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Original article

Clinicopathological Characterizations in Select Food Animals in Northern Samar

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ABSTRACT

Food-borne zoonoses may occur with ingestion or contact of diseased organs/tissues of food animals slaughtered for public consumption. Food animals include cattle, carabaos, sheep, goats, pigs, and poultry. In this study, the gross and histological features of the lungs, liver, connective and meningeal tissue of pigs and carabaos regarded as food animals were examined. Following gross observations of clinically suspected animals, the muscle, lungs, liver, knee joints and meninges were fixed at 10% buffered formaldehyde and processed for histopathology using paraffin method. Gross examination in a pig showed suppurative changes in the knee joints and brain meninges while congestions were grossly discerned in the lung samples of three sampled carabaos. Histopathology of the lung sections showed alveolar thickening, abundance of red blood cells and inflammatory cells in the alveolar parenchyma. Suppurative arthritis and meningitis were observed and Streptococcus spp. from the knee joints, lymph nodes and liver was isolated from one pig. Further studies involving cultural and law-adherence of slaughtering practices as well as examinations of variety of lesions affecting food animals, which are vital in developing recommendations for thorough meat inspection procedures that will be beneficial to food safety in the region are suggested.

KEYWORDS: *bacteria, food animals, Northern Samar, pathology, zoonosis*

1 INTRODUCTION

Despite utmost concerns among abattoirs and meat inspection officers to make sure the passage of disease-free food animal product and by-products, still, it is all-important that well-elucidated detection procedures for the occurrence of obscured or even subclinical conditions during post-mortem examination be systematically strengthened. Although some of the animal diseases may not directly affect the consumers, still the risk of those that may carry potentially transmissible infection contamination to the meat food chain must be considered. For example, streptococcal infection in pigs caused by *Streptococcus suis* which is a worldwide threat to the swine industry (Byra *et al.*, 2011, Gottschalk *et al.*, 2010) is now regarded a zoonotic risk. In almost all of the reported human cases with most common manifestations of meningitis, it was found that patients had close contact with an infected pig; these consist of farmers, butchers, abattoir workers, veterinarians, or one that handled pork products (Camer & Masangkay, 2014; Hughes *et al*, 2009). *S. suis*, α-hemolytic streptococci related to Lancefield group D is the species associated with septicemia, arthritis, endocarditis, and meningitis. Likewise, pneumonic lesions of carabaos may be regarded as a prelude to highly risky zoonotic disease such as tuberculosis (Ayele *et al.*, 2004; Biet *et al*, 2005). Recent controversies as to the unscrupulous use of antimicrobials to food animals are added burdens that may have been a result of attempts to combat infections affecting livestock (Marshall *et al*, 2011; Van Boeckel *et al*, 2015). With better understanding and application, their transmission may be curtailed through thorough and sound meat inspection procedures.

This study was intended to characterize and describe any gross and histological lesions that may be observed in the muscle carcass, skin, lungs, liver, brain meninges, connective tissue of selected food animals (carabaos and pigs) obtained from a local abattoir and backyard slaughtering and to develop valuable recommendations thereof.

2 MATERIALS AND METHODS

A purposive sampling method of clinically suspected food animals was employed in the collection of samples. The selected samples were taken only from those food animals that manifest clinical and subclinical condition from Catarman abattoir and the backyard slaughtering practices in some barangays in Catarman. Animals that qualify for sampling were those that manifest clinical or subclinical signs of dyspnea, weakness or inappetence. Lung, liver, muscles, brain, kidneys, lymph nodes and connective tissue samples of 5 clinically suspected pigs and 8 carabaos, were obtained and were subjected to histopathological

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examinations. A 2 X 2 cm sliced samples of each of the organ/tissue obtained was fixed in 10% buffered formalin for histopathological processing using the paraffin method. Fixed specimens were brought to UPLB-Histopathology Department for slide processing. Prepared slides were stained with hematoxylin and eosin (H & E) stains and examined by light microscopy. Bacterial isolation from cases with pronounced infectious lesions was done. The data were analyzed using descriptive methods of research.

3 RESULTS AND DISCUSSION

Shown in Table 1 were the samples obtained for gross and histological characterizations from clinically suspected carabaos and pigs. Of the eight carabaos showing clinical/subclinical respiratory signs, 3 have shown variable gross lesions ranging from moderate pulmonary congestions, lymphadenopathy and hepatic congestions. Of the five pigs examined, two showed gross lesions of moderate focal skin redness (centipede bite) and severe inflammatory and congestive lesions of the knee joints, lungs, and brain.

Three carabaos showing clinical dyspnea prior to slaughter showed lung congestion. Histopathology showed alveolar thickening, an abundance of red blood cells and inflammatory cells in the lung parenchyma, alveolar widening, and emphysema, pulmonary consolidations, some areas of fibrosis with connective tissue proliferation. Representative gross and histological lesions are presented in Figure 1 A and B. These lesions are attributed to a wide variety of bacterial agents which include Pasteurella spp., Klebsiella pneumoniae, septicemic E. coli, Mycoplasma and mycotic infections such as those caused by toxins of aspergilli (McGavin and Zachary, 2012; McGavin *et al.*, 2001). Lymph nodes were distended showing histological hyperplastic lymphoid follicles – a condition indicative of a response to acquired infection. The livers were congested and fibrotic which could be due to parasitic and bacterial invasions such as ascarids and clostridial infections. Two of these carabaos were slaughtered in the backyard, thus, an indication that it had not undergone proper meat inspection procedures. Unfortunately, those that do practice slaughtering outside the usual abattoir method may be unaware of the prohibitions of the law on slaughtering and the risk involved on such unscrupulous acts. Hence, additional study that could comprehensively evaluate and analyze some of the prevailing cultural practices of backyard slaughtering as well as investigations on adherence to existing laws and ordinances on animal health, welfare and slaughtering is urgently needed.

Table 1. General Gross Observations of Samples Obtained from Selected Food Animals (Carabaos and Pigs)

Species of Animal		Gross Observation	Source of Samples	Specific Organ Gross Changes
Carabao (Bubaline	**#1**	With Moderate Gross Lesion	Abattoir	Moderate pulmonary congestions, lymphadenopathy
	#2	No Apparent Gross Lesion	Abattoir	Intact organs
	#3	With Apparent Gross Lesion	Backyard	Pulmonary congestions, lymphadenitis, hepatic congestions and fibrosis
	#4	No Apparent Gross Lesion	Abattoir	Intact organs
	#5	No Apparent Gross Lesion	Abattoir	Intact organs
	#6	No Apparent Gross Lesion	Abattoir	Intact organs
	#7	With Apparent Gross Lesion	Backyard	Pulmonary congestions, lymphadenitis, hepatic congestions and fibrosis
	#8	No Apparent Gross Lesion	Abattoir	Intact organs
Pig (Porcine)	**#1**	With Apparent Gross Lesion	Backyard	Suppurative arthritis, meningitis, pneumonia
	#2	No Gross Lesion	Abattoir	Intact organ
	#3	No Gross Lesion	Backyard	Intact organ
	#4	No Gross Lesion	Abattoir	Intact organ
	#5	With Minimal to Moderate Gross Lesion	Backyard	Focal skin redness, pneumonia lymphadenopathy

Of the five pigs examined, one of the backyard pig showed a skin bite lesion (centipede bite, acute focal erythema), pneumonia, hepatic congestion, and lymphadenitis. One notable clinical case of severe weakness and inability to rise was documented in a pig raised from a backyard in Catarman, Northern Samar, Philippines. The pig that succumbed to death was necropsied and sterile swabs were taken from the affected joints, meninges, liver and lymph nodes for a bacterial culture where *Streptococcus* species were primarily and predominantly isolated (Camer and Masangkay, 2014). Necropsy revealed prominent lesion of severe darkening of meningeal gyri and sulci with disseminated foci of congestions and fibrinous lesions. The brain appeared swollen. The knee joints exuded with suppurations upon opening (see Figure 2, A to B). The lungs showed moderate zones of congestions. The animal was diagnosed with subacute severe fibrino-congestive meningitis and subacute severe arthritis. Streptococcal arthritides and meningitides are primary

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infections with lesions of acute to subacute leukocyte infiltrations of the affected tissues/organs. In pigs, it is pathognomonic whereby meningitis can serve as the most striking lesion in which presumptive diagnosis of porcine streptococcal infection must be based. Accordingly, the condition may variably respond with antimicrobial treatment such as the use of penicillins (Byra *et al.*, 2011). Streptococcal septicemia in pigs should not be discounted because this infection is labeled as zoonotic. In one of the remarkable cases where high mortality in pigs (640 pigs) and people (39 humans), and an overall 198 humans being affected with the infection, and with all having had a history contact with *Streptococcus* infected pigs was documented in 2005 in Sichuan Province of China. This has been a controversial report which received significant media mileage and apprehensions from health officials and veterinarians (Feng *et al.*, 2009; Lun *et al.*, 2007; Hughes *et al.*, 2009).

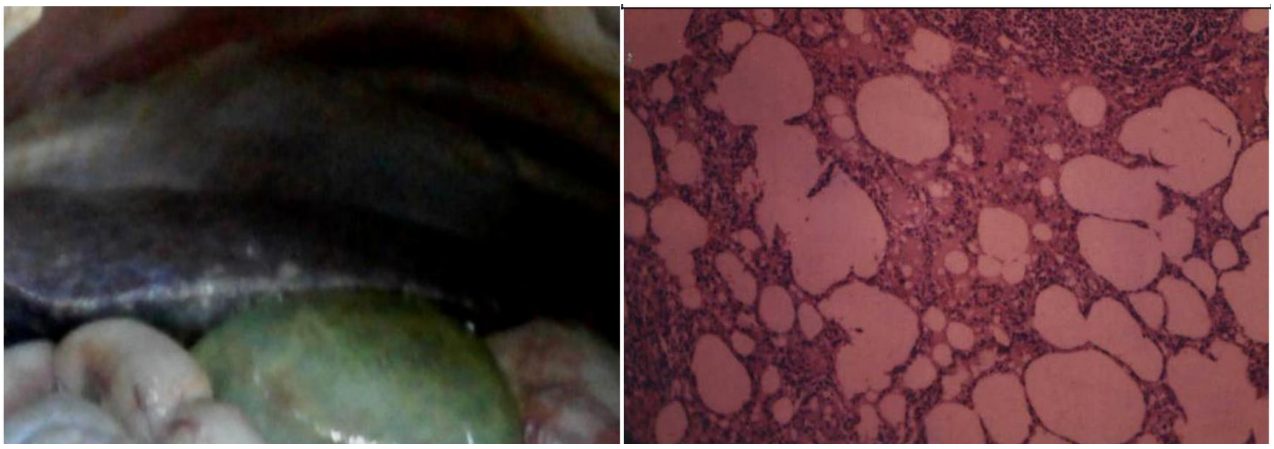

Figure 1. A. Gross pathology of the lung upon opening of the thoracic viscera showing congestions and pale foci. B. Shown below is the microscopic appearance of collapsed alveolar parenchyma, with consolidations, edema and congestions (H & E, 100x).

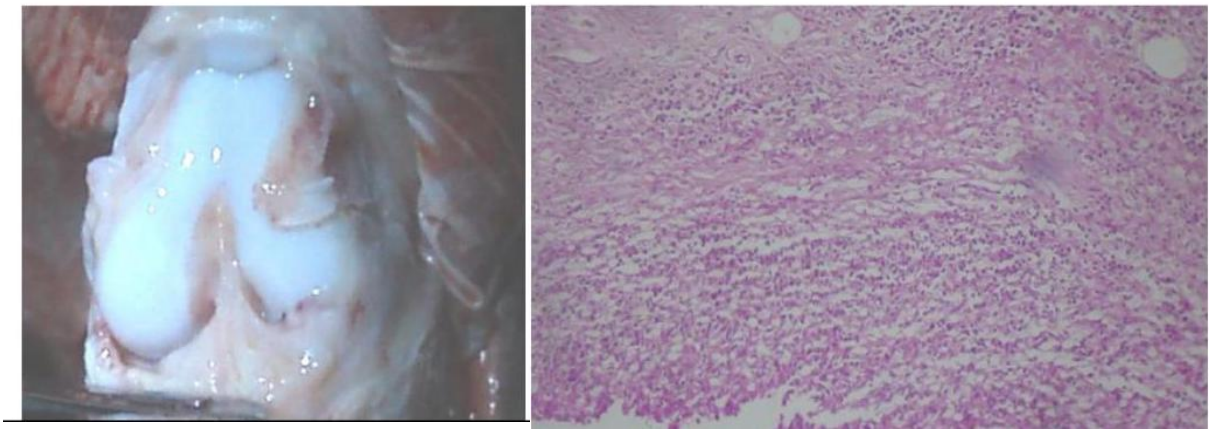

Figure 2. A. Note the purulent exudates from the knee joints of the infected pig. B. Severe infiltrations of polymorphonuclear inflammatory cells are predominantly discerned in the histopathology of connective tissue from the knee joint (H& E, 100X; Camer and Masangkay, 2014)

Through these observations, veterinarians and clinicians, as well as food safety personnel, are encouraged to regularly consider using basic diagnostic tools of histopathology as well as bacterial isolations in the differential diagnoses of diseases especially those regarded as potential zoonosis (Zhao et al, 2003). Ante- and post-mortem inspection of livestock must be strictly implemented to ensure passage of safe meat for public consumption. Further researches are recommended in order to categorically establish the multiplicity of lesions affecting food animals that are vital in developing systematic meat inspection procedures in a locality. The need to increase the level of understanding and adherence to existing ordinances and laws involving animal welfare, slaughtering and meat inspection procedures need to be reinforced through community extension and education services to be championed by the local government units, the nearby academic institution and the National Meat Inspection Services (NMIS) are recommended.

4 CONCLUSION

Based on the results obtained, it is inferred that not all food animals that are subjected to slaughter may be suitable for consumption as evidenced by the lesions seen from the examined samples. It is proposed that

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assessment of existing regulations regarding private slaughtering in the locality must be given prompt attention by the authorities concerned.

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REFERENCES

Ayele, W. Y., Neill, S. D., Zinsstag, J., Weiss, M. G., & Pavlik, I. (2004). Bovine tuberculosis: an old disease but a new threat to Africa. *The International Journal of Tuberculosis and Lung Disease*, 8(8), 924-937.

Biet, F., Boschiroli, M. L., Thorel, M. F., & Guilloteau, L. A. (2005). Zoonotic aspects of Mycobacterium bovis and Mycobacterium avium-intracellulare complex (MAC). *Veterinary research*, 36(3), 411-436.

Byra, C., Gadbois, P., Cox, W. R., Gottschalk, M., Farzan, V., Bauer, S. A., & Wilson, J. B. (2011). Decreased mortality of weaned pigs with Streptococcus suis with the use of in-water potassium penicillin G. *The Canadian Veterinary Journal*, 52(3), 272.

Camer, G. A., & Masangkay, J. S. (2014). Streptococcal Meningitis and Arthritis in a Philippine Pig (Sus scrofa domestica). *Philippine Journal of Veterinary Medicine*, 51(1).

Feng, Y., Shi, X., Zhang, H., Zhang, S., Ma, Y., Zheng, B., ... & Gao, G. F. (2009). Recurrence of human Streptococcus suis infections in 2007: three cases of meningitis and implications that heterogeneous S. suis 2 circulates in China. Zoonoses and public health, 56(9-10), 506-514.

Gottschalk, M., Xu, J., Calzas, C., & Segura, M. (2010). Streptococcus suis: a new emerging or an old neglected zoonotic pathogen? Future microbiology, 5(3), 371-391.

Lun, Z. R., Wang, Q. P., Chen, X. G., Li, A. X., & Zhu, X. Q. (2007). Streptococcus suis: an emerging zoonotic pathogen. The Lancet infectious diseases, 7(3), 201-209.

Marshall, B. M., & Levy, S. B. (2011). Food animals and antimicrobials: impacts on human health. *Clinical microbiology reviews*, 24(4), 718-733.

McGavin and Zachary, 2012). Pathologic Basis of Veterinary Disease. 4th ed. Mosby Elsevier USA. Chapter 9, pp 465-536

McGavin, M. D., Carlton, W. W., & Zachary, J. F. (2001). Thomson's Special Veterinary Pathology. Mosby. Year book in C, 11830, 56-97.

Hughes, J. M., Wilson, M. E., Wertheim, H. F., Nghia, H. D. T., Taylor, W., & Schultsz, C. (2009). Streptococcus suis: an emerging human pathogen. Clinical Infectious Diseases, 48(5), 617-625.

Van Boeckel, T. P., Brower, C., Gilbert, M., Grenfell, B. T., Levin, S. A., Robinson, T. P., ... & Laxminarayan, R. (2015). Global trends in antimicrobial use in food animals. *Proceedings of the National Academy of Sciences*, 112(18), 5649-5654.

Zhao, S., Qaiyumi, S., Friedman, S., Singh, R., Foley, S. L., White, D. G., ... & Baron, E. J. (2003). Characterization of *Salmonella enterica* serotype Newport isolated from humans and food animals. *Journal of Clinical Microbiology*, 41(12), 5366-5371.

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