

A survey on the incidence rate of foot diseases in dairy cattle

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Abstract

This study was carried out to investigate the status of hoof diseases and to develop treatment method for cattle with hoof diseases during the period of January to December in 2000. Out of 438 heads, 34 heads(7.8%) had hoof diseases. In respect to season, incidence rate was higher in August to September than that of other seasons. The incidence rates of hoof rot, pododermatitis verrucosae, laminitis, other cases and trauma were 14 cases(41%), 10 cases (29%), 7 cases(21%), 2 cases(6%) and 1 case(3%), respectively. In respect to age and milk production, incidence rate was higher in the cattle with high milk production. Incidence rate of hoof diseases on the hind-limbs was higher than that of the fore-limbs. *E coli*(8 strains), *Clostridium* spp(8 strains), *Staphylococcus* spp(6 strains), *Fusobacterium* spp(6 strains), and *Bacteroides* spp(6 strains) were isolated from the hoof lesions. All isolates were sensitive to composite preparation made of mainly formalin with picric acid and phenol.

(Treatment against each strains isolated was sensitive to composite preparation made out of the main constitutions of formalin with picric acid and phenol).

Key words : Hoof disease, Incidence rate, Bacteria, Susceptible therapeutics

Introduction

Modern dairy and beef cattle industries have aimed at high milk production and high weight gain. Therefore, these industries have a structure of the big herd size and over crowding farming. Although high milk production and high weight gain due to pro-

vision of high energy feeds have been possible, numerous diseases have also been increased.

Especially, cattle with high performance have been considered to be vulnerable to foot rot because those are raised with much high energy feeds. Dairy cattle with foot rot show a drop of milk production by 20%. Herds

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with a severe foot rot disease(more than 30% cattle showing lameness) show drop of milk production up to 50%.

Sometimes, dairy cattle which have high milk production are culled because of lameness or foot rot. Foot rot in beef cattle is less frequent than dairy cattle. But beef cattle infected with foot rot are worthless. Those cattle show a severe drop of daily gain(in severe case, up to 40%), especially in finishing cattle¹⁾.

Hoofs of cattle are consisted of capsula and corium unguulae. Those sustain body weight and are always contacted with feces, soil and thus vulnerable to diseases²⁾.

Foot rot refers to diseases occurred in hoofs and is consisted of necrosis to purulent lesions in interdigital skin and soft tissue, lesions in sole and bulb of hoof. Recently foot rot is classified into interdigital necrobacillosis, interdigital dermatitis, purulent inflammation of corium unguulae and chronic foot rot.

Forty to fifty percent of lamenesses in cattle are caused by foot rot^{3~5)}. Thus cattle with hoof problems can not show their maximum ability and show drop of milk production and weight gain, and reproductive disorders. In severe case, these cattle are culled. Eventually those cattle cause severe economic loss.

In this study, we described the status of hoof diseases in dairy and beef cattle farms, development of method for treatment of cattle with hoof diseases to diminished the economic losses of dairy farms.

Materials and Methods

Number of farms surveyed

Twenty-five dairy farms(438 heads) in the

areas of Bo-eun, Ok-chun and Yeong-dong county in Chungbuk province were surveyed from January to December in 2000.

Isolation of causative agents

Bacterial agents of hoof disease were isolated from the tissue samples collected from lesions of hoof disease by inoculation of samples onto both thioglycollate broth and nutrient broth.

Biochemical tests of bacteria isolates.

Biochemical tests for isolated bacteria were done by the methods described in "Laboratory Diagnosis of Anaerobic Bacterial Infections" .

Sensitivity test to therapeutic agents

The hoof lesions were removed and the therapeutic agents were applied on the lesions.

The therapeutic efficacy of each agent were evaluated. The formulas of therapeutic agents are summarized in table 1.

Table 1. Therapeutic agents for foot oiseases

Therapeutics	Components	
A	Formalin sol (25%)	500 ml
	Saturated picric acid	500 ml
	Absolute ethanol	1,000 ml
	Acetic acid	20 ml
	Glycerine (1%)	180 ml
B	Formalin sol(25%)	100 ml
	Phenol	120 ml
	Salicylic acid	10 g
	Strong iodide	100 ml
	Glycerine(1%)	50 ml
	Tar	800 g
C	10% Formalin solution	
D	10% Cupric sulfate solution	

Table 2. Incidence rates of hoof diseases observed in 25 dairy farms during one year

Form of hoof disease	Month												Total Cases(%)
	1	2	3	4	5	6	7	8	9	10	11	12	
Foot rot		1		2	1	1	1	3	4	1			14 (41)
Pododermatitis verrucosae	1		1			2	2	3	1				10 (29)
Laminitis		1		1			2	2	1				7 (21)
Punctured wound							1						1 (3)
Others										1	1		2 (6)
Total	1	2	1	3	1	3	6	8	6	2	1		34 (100)

Results and Discussion

Out of 25 dairy farms(438 heads), 34 heads (7.8%) had hoof diseases.

Recently, although dairy and beef cattle industry had structure of big herd size and over crowded farming, farming facilities and skills has not well developed and therefore, outbreaks of hoof diseases have been increased⁶⁾. Although mortality rate is not high economic losses has been increasing and the poor understanding of farmers to hoof disease helps in economic losses⁶⁾.

Although incidence rate of hoof diseases was variable between researchers, the incident rate in Korea was lower than that of foreign countries. Adams³⁾ reported that one herd showed 80% incidence rate of hoof disease. Egerton⁷⁾, Shelton⁸⁾, and Song-mi⁹⁾ reported that incidence rate was 40%, 5~6%, and 75%, respectively. Thus we can know that hoof diseases are very serious.

Jung¹⁰⁾ reported that incidence rate was 7.57%(105 out of 1,387 heads) and his results were very similar to our results(7.7%). In respect to season, more cases of hoof disease were observed in the season with high temperature and high humidity (August, September) as shown in Table 2.

This result is similar to the result re

ported previously by Jung¹⁰⁾, but is contrary to that of Gupta¹¹⁾ and Gibbons¹²⁾. They reported that most cases of hoof diseases occurred in winter. As playground, grazing area, and pen are wet during the summer, the capsula unguiae become soft and vulnerable to infection. And the causative agents are also activated as temperature rises.

Based on our classification of hoof disease, the incidence rates of hoof rot, pododermatitis verrucosae, laminitis, other cases and trauma were 14 cases(41%), 10 cases(29%), 7 cases(21%), 2 cases(6%) and 1 case(3%), respectively(Fig. 1~6).

In respect to age and milk production, incidence rate of hoof diseases showed a tendency to be high in cattle with high milk production, older age as shown in Table 3. And this result was almost consistent with other researcher reports.

Table 3. Relationship of foot diseases and milk yield

Milk yield(kg)	No of head infected	%
15~20	9	26.4
21~30	16	47.2
31~40	9	26.4
Total	34	100

Incidence rate of hoof disease in hind-limbs(76.5%) is much higher than that of fore-limb(23.5%). This result is consistent with reports of Funk⁵⁾ and Greenough¹³⁾.

We considered hind-limbs should sustain mammary gland, fetus in case of pregnancy, and be done more frequently contacted with urine, feces than fore-limbs, and so be vulnerable to tenderness and infections.

Table 4. Incidence rates of foot disease in the limbs

No of heads infected	Fore limbs		Hind limbs	
	Left	Right	Left	Right
34 (100%)	3 (8.8%)	5 (14.7%)	10 (29.4%)	16 (47.1%)

Number of bacteria isolates and isolation rate are shown in Table 5. *E coli*(8 strains),

Table 5. Species and numbers of isolates from the hoof lesions

Microorganisms	No of isolates	%
<i>E coli</i>	8	23.6
<i>Staphylococcus</i> spp	6	17.6
<i>Clostridium</i> spp	8	23.6
<i>Fusobacterium</i> spp	6	17.6
<i>Bacteroids</i> spp	6	17.6
Total	34	100

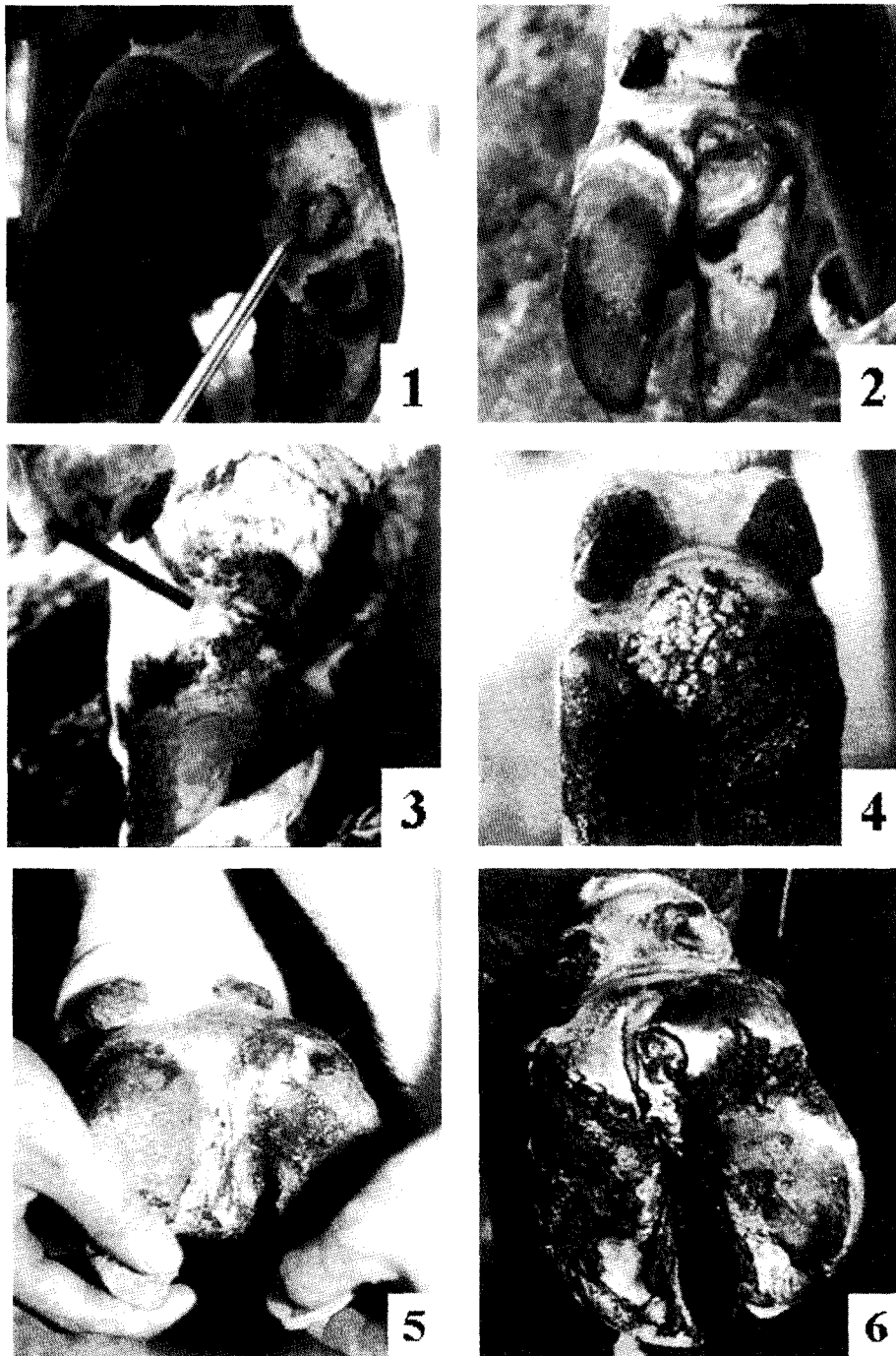
Staphylococcus spp(6 isolates) and *Clostridium* spp(8 isolates) were isolated. *Fusobacterium* spp(6 isolates) and *Bacteroids* spp(6 isolates) which have been known as a causative agent of foot rot disease were also isolated.

In the sensitivity test of isolates to therapeutics, the isolates were more sensitive to therapeutics A(saturated picric acid) than therapeutics B(25% formalin sol).

Table 6. Results of therapeutic susceptibility test against strains isolated

Strains	No of strains examined	Therapeutics			
		A	B	C	D
<i>E coli</i>	8	1/2*	2/2	0/2	0/2
<i>Staphylococcus</i>	6	1/2	2/2	0/1	0/1
<i>Clostridium</i> spp	8	2/2	2/2	0/2	0/2
<i>Fusobacterium</i> spp	6	1/2	1/2	0/1	0/1
<i>Bacteroids</i> spp	6	1/2	2/2	0/1	0/1
Total	34	6/10	9/10	0/7	0/7

*No of remedied / No of tested



Legends for Figures

Fig 1. Punctured sole in cattle.

Fig 2. Heelhorn abscess in cattle.

Fig 3. Interdigital dermatitis in cattle.

Fig 4. Interdigital granuloma in cattle.

Fig 5. Laminitis in cattle.

Fig 6. Foot rot in cattle.

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