 1998. Paper American Society of Agricultural Engineers*. 1998; No. 984134: 17 p.

NAL Call No.: S671.3.A54

Descriptors: closed-loop anaerobic digestion system, poultry mortality disposal, comparison of 3 leachbed methods, varying moisture contents, farm application discussed

Chen, Ten Hong; Shyu, Wu Huan, Chen, T.H., Shyu, W.H. **Chemical characterization of anaerobic digestion treatment of poultry mortalities.** *Bioresource Technology*. 1998; 63: (1): 37-48.

NAL Call No.: TD930.A32

Descriptors: poultry mortalities anaerobic digestion system, poultry carcass disposal, destruction of animals, digestion system, poultry carcasses, leachbed, upflow anaerobic sludge blanket, closed loop, methogenesis, varying temperatures and moisture contents, concentrated effluent, oxygen demand.

Fulhage, C.D. **Composting dead animals - The Missouri experience.** *ASAE Annual International Meeting, Orlando, Florida, USA, 12-16 July, 1998. Paper American Society of Agricultural Engineers*. 1998; No. 984135: 10 p.

NAL Call No.: S671.3.A54

Descriptors: animal mortalities, composting system, pig carcasses, sawdust, 6 months composting time for pigs, bovine carcasses, location, management, ingredients, Missouri.

Gale, P.; Young, C.; Oakes, D.; Stanfield, G. **Development of a risk assessment for BSE in the aquatic environment.** *Journal of Applied Microbiology*. April 1998; 84 (4): 467-477. ISSN: 1364-5072.

NAL Call No.: QR1.J687

Descriptors: bovine spongiform encephalopathy, transmission risks, rendering plants, slaughter house and landfills, water contamination, carcasses, model of risks from a rendering plant, culled cattle carcasses, chalk aquifer, barriers, risk assessment.

Johnston, L.J.; Robinson, R.A.; Clanton, C.J.; Goyal, S.M.; Ajariyakhajorn, C.; Heilig, D.M. **Homogenization for disposal of dead piglet carcasses.** *Applied Engineering in Agriculture*. Mar 1998; 14 (2): 183-186. ISSN: 0883-8542.

NAL Call No.: S671.A66

Abstract: An experiment was conducted to evaluate the feasibility of using a commercial homogenization system to dispose of dead piglets in existing swine waste handling systems. Eight polyethylene tanks in each of two trials were filled with 680 L (180 gal) of liquid swine waste to mimic conditions of a waste storage pit. Each tank was assigned

randomly to one of four treatments: 0% (control)--swine waste containing no ground dead piglets; 1%, 2% or 4%--swine waste to which ground dead piglet dry matter was added at 1%, 2% or 4% of the initial tank dry matter. Dead piglets 1.3 to 5.5 kg (2.9 to 12.1 lb) each and placentas were ground with a commercial homogenizing system. Two additional tanks in each trial were filled with liquid swine waste. Sixteen Dacron bags were suspended in each tank. Four bags contained nothing (control) and 12 bags (treated) contained about 7 g (0.25 oz) of carcass dry matter. One control bag and three treated bags were removed on Day 15, 30, 60, and 90 for determination of mass change. Addition of piglet dry matter to tanks at 0%, 1%, 2%, or 4% of the manure dry matter in the tank had no effect on the breakdown rate of dry matter in the tanks. Mass of control bags did not change during the experiment. Dacron bags containing piglet carcass dry matter lost significant amounts of mass compared with control bags, suggesting breakdown of carcass material in the bags. Initial studies indicate that introduction of homogenized dead piglets into existing liquid handling systems for swine wastes is a practical disposal alternative for piglet carcasses.

Descriptors: piglet carcasses, piglet homogenization, carcass disposal, liquid wastes, application to land, Minnesota.

Kaye, G. I.; Weber, P.B.; Evans, A.; Venezia, R.A. **Efficacy of alkaline hydrolysis as an alternative method for treatment and disposal of infectious animal waste.** *Contemporary Topics in Laboratory Animal Science*. 1998; 37: (3): 43-46. ISSN: 1060-0558.

NAL Call No.: SF405.5.A23

Descriptors: dead animal waste disposal, alkaline treatment for carcasses, autoclaving, infectious wastes, pathogen survival, *Staphylococcus aureus*, *Mycobacterium fortuitum*, *Candida albicans*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Aspergillus fumigatus*, *Mycobacterium bovis*, *Giardia muris*, pigs, sheep, rabbits, dogs, rats, mice, guinea pigs.

Keulen, A.T. **Kadaverlagerung - Kuehlgeraete fuer Kadaver im Vergleich. [Carcass storage - Comparison of cooling systems for dead animals].** *DGS Magazin* (Germany). 1998; (6): 38, 40-41. ISSN: 0947-5664. Note: In German.

NAL Call No.: SF481.D48

Descriptors: animals, abattoir byproducts, waste disposal, cold-storage process, equipment characteristics and testing, technical aspects, quality controls, waste management.

Macklin, K.S.; Norton, R.A.; Blake, J.P. **Current status of dead bird digesters in Alabama.** *Poultry Science*. 1998; 77 (Suppl. 1): 123. ISSN: 0032-5791. Note: Nineteenth Annual Meeting of the Southern Poultry Science Society and the 39th Annual Meeting of the Southern Conference on Avian Diseases, Atlanta, Georgia, USA, January 19-20, 1998.

NAL Call No.: 47.8 AM33P

Descriptors: animal husbandry, carcass disposal equipment, waste management, dead poultry, digesters, Alabama.

Myers, L.M. **Impact of poultry mortality pits on ground water quality in Georgia.** *Proceedings One Hundred and Second Annual Meeting of the United States Animal Health Association, Minneapolis, Minnesota, USA, 3-9 October, 1998*. 1998; 555-562.

Descriptors: groundwater contamination, dead poultry carcass disposal, hens, eggs, broilers, pits, pollution control, public health concerns, water pollution.

Parker, J.M.; Stikeleather, L.P.; Classen, J.J.; Ferket, P.R. **A system for on-farm preservation and storage of swine mortalities.** *ASAE Annual International Meeting, Orlando, Florida, USA, 12-16 July, 1998. Paper American Society of Agricultural Engineers*. 1998; No. 984132: 12 p.

NAL Call No.: S671.3.A54

Descriptors: pig carcass disposal, phosphoric acid preservation, pollution control, ensiling carcasses by grinding and pasteurization, pathogen reduction, method discussed.

1997

Bisping, W. **Mikrobiologische risiken der tierkorperbeseitigung und -verwertung fur die gesundheit von mensch**

und tier. [Microbiological risks in carcass removal and utilization for the health of man and animals.] *Deutsche Tierärztliche Wochenschrift*. 1997; 104 (7): 247-250. Note: In German with an English summary.

NAL Call No.: 41.8 D482

Descriptors: human and animal health risk factors, environmental contamination, carcass disposal, pathogenic microbes, *Salmonella*.

Crane, N. **Animal disposal and the environment.** *State Veterinary Journal*. 1997; 7 (3): 3-5. ISSN: 0269-554.

NAL Call No.: SF601.S8

Descriptors: dead animal carcass disposal, environment pollution concerns, United Kingdom legislation.

Deshmukh, A.C.; Patterson, P.H. **Preservation of hatchery waste by lactic acid fermentation. 1. Laboratory scale fermentation.** *Poultry Science*. Sept 1997; 76 (9): 1212-1219. ISSN: 0032-5791.

NAL Call No.: 47.8 Am33P

Abstract: In Experiment 1, two types of hatchery wastes, including cockerel chicks (CC), and shell waste (SW) blended with CC (60:40 CC:SW), were ground and mixed with a by-product carbohydrate (5, 10, and 15% wt/wt) with or without a bacterial culture and fermented for a period of 21 d. Cockerel chicks fermented with 15% carbohydrate and the culture had a pleasant smell and little H₂S production. Elevated H₂S concentrations were recorded for CC:SW samples at all carbohydrate levels when the culture was not added. No NH₃ was detected from any treatments during fermentation. The addition of culture to the CC and CC:SW by-products resulted in pH values lower (P <0.05) than those without culture on Day 21, and the 15% carbohydrate treatment significantly reduced pH beyond the 5% carbohydrate. Final proximate composition of CC and CC:SW samples with culture were not significantly different from those without culture added. In Experiment 2, carbohydrate was added at 10.0, 13.3, 16.7, and 20.0% wt/wt to CC and CC:SW in the presence of the bacterial culture. Shell waste alone was fermented with 15, 20, and 25% carbohydrate and the culture. Moisture level in this experiment was adjusted to approximately 70% for all treatments. The lowest pH for the CC and CC:SW treatments was observed at the 16.7% carbohydrate level. Shell waste pH was better maintained at the 20 and 25% carbohydrate levels. After fermentation for 21 d CC, CC:SW and SW treatments from Experiments 1 and 2 contained negligible *Escherichia coli*, and no *Salmonella* were detected.

Descriptors: hatchery waste, fermentation, lactic acid bacteria, chemical-composition, pH, *Lactobacillus*, *Streptococcus*, *Salmonella*, *Escherichia coli*, bacterial counts, egg shell, laboratory methods, cocoa products, waste utilization, carcass disposal, gas production, nutrient content, waste disposal, poultry hatchery waste birds, cockerel chicks, shell waste, fermentation process, moisture levels, carbohydrate levels, *Salmonella*, lactic acid bacteria, pH, *E. coli*, bacterial levels, gas production.

Deshmukh, A.C.; Patterson, P.H. **Preservation of hatchery waste by lactic acid fermentation. 2. Large-scale fermentation and feeding trial to evaluate feeding value.** *Poultry Science*. Sept 1997; 76 (9): 1220-1226. ISSN: 0032-5791.

NAL Call No.: 47.8 Am33P

Abstract: Two waste streams from a leghorn hatchery were preserved and recycled by fermentation with a by-product carbohydrate and extrusion processing into new feed ingredients that were evaluated with broiler chickens. Cockerel chicks (CC) and a 60:40 ratio of CC:shell waste (CC:SW) were fermented in 189-L barrels for 21 d following grinding, then mixing with a liquid culture (0.2%) and carbohydrate source at 15 and 16.66%, respectively. At 2 wk, pH was 4.44 and 5.09 for the CC and CC:SW products compared with higher values of 6.54 and 6.98 for the raw ingredients at the onset. Negligible hydrogen sulfide and no ammonia gas were recorded during the fermentation period. At 21 d, the fermented CC and CC:SW were extruded, dried, and ground to meals containing CP and TME_n levels of 47.4%, 3,187 kcal/kg, and 33.1%, 2,696 kcal/kg, respectively. Broiler chickens were fed a control diet and the CC (5 and 10%) and CC:SW (2.5 and 5%) ingredient diets with corn and soybean meal for 6 wk to evaluate feeding value and carcass yield. Body weight, gain and feed conversion at 42 d for birds fed diets supplemented with CC or CC:SW at all levels were comparable to those of the control. Diets supplemented with hatchery by-product had no negative effect on carcass measurements except ready to cook carcass and wing yield, which were significantly greater for the 10% CC:SW birds than for the control. These data indicate that nutrient dense hatchery by-products can be preserved with fermentation up to 21 d and support broiler live performance and carcass yield as dietary ingredients equal to or better than a corn-soybean meal control.

Descriptors: broiler hatchery waste, fermentation, waste disposal, chicks, broilers, body-weight, liveweight gain, feed

conversion, nutrient content, nutritive value, diets, broiler performance, carcass yield.

Environmental Agency, United Kingdom. **Risks from BSE via Environmental Pathways**. Bristol, UK. 1997.
Descriptors: public health risks, waste disposal, BSE, bovine spongiform encephalopathy, cattle carcass disposal methods, burning rendered products in power stations, animal carcass incinerators, landfills, United Kingdom.

Fulhage, C.D.; Bottcher, R.W. (Editor); Hoff, S.J. **Management of livestock mortalities through composting**. *Livestock Environment 5, Volume 2. Proceedings of the Fifth International Symposium, Bloomington, Minnesota, USA, 29-31 May, 1997*. American Society of Agricultural Engineers (ASAE). 1997; 355-370. ISBN: 0-929355-84-9.
NAL Call No.: SF91.L58 1997

Descriptors: composting of pig carcasses, composter size and design, 6 month composting time, guidelines, ingredients, recipes, nutrient content, management protocol.

Glanville, T.D.; Trampel, D.W. **Composting alternative for animal carcass disposal**. *Journal of the American Veterinary Medical Association*. Apr 15, 1997; 210: (8): 1116-1120. ISSN: 0003-1488.
NAL Call No.: 41.8 Am3

Descriptors: dead animal carcasses, carcass disposal, composting, safety, public health risks, USA.

Johnston, L.J.; Robinson, R.A.; Clanton, C.J.; Ajariyakhajorn, C.; Goyal, S.M.; Bottcher, R.W. (ed.); Hoff, S.J. **Disposal of dead piglets using homogenization**. *Livestock Environment 5, Volume 2. Proceedings of the Fifth International Symposium, Bloomington, Minnesota, USA, 29-31 May, 1997*. American Society of Agricultural Engineers (ASAE). 1997; 363-370. ISBN: 0-929355-84-9.
NAL Call No.: SF91.L58 1997

Descriptors: piglet carcass disposal, homogenization, pig liquid manure, waste disposal system, environmental and soil pollution, pigs, *Salmonella anatum*, Aujeszky virus, coliphage, microbial pathogen survival.

Kamphues, J. **Alternativen zu der hier etablierten Tierkorperverswertung - geduldet, gewünscht und gefürchtet? [Alternatives to established forms in removal of dead animals and by products in rendering plants - tolerated, intended and feared?]** *Deutsche Tierärztliche Wochenschrift*. 1997; 104: (7) 257-260. Note: In German with an English summary.

NAL Call No.: 41.8 D482

Descriptors: carcass removal and disposal, animal byproducts, rendering plants, carcass disposal methods, hygiene risk factors

Khaled, K.; Dhaou, M.A. **Pollutiones liees a l'activite des abattoirs. [Environmental pollution from abattoirs.]** *Tunisie Medicale*. 1997; 75 (5): 357-361. Note: In French.

Descriptors: animal wastes, slaughter houses/abattoirs waste, slaughterhouse carcasses, blood, pathogenic microbes, tuberculosis, coliform bacteria, *Salmonella*, composting system, public health concerns, incineration.

Khare, N; Classen, J.J.; Pilkington, D. **Kinetics of whole hog fermentation**. *ASAE Annual International Meeting, Minneapolis, Minnesota, USA, 10-14 August, 1997. Paper American Society of Agricultural Engineers*. 1997; No. 974047: 11 p. ISSN: 0149-9890.

NAL Call No.: S671.3.A54

Descriptors: fermentation, waste disposal of hog carcasses, composting, biotechnology, pigs, waste management, USA.

Kuettler, D. **Konventionelle und alternative wege der Tierkörperbeseitigung. [Traditional and alternative types of carcass disposal.]** *Deutsche Tierärztliche Wochenschrift*. 1997; 104 (7): 239-245. ISSN: 0341-6593. Note: In German with an English summary.

NAL Call No.: 41.8 D482

Descriptors: meat production, history, reviews, dead animal carcass disposal, hygiene, rendering, slaughter houses/abattoirs, slaughter, rendering laws, carcass disposal, conventional rendering, alternative procedures.

Spouge, J. **Risks from Disposing of BSE Infected Cattle in Animal Carcass Incinerators.** 1997: 50 p. Environment Agency; London, UK.

Descriptors: technical report, zoonoses, public health risks, dead cattle carcass disposal, bovine spongiform encephalopathy, BSE risk factors, United Kingdom.

Spouge, J. **Assessment of Risk from BSE Carcasses in Landfills.** 1997: 22 p. Environment Agency; London, UK.

Descriptors: landfill leachates, landfills as waste disposal systems, zoonoses potential, public health risks, BSE, bovine spongiform encephalopathy, carcass disposal, risk factors.

Spouge, J. **Risks from Burning Rendered Products from the Over Thirty Month Scheme in Power Stations.** 1997: 38 p. Environment Agency; London, UK.

Descriptors: public health risk factors, coal fired power stations as incinerators of cattle carcasses, BSE, bovine spongiform encephalopathy, carcass disposal method, United Kingdom.

Spouge, J. **Overview of Risks from BSE via Environmental Pathways.** Environment Agency; London, UK. 1997; 23 p. NAL Call No.: SF967.S63S66 1997

Descriptors: mankind, zoonoses, BSE, bovine spongiform encephalopathy, public health risks, carcass disposal, waste disposal, cattle.

Stede, M. **The problems of disposal of perished marine mammals.** *Deutsche Tierärztliche Wochenschrift.* 1997; 104 (7): 245-247. ISSN: 0341-6593.

NAL Call No.: 41.8 D482

Descriptors: stranded large whales, environmental contamination, toxins, *Clostridium botulinum*, waterfowls, carcass disposal.

Wilson, T.M.; Tuszynski, C. **Foot and mouth disease in Taiwan - 1997 overview.** *Proceedings One Hundred and First Annual Meeting of the United States Animal Health Association, Louisville, Kentucky, USA, 18-24 October, 1997.* 1997; 114-124.

NAL Call No.: SF601.U83

Descriptors: disease control, outbreaks, disinfection, foot and mouth disease, epidemiology, symptoms, dead animal carcass, disposal, Taiwan.

Wineland, M.J.; Carter, T.A.; Anderson, K.E. **Incineration or composting: cost comparison of the methods.** *Poultry Digest.* 1997; 56 (6): 22, 24-27. ISSN: 0032-5724.

NAL Call No.: 47.8 N219

Descriptors: composting carcass disposal system, economics, poultry mortalities, comparison study, incineration, layers, broilers.

1996

Blake, J.P.; Conner, D.E.; Donald, J.O. **Composting poultry carcasses.** *British Poultry Science.* 1996; 37 (Suppl.): S10-S11. ISSN: 0007-1668. Note: Meeting of the World's Poultry Science Association (UK Branch), Scarborough, England, UK, March 21-22, 1996.

NAL Call No.: 47.8 B77

Descriptors: dead bird disposal, composting method, waste management, pollution control, pathogens.

Donald, J.O.; Blake J.P. **Update on bird disposal methods.** *Poultry Digest.* 1996; 55 (7): 18-20. ISSN: 0032-5724.

NAL Call No.: 47.8 N219

Descriptors: composting of poultry mortalities, carcass condemnation, carcass disposal, regulations, poultry diseases,

incineration method, United States.

Johnston, L.J.; Ajariyakhajorn, C.; Goyal, S.M.; Robinson, R.A.; Clanton, C.J.; Evans, S.D.; Warnes, D.D. **Survival of bacteria and virus in ground piglet carcasses applied to cropland for disposal.** *Swine Health and Production*. July/Aug 1996; 4 (4): 189-194. ISSN: 1066-4963.

NAL Call No.: SF971.N472

Descriptors: pig manure, piglet carcass disposal, application to land, *Salmonella anatum*, viruses, survival, homogenization, commercial sized grinder, inoculated slurry, coliphage, soil contamination, swine diseases.

Johnston, L.J. **An alternative pig carcass disposal method using land application.** *Innovations*. West Central Experiment Station. Winter 1996; 6 (1): 1, 3.

NAL Call No.: S77.I56

Descriptors: pig carcass disposal, alternative methods, land applications.

McCaskey, T.A.; Little, J.A.; Krotz, R.M.; Lino, S.P.; Hannah, T.C. **On-farm composting feasible for disposal of swine carcasses.** *Highlights of Agricultural Research*. Agricultural Experiment Station of Auburn University. Spring 1996; 43 (1): 18-20. ISSN: 0018-1668.

NAL Call No.: 100 A11H

Descriptors: pig carcass disposal, composting techniques, odor abatement, fertilizers, nutrient content, waste disposal, Alabama.

1995

Arrow, M. **Bovine spongiform encephalopathy (BSE) suspect cases - carcass disposal.** *State Veterinary Journal*. 1995; 5 (2): 3-4. ISSN: 0269-5545.

NAL Call No.: SF601.S8

Descriptors: prion diseases, cattle carcass disposal, disease control, disease prevention, BSE, bovine spongiform encephalopathy, United Kingdom.

Blake J.P.; Donald, J.O. **Fermentation of poultry carcasses.** *Circular ANR*. Alabama Cooperative Extension Service, Auburn University. July 1995; (955): 3 p. ISSN: 1057-6991.

NAL Call No.: S544.3.A2C47

Descriptors: poultry carcass disposal, fermentation, farm storage, methodology, farm equipment, agricultural byproducts feeds, total costs, Alabama.

Fulhage, C. **Carcass composting.** *Small Farm Today*. June 1995; 12 (3): 40. ISSN: 1079-9729.

NAL Call No.: S1.M57

Descriptors: composting carcasses, poultry, pigs, carcass disposal.

Gordon, B.E.; Skoula, C.M.; Pulliam, C.L. **Pyrolytic incineration of medical waste containing animal carcasses may result in excessive barium ash levels.** *Contemporary Topics in Laboratory Animal Science*. Jan 1995; 34 (1): 68-70. ISSN: 1060-0558.

NAL Call No.: SF405.5.A23

Descriptors: carcass disposal, dead animals, waste disposal, incineration, burning, barium ash, pyrolysis.

Gustafsson, B.; Magnusson, M. **Kompostering av svinkadaver. [Dead swine composting.]** *Specialmeddelande. Institutionen for Jordbrukets Biosystem och Teknologi, Sveriges Lantbruksuniversitet*. Lund, Sweden. 1995; No. 215: 78 p. Note: In Swedish with an English summary.

NAL Call No.: TH4911.A1U6 no. 215

Descriptors: effectiveness of composting system, on farm disposal, dead piglets and sows, roofed and non-insulated silo, straw/horse manure, moisture, 6-12 months conversion time, compost used as fertilizer, Sweden.

Henry, S.T. **Composting dead swine in South Carolina.** *Clean water, Clean Environment, 21st Century Team Agriculture, Working to Protect Water Resources Conference Proceedings, March 5-8, 1995, Kansas City, Missouri.* ASAE, c1995; 3: 129-132. ISBN: 0929355601.

NAL Call No.: TD365.C54 1995

Descriptors: composting, carcasses, pigs, piglets, newborn animals, carcass disposal, sawdust, South Carolina.

Kerr, H. **Bovine spongiform encephalopathy (BSE) suspect cases carcass disposal.** *State Veterinary Journal.* 1995; 5 (1): 14-15. ISSN: 0269-5545.

NAL Call No.: SF601.S8

Descriptors: BSE, disease control and prevention, bovine spongiform encephalopathy, cattle diseases, United Kingdom.

Morrow, W.E.M.; O'Quinn, P.; Barker, J.; Erickson, G.; Post, K.; McCaw, M. **Composting as a suitable technique for managing swine mortalities.** *Swine Health and Production.* Nov/Dec 1995; 3 (6): 236-243. ISSN: 1066-4963.

NAL Call No.: SF971.N472

Descriptors: pig carcass disposal, composting, *Salmonella*, Aujeszky virus, *Erysipelothrix rhusiopathiae*, microbial inactivation, disease control, North Carolina.

Murphy, D.W.; Estienne, M.J.; Dobbins, C.N.; Foster, K.A. **Disposing of dead swine.** *Pork Industry Handbook.* Cooperative Extension Service, Purdue University. 4 p. Note: Management, PIH-133, June 1995.

NAL Call No.: SF395.P62

Descriptors: pig carcass disposal, pig farming and management, dead animal composting and fermentation, *Lactobacillus*.

Niemann, H. **Die Verwertung von Schlachtnebenprodukten und Tierkoerpern in ihrer Bedeutung fuer die Wirtschaftlichkeit der Tierproduktion und den Umweltschutz. [Utilization of slaughter byproducts and carcasses in their importance for profitability of animal production and environmental protection].** *Fleischmehl Industrie* (Germany). 1995; 47 (Suppl. 1): 1-5. Note: In German.

Descriptors: slaughter plant waste, carcass disposal, environmental protection legislation, waste management, human health risks, Germany.

Niemann, H. **Kuenftige Entwicklung der Tierkoerperbeseitigung und der Tierkoerperbeseitigungsgebuehren. [Future development of carcass disposal and carcass disposal charges].** *Fleischmehl Industrie* (Germany). 1995; 47 (8): 142-148. Note: In German.

Descriptors: livestock animals, carcasses, waste disposal, Federal Republic of Germany, legislation, slaughter plant/abattoir byproducts, meat meal, utilization costs, environmental protection.

Sander, J.E.; Cai, T.; Barnhart, H.M. Jr. **Evaluation of amino acids, fatty acids, protein, fat, and ash in poultry carcasses fermented with *Lactobacillus* bacteria.** *Journal of Agricultural and Food Chemistry.* Mar. 1995; 43 (3): 791-794. ISSN: 0021-8561.

NAL Call No.: 381 J8223

Abstract: Laboratory studies determined the effect of bacterial fermentation variables on pH, ammonia nitrogen, moisture, protein, fat, and ash in poultry carcasses before and after fermentation with dried whey and cornmeal. Field-produced silage was collected throughout the year to determine the effect of seasonal temperature variation. Amino acid profiles changed little during the 10-week fermentation period, with a slight increase in alanine and decreases in lysine, threonine, and aspartic acid. Increased moisture resulted in decreases in serine, glutamic acid, and proline. The fatty acid profile remained unchanged. Protein, fat, ash, and moisture levels did not change during fermentation. Ammonia nitrogen increased with long-term storage. Lactic acid was the major acid produced.

Descriptors: poultry carcass disposal via fermentation, chemical composition, proximate analysis, amino acids, protein

content, fatty acids, seasonal variation, temperature, silage, *Lactobacillus*.

Wiemer, U. **Tierseuchenrecht und -situation in der EU, besondere Bedeutung der Tierkoerperbeseitigung im Rahmen der Tierseuchenbekaempfung.** [Animal disease law and -situation in EU (European Union) special importance of carcass disposal within the scope of animal disease control.] *Fleischmehl Industrie* (Germany). 1995; 47 (9): 162-174. Note: In German.

Descriptors: European Communities legislation, animal disease control, endemics, veterinary medicine, epidemiology, trade, food inspection, waste disposal, waste management, environmental protection, Germany.

1994

Cai, T.; Pancorbo, O.C.; Merka, W.C.; Sander, J.E.; Barnhart, H.M. **Stabilization of poultry processing by-products and waste and poultry carcasses through lactic acid fermentation.** *Journal of Applied Poultry Research*. Spring 1994; 3 (1): 17-25. ISSN: 1056-6171.

NAL Call No.: SF481.J68

Descriptors: poultry offal, agro-industrial byproducts, silage making, additives, lactic acid bacteria, rendering dead animals, pH, ammonia, broilers carcasses, temperature, brewery byproducts, waste disposal.

Campbell K.L. (Editor), Graham, W.D. (Editor), Bottcher, A.B. **Environmentally Sound Agriculture.** American Society of Agricultural Engineers (ASAE). 1994, xv + 578 pp. *ASAE Publication:* 04-94. Note: *Proceedings of the Second Conference on Environmentally Sound Agriculture, 20-22 April 1994 in Orlando Florida*. ISBN: 0-929355-47-4.

NAL Call No.: S589.7.E57 1994

Descriptors: poultry carcasses, animal wastes, biological treatment by composting system, potential for soil and water pollution from pit carcass disposal, southern United States.

Cummins, C.G.; Wood, C.W.; Delaney, D.P. **Co-composted poultry mortalities and poultry litter: composition and potential value as a fertilizer.** *Journal of Sustainable Agriculture*. 1994; 4 (1): 7-18. ISSN: 1044-0046.

NAL Call No.: S494.5.S86S8

Descriptors: nitrogen, carbon, phosphorus, potassium, compost chemistry, waste disposal of chicken mortalities, carcasses, composts system, poultry litter, manures, compost efficiency, fertilizers, Alabama, USA.

Donald, J.; Blake, J.P.; Tucker, K.; Harkins, D. **Mini composters in poultry production.** *Circular ANR*. Alabama Cooperative Extension Service, Auburn University. May 1994; 804: 4 p. ISSN: 1057-6991. Note: In subseries: *Agricultural Engineering*.

NAL Call No.: S544.3.A2C47

Descriptors: broiler production, poultry carcass disposal, composting boxes, building materials, litter, application to land, Alabama.

Ford, W.B. **Air Curtain Incinerator system test for disposal of large animal carcasses.** *Foreign Animal Disease Report*. Emergency Programs, Veterinary Services, Animal and Plant Health Service, U.S. Dept. of Agriculture. Summer 1994; 22-2: 8-9. ISSN: 0091-8199.

NAL Call No.: aSF601.U5

Descriptors: large dead animal carcasses, waste disposal, equipment, performance testing, disease control.

Hammond, C. **Poultry composting facilities.** *Circular of the Cooperative Extension Service*, University of Georgia College of Agriculture. Athens, Ga. Oct 1994; 828: 5 p. ISSN: 0092-2595.

NAL Call No.: 275.29 G29C

Descriptors: poultry farming, carcass disposal, composting, carbon nitrogen ratio, facility layout, design calculations, costs, comparisons, operation, composters.

Handbuch des Tierkörperbeseitigungsrechts [Handbook of Animal Carcass Removal Law.] Stuttgart: R. Boorberg, c1994; 322 pp. ISBN: 3415018938. Note: In German.

NAL Call No.: KK6239.G78 1994

Descriptors: dead animal removal and disposal, law and legislation in Germany.

Haynes, R.; Williams, B. **Poultry & eggs.** *Publication of the Mississippi State University, Cooperative Extension Service.* Apr 1994; 1961: 3 p. ISSN: 0886-7488. Note: In subseries: *AgFocus '94.*

NAL Call No.: 275.29 M68Ext

Descriptors: poultry and egg farming operations, economic impacts, prices, returns, poultry manure management, composting, carcass disposal, state regulation, Mississippi.

Johnston, L.J. **Disposal of dead piglets--a new approach using homogenization.** *Innovations.* West Central Experiment Station. Fall 1994; 4 (2): 3.

NAL Call No.: S77.I56

Descriptors: carcass disposal of dead piglets, homogenization, waste disposal.

Johnston, L.J. **Disposal of swine carcasses--a new approach.** *Innovations.* West Central Experiment Station. Spring 1994; 4 (1): 4.

NAL Call No.: S77.I56

Descriptors: pig carcass disposal, piglets, piggery effluent, waste disposal.

Krieg, K. **Disposing of dead livestock.** *Publication. University of Alaska (System) Cooperative Extension Service.* Oct 1994; 100G-00746, rev.: 2 p.

NAL Call No.: 275.29 AL13P

Descriptors: carcass disposal of dead livestock, Alaska.

Kuettle, D. **Tierkoerperbeseitigung: Rechtliche Probleme der Beseitigung von genussuntauglichem Gefluegel. [Carcass disposal: Legal problems with the disposal of poultry unfit for human consumption].** *Fleischmehl Industrie* (Germany). 1994; 46 (3): 46-48. Note: In German.

Descriptors: poultry mortalities, waste disposal legislation, pollution control, Germany.

Niemann, H. **Aktuelle und zukuenftige Probleme bei der Verwertung von Schlachtierkoerperteilen. [Topical and future problems by the commercialization on parts of the carcasses].** *Fleischmehl Industrie* (Germany). (1994); 46 (1): 2-7. Note: In German.

Descriptors: carcass waste disposal, slaughter plant/abattoir byproducts, meat industry costs, legislation, pollution control.

Oberthuer, R.C. **Technische Probleme der Tierkoerperbeseitigung von genussuntauglichem Gefluegel. [Technical problems of the carcass disposal on poultry unit for human consumption].** *Fleischmehl Industrie* (Germany). (1994); 46 (2): 22-28. Note: In German.

Descriptors: poultry waste disposal, technology, temperature, storage, wastewater pollutant load, drying, sterilizing, slaughter plant/abattoir byproducts.

Polk County Soil & Water Conservation District (Tenn.). **A Guide to Poultry Composting.** Polk County Soil & Water Conservation District, Benton, TN, c1994; 1 videocassette (ca. 14 min.): sd., col. 1 brochure (10 identical copies).

NAL Call No.: Videocassette no. 2219

Descriptors: poultry carcass disposal method, composting of dead animals, designing a facility.

Poultry Water Quality Consortium. **Poultry Water Quality Handbook.** The Consortium, Chattanooga, TN (HB-2C, 1101 Market St., Chattanooga, 37402-2801). 1994; 1 v. (loose-leaf): ill.

NAL Call No.: TD899.P65P68 1994

Descriptors: poultry waste disposal, environmental aspects, water quality concerns, poultry manure, poultry carcass disposal, poultry processing water requirements, poultry industry byproducts.

Radenkovic, B. **Problemi neskladljivog uklanjanja zivotinjskih leseva i njegovo resavanje u Srbiji [The problem of the safe removal of dead animals and its solution in Serbia.]** *Veterinarski Glasnik*. 1994; 48 (10): 909-912. ISSN: 0350-2457. Note: In Serbo-Croatian with English and Russian summaries.

NAL Call No.: 41.8 J93

Descriptors: carcass disposal, livestock animals, Yugoslavia.

Reddy, M.R.; Chawak, M.M.; Sahoo, P.K. **Scientific disposal of dead birds and hatchery waste.** *Poultry Adviser*. 1994; 27 (11): 39-44. ISSN: 0970-1958.

Descriptors: poultry hatchery mortalities, carcass disposal, hatcheries, India.

Sabo, F.; Moessinger, M.; Schneider, T. **Optimierung bestehender biologischer Abluftreinigungsanlagen bei Tierkoerperbeseitigungsanlagen. [Improvement of existing biological waste air cleaning constructions by carcass disposal houses].** *Fleischmehl Industrie* (Germany). 1994; 46 (6): 109-113. Note: In German with a German summary.

Descriptors: carcass disposal, waste disposal facilities, air cleaners, air cleaning equipment, deodorizing, appropriate technology, organic matter, inorganic compounds, pollution control.

Senne, D.A.; Panigrahy, B.; Morgan, R.L. **Effect of composting poultry carcasses on survival of exotic avian viruses: highly pathogenic avian influenza (HPAI) virus and adenovirus of egg drop syndrome-76.** *Avian Diseases*. Oct/Dec 1994; 38 (4): 733-737. ISSN: 0005-2086. Note: In English with a Spanish summary.

NAL Call No.: 41.8 Av5

Abstract: Eight-week-old chickens were inoculated with one of two exotic viruses to determine the effect of composting on virus survival. Group 1 chickens were inoculated with highly pathogenic avian influenza (HPAI) virus via the caudal thoracic air sac. Group 2 chickens were inoculated with the adenovirus that causes egg drop syndrome-76 (EDS-76) by the oral route. Five days after inoculation, lung, trachea, and air sacs for HPAI and spleen, cecal tonsils, and bursa of Fabricius for EDS-76 were collected and composted with poultry carcasses. At the end of the first 10 days of composting, virus-isolation efforts showed that the HPAI virus had been inactivated, and only 1 of 20 tissue samples yielded the adenovirus of EDS-76. The viruses of HPAI and EDS-76 were completely inactivated at the end of the second 10-day period of the two-stage composting process. Control tissues collected at necropsy and frozen at -70 C for virus isolation were all positive for virus.

Descriptors: chickens, avian influenza virus, avian adenovirus, survival rates, egg drop syndrome, carcasses, carcass disposal, composting, inactivation of pathogens, disease control, two stage composting.

Wachendoerfer, G.; Valder, W.A. **Die wichtigsten Schafkrankheiten und ihre Bekaempfung, 9. [The most important sheep diseases and their control, 9.]** *Deutsche Schafzucht* (Germany). 1994; 86 (12): 282-283. ISSN: 0720-0862. Note: In German.

Descriptors: sheep, drugs, disinfection, trade, European Communities, animal housing, waste disposal, carcass disposal, regulations.

Walker, W.R.; Lane, T.J.; Jennings, E.W.; Myer, R.O.; Brendemuhl, J.H. **Alligator production in swine farm lagoons as a means of economical and environmentally safe disposal of dead pigs.** *Environmentally Sound Agriculture. Proceedings of the Second Conference 20-22 April 1994*. American Society of Agricultural Engineers, c1994. 1994: 373-378. ISBN: 0929355474.

NAL Call No.: S589.7.E57 1994

Descriptors: pig carcass disposal, waste utilization, alligator feeding, performance and liveweight gain, hides and skins, meat quality, food safety, ancillary enterprises.

Walker, W.R.; Lane, T.J.; Jennings, E.W.; Myer, R.O.; Brendemuhl, J.H.; Campbell, K.L. (Editor); Graham, W.D. (Editor); Bottcher, A.B. **Alligator production in swine farm lagoons as a means of economical and environmentally safe disposal of dead pigs.** *Environmentally Sound Agriculture: Proceedings of the Second*

Conference, 20-22 April 1994, Orlando, Florida. American Society of Agricultural Engineers. *ASAE Publication.* 1994; 04-94: 373-378. ISBN: 0-929355-47-4.

NAL Call No.: S589.7.E57 1994

Descriptors: feasibility of rearing alligators, pig farming mortality disposal, alligator production results, hides and skins, weight gain, feeding.

Watts, N.N. **Dead bird composting.** *Environmentally Sound Agriculture. Proceedings of the Second Conference 20-22 April 1994.* American Society of Agricultural Engineers, c1994. 1994; 379-382. ISBN: 0929355474.

NAL Call No.: S589.7.E57 1994

Descriptors: poultry carcass disposal, waste utilization, composting.

Weston, D. **Assessing your livestock and dairy operation.** *NDSU Extension Service.* Fargo, N.D.: The University. Apr 1994; AE-1079: 4 p. ISSN: 1061-7809.

NAL Call No.: S544.3.N9C46

Descriptors: livestock farming, dairying, operations, water pollution control, wells water safety, animal manure storage, runoff, silage, carcass disposal, waste water management.

1993

Arkansas Soil and Water Conservation Commission. United States. Environmental Protection Agency. **Dead Bird Disposal.** Arkansas Soil and Water Conservation Commission, [between 1990 and 1993]. 1 videocassette (29 min., 11 sec.) sd., col. Note: Funding was made possible by a portion of a grant from the U.S. Environmental Protection Agency.

Abstract: To educate producers about the best water quality management for the disposal of poultry carcasses.

Descriptors: agricultural wastes, Arkansas, animal waste Law and legislation United States, water quality management, water pollution, United States.

Bell, D. **The egg industry of California and the USA in the 1990s: a survey of systems.** *World's Poultry Science Journal (UK).* Mar 1993; 49 (1): 58-64. ISSN: 0043-9339. Note: Summaries in French, German, Spanish, and Russian.

NAL Call No.: 47.8 W89

Descriptors: egg production, farm surveys, hens, poultry manure, carcass disposal, California.

Blake, J.P.; Conner, D.E.; Donald, J.O. **Fermentation offers option for handling poultry carcasses.** *Highlights of Agricultural Research Alabama Agricultural Experiment Station.* Auburn University. Spring 1993; 40 (1): 15. ISSN: 0018-1668.

NAL Call No.: 100 AL1H

Descriptors: poultry carcass disposal, fermentation, feeds, pathogens, Alabama.

Blake, J.P.; Conner, D.E.; Donald, J.O. **Fermentation of poultry carcasses prior to rendering.** *Proceedings of the Western Poultry Disease Conference. Davis, Calif.: University of California.* 1993; 42nd: 27-29. Note: Meeting held on Feb. 28-Mar. 2, 1993, Sacramento, California.

NAL Call No.: SF995.W4

Descriptors: poultry carcass disposal, fermentation process.

Bohm, R.; Prosek, J. **Klikvidaci kadaveru a odpadu v drivejsi dobe. [Carcass and waste disposal in the past.]** *Veterinarstvi.* 1993; 43 (8): 313. Note: In Czech.

NAL Call No.: 41.8 V6439

Descriptors: veterinary history, livestock carcass disposal, dead animal waste disposal.

Casper, J. **The Maryland plan for disaster recovery: disposal of dead animals.** *Journal of the American Veterinary Medical Association.* Oct 1, 1993; 203 (7): 997-999. ISSN: 0003-1488. Note: Paper presented at the "Symposium on

Disaster Medicine", Minneapolis, Minnesota.

NAL Call No.: 41.8 Am3

Descriptors: dead animals, mortality in disasters, carcass disposal, Maryland.

Cleplef, D.J.; Wobeser, G. **Observations on waterfowl carcasses during a botulism epizootic.** *Journal of Wildlife Diseases.* Jan 1993; 29 (1): 8-14. ISSN: 0090-3558.

NAL Call No.: 41.9 W64B

Descriptors: waterfowl, botulism, carcass disposal, epizootiology, *Clostridium botulinum*, Saskatchewan, Canada.

Conner, D.E.; Blake, J.P.; Donald, J.O. **Composting as a method for the disposal of poultry carcasses.** *Proceedings of the Western Poultry Disease Conference.* University of California., Davis, CA. 1993; 42nd: 24-27. Note: Meeting held on Feb. 28-Mar. 2, 1993, Sacramento, California.

NAL Call No.: SF995.W4

Descriptors: poultry carcass disposal, composting.

Cummins, C.G.; Wood, C.W.; Delaney, D.P. **Co-composted poultry mortalities and poultry litter: composition and potential value as a fertilizer.** *Journal of Sustainable Agriculture.* 1993; (1): 7-19. ISSN: 1044-0046.

NAL Call No.: S494.5.S86S8

Descriptors: composts, poultry manure, poultry carcass disposal, waste utilization, chemical properties and composition, composting, surveys, Alabama.

Cummins, Christina G.; Wood, C. Wesley; Delaney, Dennis P.; Blake, John P. **Chemical composition and potential fertilizer value of poultry mortalities co-composted with poultry litter.** *Poultry Science.* 1993; 72 (Suppl. 1): 69. ISSN: 0032-5791. Note: Eighty-second Annual Meeting of the Poultry Science Association, Inc., East Lansing, Michigan, USA, July 26-29, 1993.

NAL Call No.: 47.8 AM33P

Descriptors: dead bird carcass disposal, composting system, poultry litter, fertilizer value.

Doyle, C.J.; Groves, C.R. **Fallen stock disposal: a case for public intervention.** *Scottish Agricultural Economics Review.* 1993; 7: 51-62. ISSN: 0950-1509.

Descriptors: animal mortalities, carcass disposal, pollution potential, public health risks, Scotland.

Koesters, J. **Animal carcass disposal.** *Pareys Studentexte; Kompendium der Gefluegelkrankheiten, 5. [Auflage Parey's Textbooks; Compendium of Poultry Diseases, Fifth Edition].* 1993; 76. Siegmann-Otfried: Ed Verlag Paul Parey, Seelbuschring 9-17, D-1000 Berlin 42, Germany. ISSN: 0939-303X; ISBN: 3489537165. Note: In German.

NAL Call No.: SF995.S55 1993

Descriptors: dead animal disposal, carcass disposal, waste disposal, methods.

Krieg, K. **Factors to consider before establishing an Alaskan livestock enterprise.** *Publication University of Alaska (System) Cooperative Extension Service.* May 1993; 100G-00743, rev.: 4 p. Note: In subseries *Alaska Livestock Series.*

NAL Call No.: 275.29 AL13P

Descriptors: animal husbandry, livestock enterprises, feasibility, land clearance, livestock feeding, animal breeding and housing, farm equipment, carcass disposal, Alaska.

Livestock Industry Bureau. **Statistics on Animal Hygiene 1992.** 1993: 130 p. National Institute of Animal Health; Tsukuba-gun; Japan. Note: In English and Japanese.

NAL Call No.: 41.9 J274A

Descriptors: disease surveys and statistics, poultry, swine, cattle, bacterial and viral diseases, disease control, immunization, quarantine, drug therapy, antibiotics, animal insurance, slaughter, carcass disposal, Japan.

Logsdon, G. **Turnaround in the poultry industry.** *BioCycle.* Feb 1993; 34 (2): 60-63. ISSN: 0276-5055.

NAL Call No.: 57.8 C734

Descriptors: dead animal carcass disposal, poultry manure, composting, fertilizers, nitrogen, animal feeding, Delaware, Arkansas.

Morrow, W.M.; Ferket, P.R. **The disposal of dead pigs: A review.** *Swine Health and Production*. May 1993; 1 (3): 7-13. ISSN: 1066-4963.

NAL Call No.: SF971.N472

Descriptors: pig carcasses, carcass disposal, composting, storage, extrusion, fermentation.

Murphy, D.W. **Minicomposter--dead bird disposal.** *Fact Sheet, Cooperative Extension Service, College Park, Maryland*. 1992/1993; 642: 4 p. ISSN: 0093-0091.

NAL Call No.: 275.29 M36Fa

Descriptors: broilers, dead animals, mortality, carcass disposal, composting, Maryland.

Ritter, W.F.; Chirnside, A.E.M. **Impact of dead bird disposal pits on ground-water quality on the Delmarva Peninsula.** *Bioresource Technology*. 1995; 53 (2): 105-111. ISSN: 0960-8524.

NAL Call No.: TD930.A32

Abstract: Ground-water quality around six existing dead bird disposal pits was monitored for ammonia, nitrate chlorides, fecal coliforms and fecal streptococci. The disposal pits were located on Evesboro loamy sand, Sassafras sandy loam, Fallsington sandy loam and Klej loamy sand soils. Elevated ammonia concentrations were detected in the ground-water at three of the six existing disposal pits. Ammonia concentrations as high as 366 mg/l N were measured. Fecal coliform and fecal streptococcus concentrations were low. Over 70% of the sample did not contain fecal coliforms or fecal streptococci. Chloride concentrations were above normal levels in only one monitoring well at one of the disposal pits. Disposal pits that handle the normal mortality of a broiler grower should not cause any more ground-water contamination than an individual septic tank and soil absorption bed. If disposal pits are to be used in the future on the Delmarva Peninsula, they should be regulated.

Descriptors: chicken carcass disposal, waste disposal pits, groundwater pollution, water quality, public health risks, ammonia and nitrate levels, chloride, fecal coliforms, fecal *Streptococcus*, nitrate, nitrogen, Delaware.

Scarborough, J.N.; Williams, T.H.; Palmer, D.H. **Composting facilities for dead poultry disposal.** *Paper American Society of Agricultural Engineers*. 1993; No. 93-3006: 11 p. ISSN: 0149-9890.

NAL Call No.: 290.9 Am32P

Descriptors: poultry carcasses, broilers, carcass composting system, facilities, design, process technology, construction and operation.

Stone, D.R. **Fighting environmental regulations.** *Meat Marketing & Technology*. Jan 1995; 3 (1): 46, 48. ISSN: 1079-1604.

NAL Call No.: HD9411.M438

Descriptors: meat byproducts, U.S. laws and regulations regarding carcass disposal, agricultural waste disposal, environmental policy, meat and livestock industry.

1992

Blake, J.P.; Donald, J.O. **Alternatives for the disposal of poultry carcasses.** *Poultry Science*. July 1992; 71 (7): 1130-1135. ISSN: 0032-5791.

NAL Call No.: 47.8 AM33P

Abstract: Every broiler production facility is faced with the reality of carcass disposal. Nationwide, this represents a tremendous amount of organic matter that requires environmentally and biologically safe disposal or utilization. Disposal of poultry carcasses has been identified as one of the major problems facing the poultry industry. If poultry carcasses resulting from death by natural occurrences at such high levels of production are not disposed of by environmentally acceptable methods, future industry expansion will be limited or regulatory constraints will be

imposed. Methods for the disposal of poultry carcasses include burial, incineration, composting, and rendering. Burial and incineration impose environmental concerns that are becoming less acceptable. Composting is environmentally sound, relatively inexpensive, and is gaining widespread acceptance. Rendering carcasses into a valued protein by-product meal is another alternative. Methods for transporting fresh or refrigerated carcasses to a rendering facility are being investigated. When coupled with rendering, fermentation is an excellent alternative for storing and sporting pathogen-free poultry carcasses. Extrusion of carcasses provides an alternative to conventional by-product rendering. AD methods that allow for the environmentally safe and biosecure disposal of poultry carcasses should be considered. No single method will completely solve the problem.

Descriptors: poultry waste disposal, carcass disposal, rendering, fermentation, composting, extrusion, burial, incineration.

Collins, E.R. Jr.; Weaver, W.D. **Rendering poultry mortalities.** *Paper American Society of Agricultural Engineers.* Summer 1991; No. 914050: 8 p. ISSN: 0149-9890. Note: Paper presented at the "1991 International Summer Meeting sponsored by the American Society of Agricultural Engineers," June 23-26, 1992, Albuquerque, New Mexico.

NAL Call No.: 290.9 Am32P

Descriptors: poultry carcass disposal, rendering, disease control.

Conner, D.E.; Blake, J.P.; Kotrola, J.S. **Levels of carbohydrate needed to support endogenous fermentative stabilization of poultry carcasses and the effect of propionic acid on fungal growth.** *Poultry Science.* 1992; 71 (Suppl. 1): 47. ISSN: 0032-5791. Note: Eighty-first Annual Meeting of the Poultry Science Association, Fayetteville, Arkansas, USA, August 3-6, 1992.

NAL Call No.: 47.8 AM33P

Descriptors: fermentation, poultry carcasses, processing, composition of mixture, fungal control.

Donald, J.O.; Blake, J.P.; Conner, D.E. **Dead bird composter construction and operation in Alabama.** *Paper American Society of Agricultural Engineers.* Summer 1991; No. 914052: 8 p. ISSN: 0149-9890. Note: Paper presented at the "1991 International Summer Meeting sponsored by the American Society of Agricultural Engineers," June 23-26, 1992, Albuquerque, New Mexico.

NAL Call No.: 290.9 Am32P

Descriptors: poultry mortality, carcass disposal, waste disposal, composting systems, Alabama.

Kharlakian, H.G.; Thomas, O.P.; Murphy, D.W.; Silbert, S.A.; Slaughter, L.H. **Factors affecting the quality of broiler silage.** *Proceedings Maryland Nutrition Conference for Feed Manufacturers.* 1992: 153-160. ISSN: 0542-8386. Note: Meeting held on April 2-3, 1992, at the University of Maryland, College Park, Md.

NAL Call No.: 389.9 UN342

Descriptors: broiler poultry farming, dead animals, mortality, carcass disposal, waste disposal, silage making.

Kotrola, J.S.; Conner, D.E.; Blake, J.P. **Development of a practical fermentative process for stabilization of poultry carcasses prior to rendering: scale-up of laboratory studies.** *Poultry Science.* 1992; 71 (Suppl. 1): 48. ISSN: 0032-5791. Note: Eighty-first Annual Meeting of the Poultry Science Association, Fayetteville, Arkansas, USA, August 3-6, 1992.

NAL Call No.: 47.8 AM33P

Descriptors: poultry carcasses, fermentation process, scale up.

Lawrence, A. **Waste not - want not?** *State Veterinary Journal.* 1992; 2 (2): 5-7. ISSN: 0269-5545.

NAL Call No.: SF601.S8

Descriptors: animal waste disposal, legislation, carcass disposal, animal products, pet food.

Moorhouse, D.G. **On-farm carcass disposal. Means and methods.** *Pig Veterinary Journal.* 1992; 28: 84-94. ISSN: 0956-0939.

NAL Call No.: SF971.P5

Descriptors: pig carcass disposal, on the farm, environmental protection, pollution control, waste management.

Murphy, D. **Massive depopulation and disposal by composting.** *Proceedings of the United States Animal Health Association.* 1992; 96: 342-347.

NAL Call No.: SF601.U83

Descriptors: poultry carcass disposal, composting methods.

Sims, J.T.; Murphy, D.W.; Handwerker, T.S. **Composting of poultry wastes: Implications for dead poultry disposal and manure management.** *Journal of Sustainable Agriculture.* 1992; 2 (4): 67-82. ISSN: 1044-0046.

NAL Call No.: S494.5.S86S8

Descriptors: chicken carcass disposal, composting methods, composts, nitrogen, mineralization.

Ouart, M.D.; Bucklin, R.A.; Douglas, C.R. **Farm structures for manure storage and composting mortality.** *Proceedings of the Florida Poultry Institute. Gainesville, Fla.: Florida Agricultural Extension Service.* 1992; 501: 18-24. Note: Meeting held Oct 13-14, 1992, Gainesville, Florida.

NAL Call No.: SF481.2.F56

Descriptors: farm storage, farm buildings, poultry manure, dead animal carcass composting for carcass disposal, broilers.

Rode, R.A. **Disposal of fish mortalities.** *Arkansas Aquafarming.* Cooperative Extension Service, University of Arkansas. Jan/Mar 1992; 10 (1): 5-6.

NAL Call No.: SH35.A8A75

Descriptors: fish carcasses disposal, composting system, equipment, water and air pollution concerns, Arkansas.

1991

Blake, J.P.; Conner, D.E., Donald, J.O. **Wheat straw and peanut hulls are useful bulking agents in composting poultry carcasses.** *Poultry Science.* 1991; 70 (Suppl. 1): 14. ISSN: 0032-5791. Note: Eightieth Annual Meeting of the Poultry Science Association, Inc., College Station, Texas, USA, August 12-16, 1991.

NAL Call No.: 47.8 AM33P

Descriptors: dead poultry carcass disposal, composting system, bulking agents for the mixture, straw, peanut hulls.

Donald, J.O.; Blake, J.P.; Conner, D.E. **Dead bird composter construction and operation in Alabama.** *Sum* 1991: 8 p. ISSN: 0149-9890. Note: Paper presented at the "1991 International Summer Meeting sponsored by the American Society of Agricultural Engineers," June 23-26, 1992, Albuquerque, New Mexico.

NAL Call No.: 290.9 Am32P

Descriptors: poultry mortalities waste disposal, composting methods, environmental protection and control, Alabama, USA.

Donald, J.O.; Blake, J.P. **Construction of a dead-poultry composter.** *Circular.* ANR Alabama Cooperative Extension Service, Auburn University. July 1991; 604: 4 p. ISSN: 1057-6991. Note: In subseries *Agricultural Engineering.*

NAL Call No.: S544.3.A2C47

Descriptors: poultry carcass disposal, composting of dead animals, farm buildings, Alabama.

Pescatore, A.J.; Cantor, A.H.; Rutz, F.; Straw, M.L.; Johnson, T.H. **Evaluation of composting methods for disposal of mature fowl carcasses.** *Poultry Science.* 1991; 70 (Suppl. 1): 174. ISSN: 0032-5791. Note: Twelfth Annual Meeting of the Southern Poultry Science Society, Atlanta, Georgia, USA, January 28-29, 1991.

NAL Call No.: 47.8 AM33P

Descriptors: poultry carcasses, composting methods, methods comparison study.

1990

Barton, T.L.; Benz, R.C. **Composting poultry carcasses.** *MP University of Arkansas Cooperative Extension Service.* Apr 1990; 317: 14 p.

NAL Call No.: 275.29 AR4MI

Descriptors: composting of dead poultry, carcass disposal system.

Trumbo, S.T. **Reproductive success, phenology and biogeography of burying beetles (Silphidae, Nicrophorus).** *American Midland Naturalist.* July 1990; 124 (1): 1-11. ISSN: 0003-0031.

NAL Call No.: 410 M58

Descriptors: Coleoptera, biogeography, phenology, reproductive behavior, reproductive efficiency, carcass disposal, North Carolina, *Nicrophorus orbicollis*, *Nicrophorus pustulatus*, *Nicrophorus tomentosus*, piedmont area.

1989

Poos, Ulrich. **Die Seuchenepidemiologische Bedeutung der ausseren Haut und ihre Behandlung im Tierseuchen- und Tierkörperbeseitigungsgesetz unter besonderer Berücksichtigung des Milzbrandes. [Epidemiological significance of hides and skins and its consideration in legislation on diseases of animals and on carcass disposal, with particular emphasis on anthrax.]** *Die Seuchenepidemiologische Bedeutung der ausseren Haut und ihre Behandlung im Tierseuchen und Tierkörperbeseitigungsgesetz unter besonderer Berücksichtigung des Milzbrandes.* Hannover: [s.n.], 1989. 180 p. ill. Note: Doctoral dissertation--Tierärztliche Hochschule Hannover, 1989. In German with and English summary.

NAL Call No.: 41.2 H198 1989 [no. 134]

Descriptors: laws and regulations, epidemiology, public health concerns, hides and skins, carcass disposal methods, anthrax.

1988

Berry, J. **Dead bird disposal.** *OSU Extension Facts Cooperative Extension Service, Oklahoma State University.* Apr 1988; 8208: 4 p. ill. ISSN: 0473-6885.

NAL Call No.: S544.3.O5O5

Descriptors: poultry carcass disposal, pits, septic tanks, layout and planning, Oklahoma.

Dobbins, C.N. Jr. **Lactobacillus fermentation: a method of disposal/utilization of carcasses contaminated by pathogenic organisms or toxic chemicals.** *National Poultry Waste Management Symposium: Columbus, Ohio, April 18 and 19, 1988.* Supported by The United States Department of Agriculture and The Ohio State University. Columbus, Ohio: Department of Poultry Science, The Ohio State University, 1988. p. 76-80.

NAL Call No.: TD899.P65N3 1988

Descriptors: poultry carcass disposal, carcass waste, microbial contamination, pathogens, toxic substances, utilization, *Lactobacillus* fermentation, United States.

Lomax, K.M.; Malone, G.W. **On-farm digestion system for dead poultry.** *American Society of Agricultural Engineers. Microfiche Collection.* 1988; Fiche no. 88-4075: 11 p. Note: Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices.

NAL Call No.: FICHE S72

Descriptors: dead birds, poultry industry, waste disposal, carcass disposal, broilers, aerobic treatment, anaerobic treatment, digesters, on farm processing.

Ritter, W.F.; Chirnside, A.E.M.; Harris, J.R. **Impact of dead bird disposal on groundwater quality.** *American Society of Agricultural Engineers, Microfiche Collection.* 1988; Fiche no. 88-2546: 23 p. Note: Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Note: Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices.

NAL Call No.: FICHE S72

Descriptors: groundwater pollution, poultry farming, dead animal carcass disposal, Delaware.

Web Resources

Livestock Environment and Development Virtual Centre.

<http://www.virtualcentre.org/en/dec/manure/default.htm>

Swine waste disposal decision support tool.



The Animal Welfare Information Center, <http://awic.nal.usda.gov/contact-us>

<http://www.nal.usda.gov/awic/pubs/carcass.htm>

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