



An Important Mycotic Diseases In Animal Livestock Caused By Some Agriculture Fungi In Indonesia

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Abstract

One of contribution for Indonesian state from Agriculture sector is livestock animals. This livestock animals in Indonesia is divided to large and small ruminant, poultry, and other commercial animals. All these animals can be infected by some agriculture fungi which causes mycosis. The disease cause economic loss by morbidity and mortality. In chicken (poultry), aspergillosis caused by *Aspergillus* sp can be very important among mycotic diseases. In ruminant ringworm (dermatofitosis) caused by dermatofit fungi which infected skin, and mastitis caused by fungi in Dairy cattle causes decrease milk production. Histoplasmosis caused by fungi such as *Histoplasma farciminosum* is called Selakarang, infect horse. This paper describes these mycotic diseases and control and to give more information of fungal disease caused by some agriculture fungi.

Key words : Animal husbandry, mycotic disease, control, agriculture fungi.

Background

The livestock derived from ruminant livestock and poultry have given considerable foreign exchange contribution of the agricultural sector in Indonesia. Based on the data collection of beef cattle, dairy cattle and buffalo in 2011 conducted simultaneously throughout Indonesia from 1 to 30 June 2011, beef cattle population reached 14.8 million head; 597.1 thousand head of dairy cattle and buffaloes 1.3 million head (Ditjennak 2011). These cattle will continue to be improved in the future in order to achieve self-sufficiency in meat to meet protein needs. However, some problems can be found ranging from the provision of production inputs (seed, feed, and equipment, enclosure) to control the disease (Al-gore, 2006; Bardgett, 2008). Despite the change in survivability of the fungus will lead to the increasing resistance and the spread of disease-causing fungi. However, there remains a classic fungus diseases with different variations. In today's climate changes are extreme. This will lead to changes in the environment and ecosystems in particular microbes that live in it. The fungus will sustain life by adapting to the surrounding environment. Although

fungi undergo changes in survival will lead to the growing strength of fungi that cause disease. However, the fungus causes the disease remains a classic with its variations.

In Indonesia, which has two seasons (wet and dry) in line with the change of seasons is an attack diseases generally will increase as well against livestock. Among the important disease there is a disease attack caused by some agriculture fungi (molds and yeasts) in pathogenic and toxigenic. The disease is called mycosis. Among mycosis attacking ruminants and poultry can be classified 4 types of mycosis which often attack livestock, namely, Aspergillosis that primarily affects poultry; Ringworm (dermatophytosis) attack ruminants; mycotic mastitis affect milk production line (udder) in female animals of ruminants; and Histoplasmosis attacks the body's defense lines (nodes) in horses (Jungerman and Schwartzman, 1972).

Discussion

Aspergillosis

Definition and Etiology:

Aspergillosis is one of mycotic diseases caused by mold of genus *Aspergillus*. Some species which responsible for infection

include *Aspergillus fumigatus*, *A. flavus*, *A. niger*, *A. terreus*, *A. glaucus*, and *A. nidulans*. Aspergilli are frequently as respiratory pathogens. There are primary and secondary infections. Primary infection is the result of the direct entry of the fungus into a healthy, susceptible organ of the body (respiratory system). It is frequently occur in avian than ruminant. Secondary infection is the result of the growth of the fungus in active or arrested lesions of tuberculosis, histoplasmosis, carcinoma etc., after wounding or after antibiotic and corticosteroid therapy of other diseases, and stress due to transportation or captivity (Gholib & Tarmudji, 2005).

Clinical Symptoms:

The disease has clinical symptom of respiratory disorder, gasping, coughing, rattles sound during inhalation. In layer hen cause decrease of egg production. (Fig 1).



Figure 1. Aspergillosis in chickens

Diagnose

In poultry (chicken), suffered from disease showed respiratory disorder (gasping), cough, low egg production. Symptom of disease is not specific, since other causes of respiratory disorder may show similar symptom. Organs such as lung, respiratory track, air sacs are examined by native with KOH or NaOH₂ (10-20 %) to find hyphae microscopically. Culturing of the organ samples on *Sabouraud's Agar* media (SDA) and incubated at 37°C to find growth of *aspergillus* colonies (Jungerman and Schwartzman, 1972).

Prevention:

Infection occurs when spores of aspergillus enter the body host, frequently through inhalation and goes into the lung, air sacs. Sprouts of hyphae come out from growing spores, and invade the organs, and cause lesions. To prevent infection the

sources of spores growth, such as agricultural products, compost, litters, wastes products of animals have to be emphasized in controlling programmes. Animal feed to be kept in hygienic conditions, clean, dry and consumed in a short time, and changed with new fresh feedstuffs. So the contamination of fungal spores is restricted. Change the litter in regular times, and remove compost immediately from stable areas. The floor concrete must be regularly kept dry and clean. Chicken incubators must be controlled periodically, since it can be the source of spore infection to the hatchery of chickens.

Treatment:

The treatment of fungal diseases in animals especially for livestock seems to be useless. In fact due to economic aspect must be considered, because of cost of antifungal drugs (Nystatin, Amphotericine), time consuming until reflected recovering from the diseases, and unpractical, treatment is conducted once diagnose of disease has been determined. The determination of diagnose in chicken usually by postmortem examination.

Poultry is more often exposed to attack by the pathogen *Aspergillus* spp. Factors that particular to contribute sanitary is to concern on poor ventilation. Spores spread by wind everywhere and will grow well in humid and warm conditions. Respiratory infections will occur rapidly in a flock cage. In control with more attention to ventilation and sanitation hygiene will help reduce the incidence of aspergillosis.

Ringworm

Etiology:

The disease attack both man and animals (zoonosis). Al-Doory (1980) described the agent responsible for the disease is dermatophyte group consist of 3 genus : *Trichophyton* (26 spesies), *Microsporium* (14 spesies), and *Epidermophyton* (1 spesies). Species which are responsible for the disease are *Microsporium canis*, *M. gypseum*, *Trichophyton mentagrophytes*, *T. verrucosum*. Ringworm is a superficial

mycosis which affected superficial parts of the body such as skin, hair, nail or horn which rich of keratin that required for the fungi to grow. And it results in hair loss, crusted of skin, swelling, erythema and itchy. The disease affected health condition and animal production, because of disturbing its rest of the host, and spread easily. So it is important in veterinary field. The causative agent is fungal dermatophytes group.



Figure 2 . Ringworm in dairy cattle. White circular lesions around head.

Clinical Symptoms

The symptoms of ringworm showed circular (ring) lesion with variation in diameter, white in colour, and in intensive lesion become crust of inflammation of the skin, and alopecia due to hair damage and loss. Often the lesions occur in the shoulder, next, and head (Fig 2). (Gholib and Sri Rachmawati, 2010). There is no sense of itching in cattle; severe animals show thin body posture, and loss of appetite. Other animals invariably show the same condition, but itchy is remarkable (Jungerman and Schwartzman, 1972).

Diagnose:

The diagnose is based on observation of clinical symptoms, collected samples of skin scrapping, and cultured on agar medium (Sabouraud's agar), microscopic examination of native preparation of skin scrapping with NaOH2/KOH 10-20% solution, and examined on present of hyphae or spores structures. Culturing the samples on *Sabouraud dextrose agar* media with actidion 0,5 mg/ml, and incubated for 5-7 days in 37°C.

Prevention:

The spread of disease occur by direct contact between animals and man. Infection from man to animals is rare. Direct contact especially occurs on animals workers in husbandry or animals lovers. Indirect infections are commonly occurs with contaminated equipments. So that keep animals and environment always clean by routine treatment such as bathing regularly, the cages are kept dries, spray the cages or stables with antiseptic periodically, the hairs and skin of the animals are often brushed. Equipments are always kept in sterile if possible. Nutrition is taking part in keeping the animals to have high immunity, so foods with rich in vitamins and essential substances are important to prevent the disease.

Treatment

Curing the disease recently by using synthesis drugs conducted topically and orally. Cream ketokonazole and mikonazole are oftenly applied. Hydroxyquinoline, as antifungal, in addition of antibacterial drugs (concentration 1 – 3%), are available in salep forms. It has to be concern that excessive treatment of the drugs frequently causing *dermatofitid* (Jungerman dan Schwartzman, 1972).

Ringworm oftenly affects pet animals such as dogs and cats, but oftenly also found in dairy cows. Skin infection will be a source of transmission to other animals. The disease has become quite important because it can be transmitted to humans (zoonoses). Although it is not fatal in human, yet in human skin infection is serious because of aesthetics, becomes an important issue. Therefore, controlling the transmission of pets or productive animals is necessary. Prevention can be done through feeding with good nutrition animal, sanitation and good stables or cages condition. Through the implementation of good prevention control of ringworm disease ringworm will be achieved (Ahmad, 2005).

Mastitis Mycotic

Definition and Etiology:

Mycotic mastitis is a disease characterized by inflammation of the internal network of the udder or mammary gland by microbes, which are caused by fungi (molds and yeasts) (Blomquist, 2008; Javie and Nikki 2003). Mycotic mastitis caused by a fungus (molds) infection (*Aspergillus spp*, *Penicillium spp*, *Alternaria spp*, *Phoma spp*, *spp Epicocum*, *Aerobasidium spp*, *Geotrichum spp* and *Pichia spp*) and yeast (*Candida spp*, *Cryptococcus sp*, *Rhodoturulla spp*, *Sacharomyces spp* and *Trichosporon spp*). But generally the dominant yeasts such as *Candida spp* (Costa *et al.*, 1993; Chahota *et al.*, 2001; Farnsworth and Sorensen, 1972; Krukowski *et al.*, 2006; Spanamberg *et al.*, 2008; Tarfarosh and Purohit., 2008) also has been recorded in Indonesia are found infecting productive cows (Ahmad, 2012; Hastiono *et al.*, 1983; Natalia & Hastiono, 1985).

Clinical Symptoms:

The clinical symptoms characterized by swollen udder gland, edematous fluid exudates accompanied by signs of inflammation, such as increased temperature, redness, pain and decreased function (Fig 3). The presence of inflammation indicated by heat, redness, pain in the udder, decreased milk production, and milk composition changes (Mc Donald, 2009; Morin, 2009; Hurley & Morin, 2000). According to Mac Donald (2009), subclinical mastitis is very dangerous (high prevalency rate), than any one case of clinical mastitis, there are 20 to 40 times the incidences of subclinical mastitis. The case was eventually becomes chronic and clinical mastitis in a long time.



Figure 3. Mastitis in Dairy cattle. Red swelling mammary gland.

Diagnose:

Symptoms in subclinical mastitis are not significant, so it is necessary to develop tests to detect mastitis by counting the number of somatic cells present in milk. According to Bramley (1991) subclinical mastitis can be diagnosed when the number of somatic cells exceeds 200,000 cells / ml milk sample. Examination followed by isolation and identification of fungi from milk that has been categorized mastitis milk. Moreover, it can also be done by examination of anatomic pathology and histopathology changes when the animal has been slaughtered. At the mammary tissue of infected organs, there will be appearance of hyphae or spores of mold / fungus that infects tissues.

Prevention:

Mastitis usually occurs due to uncontrolled antibiotic treatment and a dirty environment, as well as poor management. Prevention of mastitis can be done easily and does not require expensive cost.

Procedures of prevention should be followed :

- (1). Managing the environment to keep it enough ventilation and clean,
- (2). To ensure a clean feeding grass, it has to be washed, and better than making a new enclosure/stables
- (3). Time for the treatment of mastitis cases must be suitable with milking periode.
- (4) If a parent has a history of mastitis and affected the offspring's, adult must be examined and treated at once a month,
- (5) Collecting milk has to go through the properly procedures:
 - (a) prepare the healthy cows, clean and avoid stress and make environment convenient.
 - (b) Check milking equipment regularly and udder feasibility.
 - (c) Wash udder nipple, and below part of the surface udder with warm sanitizing solution.
 - (d) Conducting dipping of nipples before milking at least 1 minute.
 - (e) Drying nipple thoroughly.
 - (f) Set automates milkier machine,
- (6) The treatment by drugs should be completely treated, and treatment area must be clean
- (7) Perform the method of *dry enclosure* (time when cattle is not milked);
- (8) Cattle with

chronic mastitis must be culled; (9) nutrition should be given properly; (10) Consultation with a nutritionist to develop nutrition plans; (11) for animal health plans, consultation with the vet (Blomquist, 2008; Mc Donald, 2009; Raza, 2009)

Treatment:

Use of Nystatin with a dose of 10 g / quarters for suffered bovine mastitis commonly applied, the drug is applied through the nipple after finished milking, and disinfected by using povidin with iodine solution, the treatment is done every day for 15 days (Stanojevic & Krnjajic. 2009). Some others of antifungal such as Amphotericin, Clotrimasol, Fluorocitosin, Miconasol, and Polimixin can be applied (Krukowsci & Saba, 2003)

Mycotic mastitis become an important disease because it occurrence rarely detected, usually occurs in chronic type. The resulting large losses due to mastitis chronic and never treated correctly. Often antibiotics are given because mastitis caused by a bacterial is most common. Besides the phenomenon of this disease can be as an iceberg. In Indonesia, It can be found, although not yet reported in the animal husbandry department (Ahmad, 2012). Control through prevention is the best of the treatment. Prevention conducted as sanitary stables and milking management are true and correct.

Histoplasmosis

Definition and Etiology:

The disease is caused by the dimorphic fungus *Histoplasma farciminosus*, has several other names, namely, African farcy, *Cryptococcus farciminosum*, equin blastomycosis, equine histoplasmosis and *Selakarang* (In Indonesia).a Generally it attacks horses.

Clinical symptoms:

Horses are infected will be marked with the ulceration of the skin that is *undulate* (Fig 4). This tissue damage occurs after many weeks to 3 months of infection. Abscess are found on the legs, chest, neck,

lips, scrotum, eyes, and furthermore it can be found thickened superficial part of lymph vessels, lymph node enlargement, regional lymphangitis, abscess pus mixed with blood and pus, then ends with the formation of ulcers on the skin of the smaller type, and then merged into one ulcers by over time. Skin thickening and fibrous. The attacks of disease can be classified according to part of body, cutaneous, nasal and ocular.



Figure 4. Histoplasmosis in horse. Nodules in lymph ducts

Diagnose:

In addition to the apparent clinical symptoms in animals, the diagnose can be conducted by examination directly in the preparation of disease-causing agents through a staining preparation. Examination of cultures which were inoculated on agar medium can also be done, However it requires quite a long time. Fungus *Histoplasma farciminosus* can take the form of yeast fungus (spores) at temperatures of 37°C and the mycelium at 25-30°C (Dimorphic mold). In the yeast form it shows ovoid or globes shape measuring 2-5 µm in diameter. This fungus can be found in the extracellular and intracellular in the cells of macrophages and giant cells. In the form of mycelia, it grows slowly and form arial mycelia. Colony color gray like the skin surface. In the media *Sabouraud dextrose agar* (SDA) the fungi produced short hyphae and irregular in shape, fungal hyphae surrounds the body of fungi, then eventually form a distinctive oval structure (*Rudimentary aleuriospora*) (Jungerman and Schwartzman, 1972). Diagnose by using serological technique can save time. It

includes blood agglutination test, fluorescent antibody test, Elisa test and hypersensitive skin test.

Prevention:

Prevention starts with controlling the horse breeding areas with their traffic trades. Animals should be free *selakarang* horse-traded. Horses and equipment maintenance can also be done well. Transmission of the objects associated sick horse should be destroyed by burning. This is because the organism can live in the environment and infectious for months at a suitable local conditions. Other prevention is eradicating flies as vectors of disease. Generally, infected horses must be eliminated. Horses can also be cured with drug treatment. Hygiene and feed management and stables is key to disease prevention As far as the healthy horses in good condition it will be avoided from the disease.

Treatment:

There are various kinds of treatment, surgery on the nodules and ulcers. Treated with KI or Hg I also with HgCl₂ injection. Use of Amphotericin B is also effective. However, the treatment of animals should be considered due to economical factor except in pet animals. Surgery and treatment should be done carefully and thoroughly so that the horse does not recur again. Vaccinations with killed or weakened vaccines must be done in endemic areas. It is expected the horse recovered from clinical symptoms will be immune to reinfection attacks of the disease. But the vaccine is not yet available.

Histoplasmosis is a disease or *selakarang* somewhat rare, but in a lot of the horse population is often an attack of this disease. Hygiene and feed management and stables is key to disease prevention, as far as the healthy horses in good condition it will be avoided from the disease (Ahmad dan Anis, 2012).

Conclusion

Control of mycosis is to do with prevention and treatment, but prevention is better than cure. The four mycosis that attack livestock in Indonesia, aspergillosis,

ringworm, mycotic mastitis and histoplasmosis can occur. Through the prevention and treatment of diseases it can be properly addressed to the four diseases.

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