

# Application of EM1 (Effective Microorganisms) for Treatment of Diarrheic Disease in Piglets in Vietnam

Pham Knac Hieu and Bui Thi Tho

Department of Veterinary Pharmacology and Toxicology  
Hanoi Agricultural University, Gialani, Hanoi, Vietnam

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**Abstract :** A study was carried out to determine the effective mechanism and benefit of EM1 (Effective Microorganisms) on prevention and treatment of diarrheic disease in piglets caused by enteric pathogens in North Vietnam. It was found that EM1 inhibited *E. coli*, *Salmonella*, *Klesiella*, *Shigella*, *Staphylococcus*, *Streptococcus*, *Clostridium perfringens*, including those that resisted various antibiotics. The anti-bacterial ability of EM1 was not lost by high temperature (120°C for 30 minutes) or after drying EM1 to form biomass. EM1 was successfully used for treatment of diarrhea in piglets due to complicated infection of enteric bacteria. It was equal in treatment effect to colistin. In addition, the growth of piglets after treatment with EM1 was not retarded as seen with antibiotics.

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## Introduction

In Vietnam product EM1 (Effective Microorganisms) has been used in a number of fields. The present study was aimed to determine the anti-bacterial property of EM1 against several pathological bacteria and its effect on treatment of diarrhea in piglets in selected northern provinces of Vietnam.

## Materials and Methods

### Materials

- EM1 provided by APNAN
- Standard bacteria and bacteria isolated from the digestive tract of diseased piglets.
- Piglets suffering from diarrhea due to complicated enteric bacteria (*E.coli*, *Salmonella*, *Proteus etc.*)

### Methods

- Evaluation of the anti-bacterial effect by improved method of volatilization according to Jokin (1977) and the improved method of diffusion in gel with columns according to Heasley (1964).
- Treatment of diseased piglets with EM1 (1ml/kg liveweight) in comparison with colistin.

## Results and Discussion

### *Anti-bacterial Effects of EM1 Based on Tokin's Method of Volatilisation*

As can be seen from Table 1, EM1 inhibited the tested bacteria, regardless of Gram negative or positive, aerobic or anaerobic, including those resistant to many antibiotics and those producing H<sub>2</sub>S, NH<sub>3</sub> and Indol. At a dose of 4 ml the tested bacteria were partially inhibited (+) and at 10ml the bacteria were totally inhibited. (+++). In the control using distilled water and water with pH of 3.5 (similar to that of EM1) the bacteria grew well without any inhibition(-).

**Table 1. Evaluation of the Effect of EM1 on Inhibition of Pathological Bacteria**

Bacteria	EM1 dose		Control (10ml)	
	4ml	10ml	Distilled water	Water with pH 3.5
E.coli*	+	+++	-	-
Salmonella*	+	+++	-	-
Klebsiella	+	+++	-	-
Shigella	+	+++	-	-
Proteus	+	+++	-	-
Staphylococcus	+	+++	-	-
Streptococcus	+	+++	-	-
Clos. pefringens	+	+++	-	-

Notes : \* Each was tested on 4 strains: 1 standard strain, 2 isolates highly sensitive to antibiotics, 1 strain resistant to Ncomycin, Nitrofurantoinin, Streptomycin. Olcandomycin, Polimycin, Erythromysin

### Antibiogram of EM1 Based on the Improved Method of Heasley

**Table 2. Antibiogram of EM1**

Bacteria	Diameter of Non-bacterial Circle (mm) of 0.4ml EM1/ Column					
	Fresh	Tyndal Steaming	Steaming at 120°C /30 min.	Setz Filtration	Biomass Form	Distilled Water with pH 3.5
E.coli*	25.0	24.5	25.0	24.5	17.5	0
Salmonella*	27.0	27.5	27.5	26.0	19.0	0
Klebsiella	26.0	26.5	26.0	26.5	18.0	0
Shigella	29.0	27.5	27.5	26.0	18.5	0
Proteus	25.0	27.0	26.0	27.0	19.0	0
Staphylococcus	23.0	24.0	25.0	24.0	17.5	0
Streptococcus	24.0	25.0	24.0	26.0	18.0	0
Clos. pefringens	24.0	23.5	24.0	22.0	21.0	0

Notes : as for Table 1.

Table 2 shows that EM1 has a strong inhibiting effect on the tested bacteria. These were the cause of complicated bacterial disorder in the diarrheic syndrome in piglets in Vietnam. It can also be seen that the anti-bacterial effect of EM1 was not lost due to high temperature (120°C/30 min) or filtration, but somewhat decreased after drying at a high temperature (80°C for 18-20 h) to produce a biomass form.

## Results of Treatment of Diarrhea with EM1

**Table 3. Composition of Diarrhea Treatment Effects of EM1 and Colistin**

Piglet Age (days)	EM1				Colistin			
	No. of Treated Piglets	No. of Recovered Piglets	Rate of Success (%)	Live Weight (Kg/head)	No. of Treated piglets	No. of Recovered Piglets	Rate of Success (%)	Live Weight (Kg/head)
1-7	47	45	95.7	1.23	30	27	90.0	1.27
8-14	33	26	78.7	-	40	34	85.0	-
15-2	40	32	80.0	-	30	25	83.3	-
22-3	35	30	85.7	6.89	41	35	85.3	6.35

It can be seen from Table 3 that EM1 was as effective as Colistin in treatment of diarrhea in piglets. In addition, after recovery the piglets given EM1 had higher growth rates compared to those receiving colistin.

### Conclusions

Product EM1 is inhibiting to many types of pathological bacteria, including gram positive and negative bacteria, drug resistant bacteria, aerobic and anaerobic bacteria, and producing gases ( $H_2S$ ,  $NH_3$ , Indol.).

This product is especially effective for treatment of enteric bacteria causing infectious complication leading to diarrhea in piglets in Vietnam; therefore use of this product can result in high effectiveness in treatment of diarrhea.

### References

- Jokin, L.** 1977. Cited in Nguyen Dye Minh. Anti-bacterial Ability of Medical Herbs in Vietnam. Medical Publishing House, Hanoi.
- Heasley, J.** 1964. Cited from Tu Quoc Quan. Antibiotics. People's Sanitary Publishing House. Beijing.