

ADVANCES IN SMALL RUMINANT RESEARCH IN INDONESIA

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SMALL RUMINANT HEALTH AND DISEASE RESEARCH AND DEVELOPMENT IN INDONESIA

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ABSTRACT

Sheep and goats, as small ruminants, are important animals for small holders in rural areas of Indonesia. The populations of both sheep and goats are low. One of the major constraints that is considered to influence growth rate is disease. A wide range of important diseases of sheep and goats have been reported but there is a lack of information on aetiology and epidemiology. Research was directed to identify missing information needed for disease prevention and control. The limited number of research staff working on small ruminant diseases and limited funding are considered to be major constraints to the development of research on small ruminant health and disease. Efforts for the development of small ruminant disease research in Indonesia are also discussed.

Introduction

Small ruminants, sheep and goats, are important animals for small holder farmers in rural areas of Indonesia. Although the animals are raised traditionally by farmers as a sideline to the main agricultural activities, they contribute from 14% to 25% of the total annual income of smallholders (Knipscheer et al., 1983). The populations of both sheep and goats are low at present at around 6 million and 11 million for sheep and goats respectively (Biro Pusat Statistik, 1991).

One of the major constraints to increasing sheep and goat production are disease and health problems. A range of small ruminant diseases and health problems has been reported since the Dutch occupation. However, most of them still need further research. Research activities on small ruminant health and diseases have made promising progress, and constraints to development have been identified.

This paper describes diseases of sheep and goats in Indonesia, research and development in veterinary science and previous and present research on small ruminant diseases carried out at the Research Institute for Veterinary Science (RIVS), Bogor.

Institutions Responsible for Research in Veterinary Science in Indonesia

The Research Institute for Veterinary Science (RIVS) or Balai Penelitian Veteriner (Balitvet) is the institution that has responsibility for research in veterinary science. The Institute also is a reference laboratory for veterinary laboratory diagnosis in Indonesia. Other institutes that carry out research in veterinary science are educational institutes which have a veterinary faculty. There are 5 such universities: Bogor Agricultural Institute, University of Syah Kuala, Gajah Mada, Airlangga and Udayana. However, most of them have limited facilities to study infectious diseases than RIVS. There are 7 Disease Investigation Centers (DIC) distributed throughout Indonesia. The DIC are responsible for disease monitoring, investigation and diagnosis, and they are the reference for the smaller veterinary laboratories in Indonesia. Research units may also be set up by the government for specific animal diseases, such as the Bali Cattle Disease Investigation Unit (BCDIU) for Jembrana disease in Bali Cattle. Although most of those laboratories do not conduct research, they contribute useful information on animal diseases.

Small Ruminant Diseases in Indonesia

A wide range of diseases of sheep and goats has been reported in Indonesia. These include viral, bacterial, and parasitic diseases. Only a few of the reported diseases are non-infectious diseases. Others are still of unknown cause. The information presented in this paper is from research findings or case reports published by the institutions mentioned above and from personal communication, up to early 1993.

Viral Diseases. One of the most common viral disease of sheep and goats is Contagious ecthyma (Orf). In Indonesia, Orf was reported first by Van Der Laan (1919). The disease may be a problem in susceptible sheep and goat populations with a morbidity of up to 100% and mortality as high as 20%, usually when the animals are stressed (Adjid, 1992). When infected animals are sold, the price is reduced by up to 80% (Adjid et al., 1989b). At present the disease is widely distributed in areas where sheep and goats are raised.

Another viral disease is blue tongue (BT). Blue tongue with severe clinical signs has been identified only in imported sheep (Sudana and Malole, 1982a). Although Sendow et al. (1986) in a serological study reported the prevalence of

BT viral antibodies in local sheep and goats, no clinical cases of the disease have been reported up to the present. The role of sheep in carrying malignant catarrhal fever (MCF) viral agents has been observed (Wiyono, 1993, personal communication). Indonesia has been free of Foot and Mouth Disease since 1984 (Direktorat Jenderal Peternakan, 1985), and the disease is now exotic for Indonesia. There are no reports of other viral diseases of sheep and goats up to present.

Bacterial Diseases. Sudana and Malole (1982b) reported foot rot in goats caused by *Sphaerophorus necrophorus* (*Fusobacterium necroporum*). Worrall et al. (1987) isolated *Clostridium novyi* from the liver of healthy sheep and goats. This agent potentially causes black disease of sheep and goats when the animals suffer from fascioliasis. Poernomo et al. (1986) reported the isolation of *Salmonella spp.* from sheep. Caseous lymphadenitis has been reported only in imported sheep (Sudarisman, 1990, personal communication). Hastiono (1993) stated that prevalence of Chlamydial infection in sheep was 14.2% as detected by a serological test. However, no clinical cases of abortion were observed.

Parasitic Diseases. Parasitic diseases are the most common cause of disease in sheep and goats in Indonesia. A range of intestinal parasites has been reported including *Haemonchus sp.*, *Strongyloides sp.*, *Ostetargia sp.*, *Bunostomum sp.*, *Oesophagostomum sp.*, *Trichostrongylus sp.*, *Cooperia sp.*, *Fasciola sp.*, *Paramphistomum sp.*, and *Eimeria sp.* (Peranginangin and Heryanto, 1985; Beriajaya, 1984; Kusumamihardja, 1988). Arasu et al. (1991) reported pancreatic fluke in sheep. Soesilo et al. (1988) reported coccidiosis in goats. The role of infestation of paramphistome fluke (*G. explanatum*) in sheep was also studied (Wiedosari, 1989).

For external parasites, scabies is the primary disease of goats (Manurung, 1988) causing economic loss. Soesilo et al. (1988) reported that *Damalinia ovis* infestation was also common in small ruminants. Infestation of a blow fly larvae (maggots) sometime causes health problems in injured animals (Adjid et al., 1989a).

Non-infectious Diseases. Soesilo et al. (1988) reported plant poisoning caused by *Leucaena sp.* Cyanide poisoning in sheep that fed Sorghum spp. was reported by Bahri et al. (1985). Kusumamihardja (1979), and Zahari et al. (1984) reported facial eczema cases of sheep. Ronohardjo (1981) also reported a skin problem in sheep characterized by symmetrical dermatitis caused by photosensitization (Bahri, 1988). Neonatal mortality of sheep in relation to T4 hormone deficiency was also reported (Bahri, 1983). Cases of goiter in goats was reported by Bahri et al. (1987). The mycotoxin of fusarium deoxynivalenol was reported by Bahri et al. (1990b) as a primary cause of death in a flock of sheep. Darmono et al. (1988) reported that zinc deficiency may be a problem in small ruminants in Indonesia. Bahri et al. (1990a) also reported a possible sodium deficiency in the sheep population.

Others (Unidentified Aetiology). Histopathologically, the most common conditions were pneumonia (31%), enteritis (12%), and hepatitis (4%) (Iskandar et al., 1984). Adjid et.al. (1989a) reported that clinically the most common problem of sheep was diarrhoea and a high neonatal mortality rate. Soesilo et al. (1988) reported the occurrence of clinical signs of the following disease of goats: cachexia, tympany, dystocia, mastitis, infectious conjunctivitis, and abscesses.

Small Ruminant Diseases Research at the RIVS

1. Previous Research Activities (1992-1993) and Research Findings.

Research on small ruminant diseases conducted at the Research Institute for Veterinary Science for the period 1992-1993 revealed the following:

Contagious ecthyma (Orf). Orf is the most common viral disease of sheep and goats in Indonesia. It is reported frequently especially when after the transportation of sheep and goats. Prevention by vaccination is not used due to the lack of available vaccine in Indonesia. The virus is considered to have more than one strain. For the period 1992/1993 study of the disease was directed to identify strain variation by looking at genomic variation among the Orf viral isolates. It was shown from the three isolates tested, that there was genomic variation among the isolates, suggesting more than one orf virus strain is present in Indonesia.

Scabies. Scabies is the most common skin disease of goats. The disease causes considerable economic loss. Effective medicine is available for treating the disease. However, smallholder farmers could not afford to buy the medicine and it is not easily obtained by farmers in rural areas. Research was conducted to find out an effective medicine from materials available in villages. The study showed promising results when 2,5% sulfur in vaseline or 0.75% detergent (soap) plus 1.5% sulfur were used for scabies treatment. However, further studies were needed to identify the effectiveness of the medicine when applied in field condition, and to investigate factors affecting successful treatment.

Nematodiasis. Nematode infestation is the most common health problem of sheep and goats. The disease is wide spread and considered to be the most important parasitic disease of sheep and goats in Indonesia. The study was carried out to identify the epidemiology and the prevention of the disease in sheep raised by smallholder farmers. The study is incomplete but available results show that monthly anthelmintic treatment was not sufficient to reduce nematodiasis to the safety level (epg less than 1000) in sheep raised under rubber plantation areas. There was a reduction of the growth rate in untreated animals aged 6 to 12 months.

Coccidiosis. Coccidiosis is an intestinal disorder caused by *Eimeria* sp. It causes problems predominantly in lambs. However there is a lack of information on the disease in Indonesian small ruminants. A preliminary study was directed to isolate and identify *Eimeria* sp. in sheep and goats in Indonesia. It showed that the prevalence of coccidiosis was 58,3% with mixed infection of *E. parva*, *E. pallida*, *E. crandalis*, *E. ovina* and *E. granulosa*.

Chlamydiasis. Chlamydiasis may cause abortion in sheep and goats. So far, there have been no reports of the disease in Indonesia. A serological study was carried out to identify the presence of reactors in sheep and goats in Indonesia. Of 649 sheep sera tested, 14.2% contained antibodies to Chlamydia, and no antibodies were detected from 6 goats sera using the CF test. No agent was isolated and no cases of abortion were found.

Abortion and Neonatal Mortality. Neonatal mortality is frequently found on traditional sheep farms. However, the primary causes and the conditions which cause the problems are still unclear. A preliminary study showed that the mortality rate was 16.4% with prevalence from 4%-25%. Around 80% of the dead animals were from twins and triplets, not single. The aged 0-24 hours was considered to be a critical time. From 2 dead new born lambs, no specific lesions were found when examined by gross and histopathology. Isolation of bacterial agents from intestinal organs was unsuccessful. The study failed to identify the primary cause of the death, but sheep production management was considered to have a major effect leading to starvation. Infectious diseases were still thought to be involved in neonatal mortality. Further integrated studies are needed to identify the cause of the problem.

Pesticide. One of the commonest pesticides used in soybean and sugar cane farms is Thiodan. It contains endosulfan. Because small ruminants are also grazed around plantation areas and usually soybean leaf and sugar cane leaves are given by farmers, it is important to study the effect of endosulfan on sheep and goats. Research was directed to study the kinetics of endosulfan in goats kept under laboratory conditions. The study showed that conjugation peroses with glucuronide acid reduced the toxicity of endosulfan.

Traditional Medicine for Small Ruminant Health Problems. The availability of traditional medicine may help and encourage farmers to increase sheep and goats productions in rural areas. In this period research was directed to the study of traditional medicine for the control of secondary bacterial infections associated with contagious ecthyma (Orf) or scabies. The effectivity of *Usnea* spp extract on bacterial agents isolated from the case of Orf was studied *in vitro*. This showed that *Usnea* spp. extract inhibited the growth of bacterial agents isolated from Orf and scabies cases. It was suggested that the study be continued to ascertain its application in field condition.

Tympany. Tympany is a non infectious health problem of sheep and goats frequently found in field. It frequently causes death. A preliminary study was carried out to identify plants and other condition that cause the problem. The study showed that under field conditions the mortality rate was 3.4% within a period of 3 months. Fresh cassava leaf/wet leaf was identified as the cause of the problem in sheep and goats that do not usually feed on the leaf. The use of coconut oil results in 80% recovery. It was suggested that deaths due to tympany were not identified by the farmer because the tympany probably occurred during the night. Laboratory work showed that tympany was caused by plants containing a high content of nitrate given in the morning when leaf was still wet. Feeding with fresh cassava leaf given in the morning and fasting or stress conditions produce tympany.

2. *Present Research Activities (1993-1994).* Research activities for the period 1993-1994 are shown in Table 1. Most of the research activities during this period are a continuation from previous research activities.

Twelve research activities on small ruminant health problems were conducted at the RIVS. They include viral, bacterial and parasitic diseases, poisonous plants, neonatal mortality and traditional medicine. These activities are conducted by 11 research scientists. Most of the projects are preliminary studies.

Development of Small Ruminant Disease Research at the RIVS

To increase the capability of the Institute to do research on small ruminant diseases, several initiatives have been made over the past ten years. They include education, training, and purchasing more advanced equipments. Post graduate study and training are carried out to increase the scientific capability and abilities to carry out research. At present 2 research staff have completed PhDs, and 3 are expecting PhD. Providing more advanced equipment allows the research staff to develop more sensitive, accurate and faster diagnostic tests for defining health problem and developing new technologies.

**TABLE 1. PRESENT RESEARCH ACTIVITIES (1993/94)
ON SMALL RUMINANTS CARRIED OUT
AT THE RESEARCH INSTITUTE FOR VETERINARY SCIENCE (RIVS)**

Diseases		Aspect
Viral		
Orf		Development of vaccine
Parasitic		
Nematodiasis		Control of nematodiasis using anthelmintic combined with mineral supplementation
		Effectiveness of <i>Carica papaya L</i> seed for controlling <i>Haemonchus contortus</i> infestation
Scabies		Control of scabies using traditional medicine (plants) <i>in vitro</i>
		Effect of <i>Anona squamosa L</i> extract on bacterial agents isolated from scabies cases <i>in vitro</i>
Bacterial		
Brucellosis		Characterization of <i>B. abortus</i> causing abortion in goats
Poisonous Plants		
		Effect of poisonous plants on milk production
		Toxic effect of pyrrolizidin on small ruminants
		Epidemiology of alkaloidosis in small ruminants
		Plants as heavy metal accumulator and its effect on animal production
		Plants containing nitrate/nitrite and their effect on production
Others		
Neonatal mortality		Epidemiology of neonatal mortality in sheep

Constraints in Research and Development at the RIVS

The limited number of research scientists is considered to be the major constraint in small ruminant research and development at the Institute. In addition not all research staff trained on small ruminants are now working on that topic. Last year only 6% of a total 67 research staff were working on small ruminant health problems. Efforts have been made to invite research staff at the Institute to work on small ruminant diseases research. Another constraint is lack of funds provided by the government. These conditions do not maximize the ability and capability of the research staff to do a research. Additional funds from other funding agencies must be forth coming. Another important consideration is a communication network among scientists working on small ruminant diseases in Indonesia. This regional network will encourage and help other scientist to do research on small ruminant diseases and to avoid duplication. An international network would also be useful for Indonesian scientist. However, this forum is not yet established.

Conclusion and Recommendations

Present research on small ruminant disease and health problem in Indonesia is inadequate. There is a need for more research staff conducting research on small ruminants diseases. The important health problems of unknown aetiology need more attention and integrated research involving many disciplines including, health, epidemiology, nutrition, breeding, genetics and management. Additional funds from other funding bodies is expected to stimulate and accelerate research on small ruminants diseases. A communication network should be established among scientists working on small ruminant diseases in Indonesia. An international communication network with other institutions working on similar problems would also give additional benefits for Indonesian scientists.

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