



**Issue 201 | August 7, 2015 | Focus on Animal Waste Management**

This issue focuses on the management of animal waste and includes recent studies and resources on the environmental and health impacts of waste from domestic animals such as cattle, pigs, and chickens. Specifically, reviews of animal waste management by the International Livestock Research Institute, and diarrheal infections associated with animal husbandry are included, as well as a WHO fact sheet on Taeniasis/Cysticercosis, and country studies from Bangladesh, Egypt, Ghana, and more.

**WASTE MANAGEMENT**

**Global Assessment of Manure Management Policies and Practices**, 2014. E Teenstra. [Link](#)

The study assessed livestock manure policies in 34 countries in Asia, Africa, and Latin America, then looked in depth at manure management practices in Bangladesh, Vietnam, Ethiopia, Malawi, Argentina and Costa Rica. The authors found wide variations in practice, with particular challenges in the handling of liquid manure; they also found government policies and lack of coordination often hindered the implementation of improved practices.

**Manure Management Practices in Urban and Peri-urban areas of Tanzania pose a Public Health Threat**, n.d. University of Copenhagen. [Link](#)

Livestock are increasingly kept in urban and peri-urban areas as a consequence of the growing urban demand for fresh meat and livestock products. Manure is a valuable byproduct of livestock production, but if it is not treated according to good manure handling practices, it may cause a public health treat due to the presence of pathogenic bacteria in the dung. A recent international research project working with cattle farmers in urban areas of Tanzania has documented that good manure handling practices are not always followed, and that this lead to direct human contact and environmental contamination with cattle manure.

**A One Health Perspective for Integrated Human and Animal Sanitation and Nutrient Recycling**, 2015. H Nguyen-Viet. | [Order from CABI](#) | [Free View/Download](#)

This chapter discusses a conceptual framework for integrated health and environmental assessment that combines health status, and the physical, socioeconomic and cultural environments in order to improve human health and minimize environmental impact. This concept's application in the management of human and animal excreta in Vietnam is then described.

### **Review of Evidence on Antimicrobial Resistance and Animal Agriculture in**

#### **Developing Countries**, 2015. D Grace, International Livestock Research Institute. [Link](#)

This short paper identifies key evidence gaps in our knowledge of livestock- and fisheries-linked antimicrobial resistance in the developing world, and to document on-going or planned research initiatives on this topic by key stakeholders. The antimicrobial resistant (AMR) infections in animals that are of most potential risk to human health are likely to be zoonotic pathogens transmitted through food, especially Salmonella and Campylobacter. In addition, livestock associated methicillin resistant Staphylococcus aureus (LA MRSA) and extended spectrum beta lactamase E. coli (ESBL E. coli) are emerging problems throughout the world.

### **Biogas Production from Vietnamese Animal Manure, Plant Residues and Organic Waste: Influence of Biomass Composition on Methane Yield.**

*Asian-Australas J Anim Sci.* Feb 2015. T Cu. [Link](#)

Anaerobic digestion is an efficient and renewable energy technology that can produce biogas from a variety of biomasses such as animal manure, food waste, and plant residues. In developing countries, this technology is widely used for the production of biogas using local biomasses, but there is little information about the value of these biomasses for energy production. This study was carried out with the objective of estimating the biogas production potential of typical Vietnamese biomasses such as animal manure, slaughterhouse waste, and plant residues.

## **ENVIRONMENTAL HEALTH IMPACTS**

### **Human Diarrhea Infections Associated with Domestic Animal Husbandry: A Systematic Review and Meta-Analysis.**

*Trans R Soc Trop Med Hyg*, Mar 2014. L Zambrano. [Link](#)

Domestic animal husbandry, a common practice globally, can lead to zoonotic transmission of enteric pathogens. However, this risk has received little attention to date. This systematic review and meta-analysis examines the evidence for an association between domestic exposure to food-producing animals and cases of human diarrhea and specific enteric infections. Results suggest that domestic poultry and livestock exposures are associated with diarrheal illness in humans. Failure to ascertain the microbial cause of disease may mask this effect. Exposure to domestic animals should be considered a risk factor for human diarrheal illness and additional studies may identify potential mitigation strategies to address this risk.

### **Formative Research on Hygiene Behaviors and Geophagy among Infants and Young Children and Implications of Exposure to Fecal Bacteria.**

*Am Jnl Trop Med Hyg*, Oct 2013. F Ngure. [Link](#)

Researchers conducted and recorded WASH-related behaviors to identify pathways of fecal-oral transmission of bacteria among infants. Hand washing with soap was not common and drinking water was contaminated with Escherichia coli in half of the households. A one-year-old infant ingesting 1 gram of chicken feces in a day and 20 grams of soil from a laundry area of the kitchen yard would consume 4,700,000–23,000,000 and 440–4,240 E. coli, respectively, from these sources.

### **Status of Taenia solium cysticercosis and Predisposing Factors in Developing Countries Involved in Pig Farming.**

*Int J One Health*, Jan 2015. J Kungu. [Link](#)

Taenia solium cysticercosis is a disease of pig and human populations considered endemic in many developing countries in Latin America, Africa, and South East Asia, that has a serious

impact on public health and agriculture. Poor pig production practices, poor hygiene, and sanitation habits have been important in the maintenance of the *T. solium* life-cycle. The major gaps identified in this review include current information on PC prevalence in pigs with few reports on the condition in humans in most developing countries.

**Occurrence of Porcine Cysticercosis in Free-Ranging Pigs Delivered to Slaughter Points in Arapai, Soroti District, Uganda.** *Onderstepoort J Vet Res.* 2015 Jun. [Link](#)

Poverty, hunger and the need for production of pigs with meagre or zero inputs have made most farmers release their pigs to range freely, thus creating a pig-human cycle that maintains *Taenia solium*, the pig tapeworm and cause of porcine cysticercosis, in the ecosystem. A preliminary study was designed to establish the prevalence of porcine cysticercosis by postmortem examination of the tongue and carcass of free-range pigs from February to April 2014 in Arapai subcounty, Soroti district, eastern Uganda. Out of 178 pigs examined, 32 were qualitatively positive for porcine cysticercosis, representing a prevalence of 18.0%. This high prevalence represents a marked risk to the communities in the study area of neurocysticercosis, a debilitating parasitic zoonosis. Proper human waste disposal by use of pit latrines, confinement of free-range pigs and treatment with albendazole and oxfendazole are recommended.

**Linking Human Health and Livestock Health: A "One-Health" Platform for Integrated Analysis of Human Health, Livestock Health, and Economic Welfare in Livestock Dependent Communities.** *PLoS One*, Mar 2015. S Thumbi. [Link](#)

This study platform provides a unique longitudinal dataset that allows for the determination and quantification of linkages between human and animal health, including the impact of healthy animals on human disease averted, malnutrition, household educational attainment, and income levels.

**Taeniasis/Cysticercosis Fact Sheet**, 2015. WHO. [Link](#)

Cysticercosis mainly affects the health and livelihoods of subsistence farming communities in developing countries of Africa, Asia, and Latin America. It also reduces the market value of pigs and cattle, and makes especially pork unsafe to eat. Cysticercosis is acquired when proglottids or eggs are ingested. It is a natural infection of pigs and cattle but, in the case of *T. solium*, it can also affect humans, usually when they swallow *T. solium* egg-contaminated soil, water or food (mainly vegetables). Taeniasis and cysticercosis are common in areas where animal husbandry practices are such that pigs and cattle come into contact with human feces.

**A Short Review of Fecal Indicator Bacteria in Tropical Aquatic Ecosystems: Knowledge Gaps and Future Directions.** *Frontiers in Microbiol*, Apr 2015. E Rochelle-Newall. [Link](#)

The primary sources of FIB in the tropics (humans and livestock) all contribute to the dissemination of FIB at the soil surface in cultivated lands and inhabited areas via open air defecation and latrines, manure application and livestock. The primary sources also directly contaminate adjacent aquatic ecosystems via direct waste and wastewater release. In humid, tropical zones rain events are often characterized by high intensities and depth. During these events, contaminated soils are washed off in overland flow that contains high suspended sediment loads.

**Hepatitis E Virus Infection: A Zoonotic Threat.** *Adv. Anim. Vet. Sci*, Nov 2014. V Saxena. [Link](#)

Hepatitis E is a virus mediated liver disease caused by hepatitis E virus (HEV). There are an

estimated 3 million cases of acute HEV infection every year, causing 70,000 hepatitis E-related deaths worldwide. HEV is transmitted via the fecal-oral route. Contaminated water and food are main source of infection. Pigs, deer and other animal species may serve as a reservoir for HEV. This review highlights the current understanding of HEV infection in humans and animals.

**Pathogen-Specific Burdens of Community Diarrhoea in Developing Countries: A Multisite Birth Cohort Study (MAL-ED).** *The Lancet*, July 2015. J Platts-Mills. [Link](#)

Most studies of the causes of diarrhoea in low-income and middle-income countries have looked at severe disease in people presenting for care, and there are few estimates of pathogen-specific diarrhea burdens in the community. There was substantial heterogeneity in pathogen-specific burdens of diarrhoea, with important determinants including age, geography, season, rotavirus vaccine usage, and symptoms. Findings suggest that although single-pathogen strategies have an important role in the reduction of the burden of severe diarrheal disease, the effect of such interventions on total diarrheal incidence at the community level might be limited.

## COUNTRY/REGIONAL STUDIES

**Bangladesh - Multidrug Resistant-Proteus Mirabilis Isolated from Chicken Droppings in Commercial Poultry Farms: Bio-security Concern and Emerging Public Health Threat in Bangladesh.** Mar 2014. A Nahar. [Link](#)

This study describes the presence of *Proteus mirabilis* in Bangladeshi poultry samples. There is a need for a stringent surveillance system in Bangladesh for antimicrobial resistance monitoring and biosafety on *P. mirabilis* and other pathogens found in poultry products.

**Egypt - Campylobacter Infections in Children Exposed to Infected Backyard Poultry in Egypt.** *Epidemiology and Infection*, (4) 2014. W El-Tras. [Link](#)

Campylobacteriosis is a zoonotic disease which has a worldwide public health impact. The disease is endemic in Egypt; however, the epidemiology in animals and humans has not been fully characterized. The objective of this study was to compare the risk of *Campylobacter* fecal carriage in children exposed to *Campylobacter*-infected vs. non-infected backyard poultry and to identify risk factors for a backyard being classified as infected. Backyard poultry may present a transmission route of *C. jejuni* to children. Backyards with poor cleaning and disinfection, wet litter and manure disposed of within the backyard had increased odds of being positive for *C. jejuni*.

**Ghana - Drinking Water from Dug Wells in Rural Ghana – Salmonella Contamination, Environmental Factors, and Genotypes.** *Int. J. Environ. Res. Public Health*, 12(4) 2015. D Dekker. [Link](#)

The study results provide an overview of the level of contamination in wells with Gram-negative rod-shaped bacteria and on the presence of unusual *Salmonella* serovars seen infrequently in patients but more often in reptiles and poultry. Studying animal reservoirs would provide useful information to identify the source of such contaminations.

**India - Cryptosporidium and Giardia in Humans, Domestic Animals, and Village Water Sources in Rural India.** *Am Jnl Trop Med Hyg*, June 2015. M Daniels. [Link](#)

*Cryptosporidium parvum* and *Giardia lamblia* are zoonotic enteric protozoa of significant health concern where sanitation, hygiene, and water supplies are inadequate. Animal loading estimates indicate the greatest contributors of environmental oocysts/cysts in the study

region are cattle. Ponds were contaminated with both protozoa, as were tube wells. Future research should address the public health concern highlighted from these findings and investigate the role of domestic animals in diarrheal disease transmission in this and similar settings.

**India - Human and Animal Fecal Contamination of Community Water Sources, Stored Drinking Water and Hands in Rural India Measured with Validated Microbial Source Tracking Assays.** *Am Jnl Trop Med Hyg*, July 2015. A Schriewer. [Link](#)

This study confirms an often suggested contamination link from hands to stored water in the home in developing countries separately for mothers' and children's hands and both human and animal fecal contamination. In contrast to MST markers, FCs provided a poor metric to assess risks of exposure to fecal contamination of human origin in this rural setting.

**Latin America - Cysticercosis Burden of Disease in Latin America**, 2015. J Torres. [Link](#)

Cysticercosis is caused by infection with the larval form (or cysticercus) of the tapeworm *Taenia solium*. The most important clinical manifestations are caused by cysts in invading the central nervous system known as neurocysticercosis, which is associated with significant morbidity and disability in Latin America. Taeniasis and cysticercosis occur globally, with the highest rates in areas of Latin America, Asia, and sub-Saharan Africa associated with poor sanitation and free-ranging pigs with access to human feces.

**Madagascar - Complex Epidemiology and Zoonotic Potential for *Cryptosporidium suis* in Rural Madagascar.** *Veterinary Parasitology*, 207 2015. J Bofager. [Link](#)

In this study system. Interestingly, *C. suis* was the dominant species of *Cryptosporidium* in the region, infecting humans, cattle, pigs, and rodents. This report represents the fifth confirmed case of *C. suis* infection in humans, and the first case in Africa. Few rural human and livestock populations have been screened for *Cryptosporidium* using genus-specific genotyping methods. Consequently, *C. suis* may be more widespread in human and cattle populations than previously believed.

**Nepal - *Cryptosporidium* Infection Among the School Children of Kathmandu Valley.** *Journal of Institute of Medicine*, Apr, 2015. D Bhandari. [Link](#)

The detection of *Cryptosporidium* oocysts and observance of diarrheal symptoms, together with the pattern of age-specific occurrence, livestock presence at home, consumption of untreated drinking water and raw vegetables/fruits consumption habit among infected children suggest that in low-income Kathmandu communities, cryptosporidiosis coupled with poor sanitary practice is a public-health issue causing potentially serious consequences.

**Zambia - Why Latrines Are Not Used: Communities' Perceptions and Practices Regarding Latrines in a *Taenia solium* Endemic Rural Area in Eastern Zambia.** *PLoS Negl Trop Dis*, Mar 2015. S Thys. [Link](#)

*Taenia solium* cysticercosis is a neglected parasitic zoonosis occurring in many developing countries. Socio-cultural determinants related to its control remain unclear. Studies in Africa have shown that the underuse of sanitary facilities and the widespread occurrence of free-roaming pigs are the major risk factors for porcine cysticercosis. The study objective was to assess the communities' perceptions, practices and knowledge regarding latrines in a *T. solium* endemic rural area in Eastern Zambia inhabited by the Nsenga ethno-linguistic group, and to identify possible barriers to their construction and use.

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