

## Effect of Enrofloxacin (Baytril Premix) for the Treatment and Prevention of Respiratory Diseases in Swine

Jae-Gil Yeh, D.V.M., Ph. D, Jeong-Ky Seo, D.V.M., Kyung-Yoon Park, D.V.M., M.S.,  
Byeung-Gie Kim, D.V.M., Ph.D., Yong-Hee Kim, D.V.M., Ph.D.

Bayer Veterinary Medical Research Institute

### Abstract

For the purpose of effective treatment and prevention of porcine respiratory diseases, Enrofloxacin(Baytril premix) was administered in the feed to trial herd occurred sporadically the respiratory diseases and then a serious investigation was carried out on the therapeutic effect, weight gain, feed conversion rate and lung lesion scoring.

The results obtained were as follows :

1. The grower pigs which were administered with Baytril premix for 10 days gained the average body weight of 31kg for 33 days compared to 20.5kg of control group( $p < 0.05$ ). Also drastical improvement of feed conversion rate( $p < 0.05$ ) and disappearance of clinical signs were approved.
2. Average scorings of lung lesions were 7.92% in the medication group and 15.8% in the control group respectively.
3. Respiratory diseases outbreaked in the trial farm were pleuropneumonia caused by *Actinobacillus (Haemophilus) pleuropneumoniae*, Mycoplasmal pneumonia and Pasteurellosis.

### Introduction

Porcine respiratory complex diseases caused by *Mycoplasma hyopneumoniae*, *Pasteurella multocida*, *Bordetella bronchiseptica* and *Actinobacillus (haemophilus) pleuropneumoniae* have been high prevalent and have done large damage economically to intensive pig farms.

For the treatment and prevention of respiratory diseases, improvement of management, vaccination and medication of several antimicrobials in the feed could have been applicable.

Enrofloxacin(Baytril<sup>®</sup>) is a new fluoroquinolone anti-infective agent with a broad antibacterial activity spec-

trum. This encompasses Gram negative, Gram positive bacteria and Mycoplasmas.<sup>1)</sup> The products of Enrofloxacin(Baytril) were developed exclusively for use in veterinary medicine.<sup>1)</sup>

Enrofloxacin was introduced to the animal health market in Korea since 1987. This trials were undertaken to ascertain the effect of enrofloxacin as a feed additives in 150 ppm of dose level(Premix type) for the treatment and prevention of respiratory complex in swine.

### Materials and Methods

Experimental pig farm : The experimental farm was

located in Pochun-county, Kyunggi-province and has been a large scale production integrated and intensive rearing as well as breeding pig farm.

**Experimental method of administration with sample drug :** The experimental drug was Baytril premix 2.5% (Enrofloxacin 281088-071 V. BAY VP 2674). Experimental pigs were supplied with the feed contained enrofloxacin at the level of 150 ppm.<sup>3)</sup> The groups of experimental pigs (average 125 days old) were infected respiratory complex and appeared the clinical signs of respiratory diseases.

Experimental groups were divided 3 groups in 90 heads each and No. of total experimental pigs were 270 heads. Group I was administered for 10 days with Baytril premix at a concentration of 150 ppm in the feed. Group II was administered for 3 days at the same dose level of group I and group III (control group) was fed with normal grower feed without antimicrobials.

All experimental pigs were weighed prior to administration (125 days old), 10 days, 20 days after administration and the finishing time. Authors have investigated the prevalence of clinical signs of respiratory diseases during this trial.

**Investigation of respiratory diseases in the experimental farm :** Situation of respiratory diseases in the ex-

perimental farm was investigated during this trial. Bacterial isolation and pathological findings were performed with dead pigs in the same stable. Lung lesions were also observed and measured by macroscopical examination with experimental pigs in slaughter house after finishing the trial, at 158 days old.

## Results

**Feeding effect of Baytril premix in growing pig :** The performances of administration with Baytril premix for the respiratory diseases of pig are summarized in Table. 1.

In group I, administered for 10 days with Baytril premix, the weight gain during trial was 31 kg and mean body weight gain per day was 939g. In group II, administered for 3 days with Baytril premix, the weight gain was 25.5kg and mean body weight gain per day was 773g.

On the other hand, in control group III, the weight gain was 20.5kg and mean body weight gain per day was 621g.

In the investigation of feed conversion, group I was 2.52, group II 2.86, group III 3.21 respectively.

The results were statistically analysed by T. test and found highly significance in weight gain and feed con-

**Table 1.** Performance of Administration with Baytril Premix for the Respiratory Disease of Pig

Description	Unit	Group		
		I	II	III
No. of tested pig		90	90	90
Average B. weight at 60 days	kg	20.7	20.7	20.7
Average B. weight before medication (125 days old)	kg	72	72.5	73
Periods of medication	days	10	3	None
Average B. weight at 145 days old	kg	92	88	85
Average B. weight at 158 days old (slaughter)	kg	103	98	93.5
Mean weight gain during trials (125~158 days)	kg	31*	25.5	20.5 *
Mean weight gain per day	g	939	773	621
Feed intake per pig	kg	78.12	72.93	65.81
Feed conversion		2.52*	2.86	3.21*

\* Means are significantly different in comparison with controls ( $p < 0.05$ ).

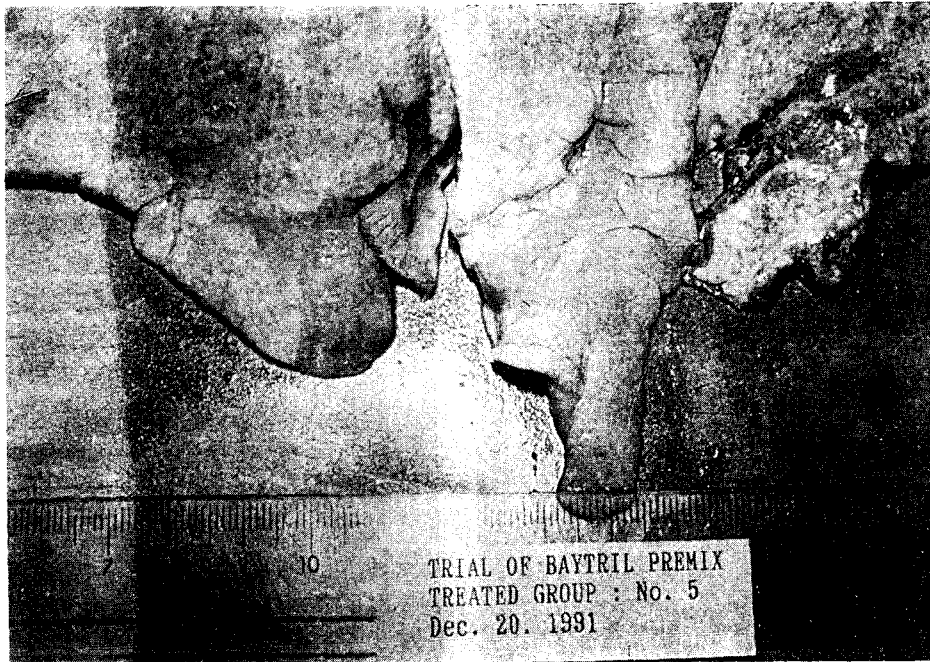


Fig. 1. Lesions of Mycoplasma pneumoniae pneumonia.

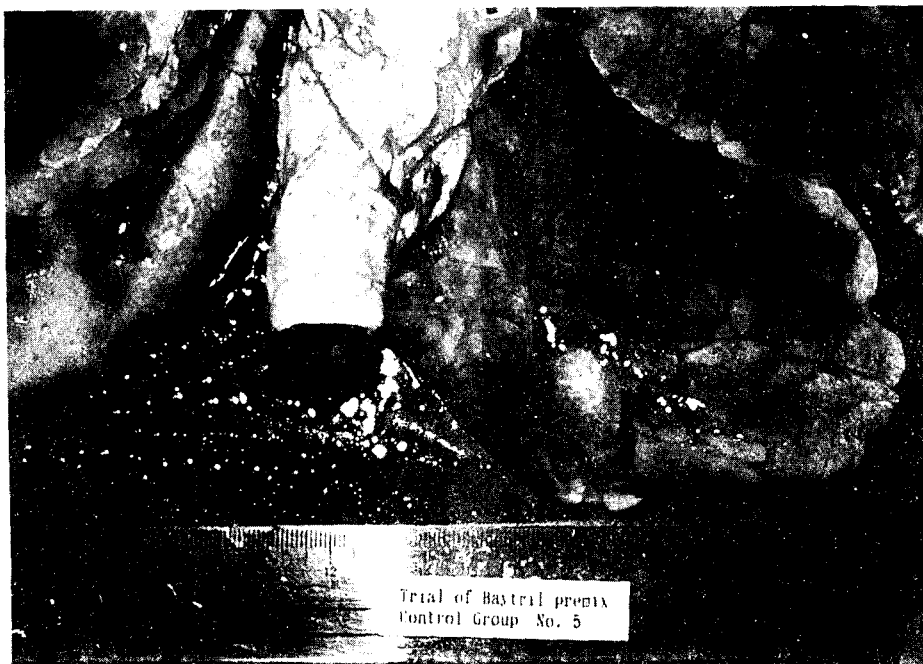


Fig. 2. Lesions of Pasteurellosis complicated with Mycoplasma.

version( $p < 0.05$ ).

Coughing pigs were sporadically found in each group when they reached 125 days.

After administration with Baytril premix, group I, II has not occurred coughing and clinical signs. But group III was appeared coughing and unthrifty continuously.

**Lung lesion scoring** : Average scorings of lung lesions were 7.92% in group I, but 15.8% in group III. Administration with Baytril premix for 10 days could be reduced as much as 7.88%.

Typical lesions of experimental lungs were mycoplasmal pneumonia(Fig. 1) in Baytril premix group and pasturellosis complicated with mycoplasmosis(Fig. 2) in control group.

**Investigation of respiratory diseases in trial herd** : In the all grower pigs of trial farm, several respiratory diseases were found during the trial as follows ;

Pleuropneumonia caused by *Actinobacillus (Haemophilus) pleuropneumoniae*, Pasteurellosis caused by

**Table 2.** Score of Lung Lesions

No. of Pig	Group	
	I	III
1	0.6%	12%
2	11.5%	5%
3	11%	13%
4	0.5%	2%
5	16%	47%
Mean	7.92%	15.8%

*Pasteurella multocida*, Swine enzootic pneumonia caused by *Mycoplasma hyopneumoniae*. And pneumonia caused by *Streptococcus* sp. and *Staphylococcus aureus*.

## Discussion

Porcine pneumonia has been recognized as a serious impediment to swine production for a long time. The causatives of porcine pneumonia are attributed to *Actinobacillus pleuropneumoniae*, *Mycoplasma hyopneumoniae*, *Pasteurella multocida*, *Haemophilus parasuis*, *Streptococcus* sp., *Bordetella bronchiseptica*, several parasites and virus as well as failures of management.

Many antiinfective agents were developed and used widely for the treatment and prevention of respiratory diseases in swine.

Authors have conducted a trial with Enrofloxacin (Baytril premix) which was developed from a group of new quinolone carboxylic acid derivatives by Bayer research division, Germany.

Kobisch<sup>4)</sup> reported that the antibacterial activity of Enrofloxacin against *Actinobacillus pleuropneumoniae* and *Mycoplasma hyopneumoniae* in combination with *Pasteurella multocida* was shown clearly in experimental piglets.

Stephano et al.<sup>5)</sup> reported that enrofloxacin administered parenterally at 8 and 12 hours post inoculation at a dose of 2.5 or 5mg/kg b.w. was effective against acute experimental infection with *Actinobacillus pleuropneumoniae*.

Depez et al.<sup>6)</sup> indicated that a metaphylactic use of medication in the post weaning period in pigs could be an alternative for the prophylactic use of antimicrobials in the prevention and control of *E. coli* enterotoxemia. Kyriakis et al.<sup>7)</sup> investigated that the benefits of controlling and preventing the post-weaning colibacillosis of piglets with enrofloxacin 50 ppm in the feed for 21 days was obvious and well documented by the reduction of mortality and diarrhea, increase of body weight gain and better utilisation of the feed.

Kyriakis et al.<sup>7)</sup> also reported that the treatment of bacterial pneumonia of growing pigs due to *Pasteurella multocida* and *Streptococcus suis* with enrofloxacin 150 ppm in the feed for 14 days was obvious and well documented by the reduction of mortality and especially because of the better performance of the trial pigs.

Ramos and Mercado<sup>9)</sup> conducted the efficacy of Baytril(Enrofloxacin) in controlling swine pneumonia.

In this trial, the results of observation indicated that Enrofloxacin(Baytril premix) as 150 ppm in the feed for 10 days could be recognized improvement of weight gain, feed conversion and disappearance of clinical signs.

Also average scoring of lung lesions was reduced in the medication group. Enrofloxacin(Baytril) can be administered by the parenteral and the oral route. This could allow the user to select the appropriate method

of administration for the swine in each particular situation.

Due to similar kinetic pattern, the parenteral and oral application have approximately the same chance of success.<sup>2)</sup>

Infective organism such as *Actinobacillus pleuropneumoniae*, *Pasteurella multocida*, *Mycoplasma hyopneumoniae*, *E. coli*, *Klebsiella* sp. *Yersinia* sp. and *Staphylococcus* sp. with MIC value can accordingly be described as highly sensitive.<sup>1,10)</sup> Yeh and Seok<sup>11)</sup> reported the high susceptibility of the domestic isolated of *Erysipelothrix rhusiopathiae* to enrofloxacin.

It could be concluded that enrofloxacin as premix type should be effective to bacterial respiratory diseases and growth promotion in Korean pig farms.

## Reference

1. Scheer, M. : Studies on the antibacterial activity of Baytril. Veterinary Medical Review., (1987) 2 : 90~99.
2. Bauditz, R. : Results of clinical studies with Baytril in calves and pigs. Veterinary Medical Review., (1987) 2 : 122~129.
3. Yeh, J.G., Seo, J.K., Kim, B.G., Lee, C.K. and Han, B.W. : Effect of Enrofloxacin on post weaning diarrhea in pig. Korean J. Vet. Clin. Med. (1991) 8(1) : 59~63.
4. Kobisch, M., Vannier, P., Delaporte, S. and Dellac, B. : The use of experimental models to study in vivo the antibacterial activity of Enrofloxacin against *Actinobacillus*

- (*Haemophilus pleuropneumoniae* and *Mycoplasma hyopneumoniae* in combination with *Pasteurella multocida*. Proceedings of 11th IPVS, (1990) p. 16.
5. Stephano, A., Diaz, C., Vazquez-Rojas, F. and Navarro-Fierro, R. : Efficacy of a new antimicrobial (Enrofloxacin) against experimental infection with *Haemophilus pleuropneumoniae* in pigs. Proceedings of 10th IPVS, (1988) p. 95.
6. Deprez, P., Cupere, F.D. and Muylle, E. : Metaphylactic in feed medication with Baytril (Enrofloxacin) against *Escherichia coli* enterotoxemia. Proceedings of 12th IPVS, (1992) p. 260.
7. Kyriakis, S.C., Sarris, K. and Papatsas, J.C. : The effect of Enrofloxacin (Baytril premix) in the feed for the control of post-weaning colibacillosis. Proceedings of 12th IPVS, (1992) p. 261.
8. Kyriakis, S.C., Sarris, K. and Tsinas, A.C. : The effect of Enrofloxacin (Baytril premix) in the feed for the treatment of natural occurring bacterial pneumonia of growing pigs. Proceeding of 12th IPVS, (1992) p. 231.
9. Ramos, W.P. and Mercado, E.P. : Efficacy of Baytril (Enrofloxacin) in comparison with Lincospectin and Tylosin/TMPS in controlling swine pneumonia. Proceedings of 12th IPVS, (1992) p. 232.
10. Jenkins, W.L. : The pharmacology of the quinolones. Proceedings of a symposium on quinolones at the eastern state veterinary conference, Florida. (1990) p. 5~12.
11. Yeh, J.G. and Seok, H.B. : Studies on properties and pathogenicity of *Erysipelothrix rhusiopathiae* isolated from pigs in Korea. Korean J. Vet. Res. (1991) 31(2) : 201~208.

## 돼지의 호흡기질병 치료 및 예방에 대한 Enrofloxacin의 효과

예재길·서정기·박경윤·김병기·김용희

한국바이엘화학(주) 부설 동물의학연구소

### 초 록

돼지의 호흡기질병을 효과적으로 치료 및 예방하고자 Enrofloxacin (Baytril premix)를 사료에 혼합하여 호흡기질병이 산발적으로 발생하고 있는 돈군에 투여하여 호흡기질병의 치료여부, 증체량, 사료요

구울, 폐병변치 등을 조사하여 다음과 같은 결과를 얻었다.

1. 육성돈군에 Enrofloxacin(Baytril premix)를 10일간 급여하였던 바 증체량은 33일동안 31kg이었으나 대조구에서는 20.5kg으로써 통계적 유의차를 보였으며( $p < 0.05$ ), 사료요구율도 개선되었고( $p < 0.05$ ), 호흡기질병의 임상증상도 없어졌다.

2. 폐병변조사에서 Baytril 급여구에서는 평균 폐병변의 형성정도는 전체 폐면적의 7.92%이었으나 대조구에서는 15.8%의 심한 병변이 형성되어 있었다.

3. 공시농장에서 발생하고 있는 호흡기질병은 *Actinobacillus pleuropneumoniae*에 의한 흉막폐렴, *Mycoplasma*성 유행성폐렴 및 *Pasteurella multocida*에 의한 폐렴 등 이었다.