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The effects of veterinary drugs based on humic acids in the treatment of enteritis in young animals

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ABSTRACT

The breeding of young pigs and cattle presents a number of difficulties due to an increased occurrence of diseases, especially those of the gastrointestinal tract - for example, in calves and piglets - in conventional as well as industrial circumstances.

In the German Democratic Republic humic acids have been used for more than 15 years as agents for the therapy, prophylaxis and metaphylaxis of infectious and non-infectious gastrointestinal diseases (particularly in pigs and ruminants). In these clinical cases the chemical, biochemical and physicochemical properties, as well as their broad spectrum of pharmacological effects, are utilized.

Experiments on laboratory animals and clinical tests in practice showed that humic acids are a valuable supplement to the present conventional therapeutic methods against enteritis of calves, pigs and several species of zoo animals.

INTRODUCTION

Due to the increased gastrointestinal diseases, especially in calves and pigs, the breeding of young livestock has problems in conventional as well as industrial cattle

breeding farms and zoo animals¹.

For more than 15 years humic acids as basic active substances have been used in the German Democratic Republic for the treatment of infectious and non-infectious gastro-intestinal diseases.

Experiments on laboratory animals and clinical tests in practice have shown that humic acids contained as solitary active substances in the veterinary medicaments Kalumat and Sulumin are a valuable supplement to the present therapeutic methods against enteric diseases.

In these cases the chemical, biochemical and physico-chemical properties of humic acids as well as their broad spectrum of pharmacological effects have been used.

MATERIALS AND METHODS

About 70% of the earth's organic bound carbon is found in fossil fuel (coal, oil, peat and natural gases). Up to 8-10% of it belongs to the group of humic substances, but only 1% is present as cellulose and less than 0.001% is available as biologically active substances used for medical purposes - for example, antibiotics and hormones. Humic acids are polyvalent macromolecules composed of a large number of basic components. These substances are three-dimensional molecules with molecular mass between 10,000 and 200,000.

The peripheral zones consist of partially modified metabolites of organic structures resulting from protein, fatty acid and carbohydrate metabolism². Core and periphery are bound mainly by phenolic groups (the substitution pattern is usually lignin-like, flavonoid-like or chinoid-like). Functional groups are found in the peripheral zones (hydroxyl-free, carbonyl-free, carboxyl-free phenolic as well as amino, and sulphhydryl groups).

Humic acids are weak polyvalent organic acids with a tendency to form complexes (absorption, ion exchange, mainly concerning cationoid groups, such as metals). For pharmaceutical use highly concentrated humic acids are available.

The clinical and pharmacological effects of humic acids, which can be derived from their chemical properties and from the wellknown pharmacological and toxicological effects, may be summarized as follows³ :

- (1) antiphlogistic, astringent and analgesic effects;
- (2) adsorption effect as well as resorption-reducing effect particularly concerning cationic compounds;
- (3) antimicrobial effects on the basis of the presence of phenolic-chinoid groups;
- (4) detoxifying effects with pesticides⁴.

RESULTS AND DISCUSSION

The most favourable use of these pharmacodynamic properties may be by combination of several products of humic acids, as found in the veterinary drugs Kalumat and Sulumin (humic acids in form of an acid depending primarily on the molecular mass have antimicrobial properties as well as antiphlogistical effects; on the other hand, the alkaline salts of the humic acids have both adsorptive and metabolism-regulating effects).

Kalumat in the treatment of enteritis in calves and zoo animals

The composition of Kalumat is as follows : humocarb 90%; highly concentrated humic acids 5%; and aluminium/magnesium silicate 5%. Its use is for the prevention and treatment of infectious and non-infectious enteritis in calves and zoo animals. Administration is oral.

Various clinical tests showed that Kalumat is more effective in comparison to the conventional chemotherapy³.

After the oral administration of Kalumat the frequency of enteritis was reduced by more than 30%. Moreover, the costs of used drugs were decreased by about 60%, and body weight was increased by nearly 7%.

In summary, therefore Kalumat is highly effective and extremely well tolerated, when applied orally and can therefore be used successfully in therapy and prevention

of specific (such as *Escherichia coli*) infections, and unspecific (for example, dyspepsia) enteritis in calves and zoo animals (such as elephants, tigers, horses, and monkeys).

It is possible to substitute the conventional treatment with chemotherapy on the basis of humic acids as a solitary active substance, the drug must be used at an early stage.

Sulumin in the treatment of diarrhoea in suckling pigs and young pigs

Worldwide the breeding of pigs is connected with many types of gastrointestinal diseases, such as virus diarrhoea, *E. coli* diseases, colitoxicosis and dyspepsia. In most cases mortality and morbidity is very high, especially in virus diarrhoea and *E. coli* infections. Some authors have even described rates of morbidity up to 100%^{1,2}.

In the German Democratic Republic Sulumin is the newest of the veterinary medicaments based on humic acids as a complex agent. Its composition is as follows : highly concentrated humic acids 70%; Fe²⁺ 1.5%; Na-carboxymethyl-cellulose 28.5%. Its use is for the prevention and treatment of infectious and non-infectious enteritis especially *E. coli* diseases and virus diarrhoea in baby pigs, piglets and young pigs. Administration is oral.

The scheme of dosage, which showed the optimum results of treatment in various enteritic diseases of pigs, could be ascertained on the basis of laboratory tests and clinical investigations in practice (Tables 33.1 and 33.2).

In clinical tests on sick animals the efficacy of Sulumin on morbidity, mortality, frequency of enteritis, development of body weight, effect of iron contained in the drug, and the possibility of side-effects, was mainly examined.

Table 33.3 shows that the frequency of enteritis was reduced in more than 50% of patients. The development of

Table 33.1 Dosage of Sulumin in suckling pigs

Escherichia coli disease	500-750 mg/kg body weight, twice a day, for 3 days
Virus diarrhoea	350-500 mg/kg body weight, twice a day, for 3 days (maximum 1000 mg/kg body weight)
Chronic TGE	500-750 mg/kg body weight, for 5-10 days
Dyspepsia	500-750 mg/kg body weight, for 5-10 days
Infectious necrotic enteritis	500-750 mg/kg body weight, for 5-10 days

Table 33.2 Dosage of Sulumin in piglets and young pigs

Colitoxicosis	interval dosage : 500-1000-500 mg/kg body weight, for 10 days, in difficult cases, maximum 2000 mg/kg body weight
Dyspepsia	500-750 mg/kg body weight, for 5-10 days

body weight in the Sulumin group showed better progress and, furthermore, the rate of mortality in the case of virus diarrhoea was decreased from 24% to 0.5%.

Results on the influence of Sulumin on the metabolism of trace elements showed that plasma levels of iron, copper and zinc moved in the physiological range. Analogous effects were found in the following haematological parameters : erythrocytes, haemoglobin and haematocrit.

Table 33.3 Frequency of enteritis and development of body weight in piglets during preventive oral administration of Sulumin (400 mg/kg body weight)

Group	n	Frequency (%) of enteritis	Development of body weight (kg)	
			start	end
Control	53	93	4.80 \pm 0.15	11.62 \pm 3.36
Sulumin	43	44	5.28 \pm 0.11	14.27 \pm 8.77

CONCLUSIONS

In summary, Kalumat is highly effective and extremely well tolerated, when applied orally, and can therefore be used successfully in the treatment of specific (*E. coli*) and non-specific (dyspepsia) enteritis in calves and several zoo animals.

Sulumin has similar effects to Kalumat in the treatment of infectious bacterial diseases (*E. coli*, *Clostridia perfringens*), virus diarrhoea (coronavirus and rotaviruses) and dyspepsia in piglets and young pigs.

References

1. Elze, K. (1982). Über den Einsatz von Huminsäuren zur Prophylaxe und Therapie von Durchfällen bei Zootieren. Internat. Symp. Erkrankungen Zootiere, Veszprem, Ungarn.
2. Golbs, S. (1983). Experimentelle Untersuchungen zur pharmakologischen Wirksamkeit und zur Pharmakodynamik von Huminsäuren unter besonderer Berücksichtigung koergistischer Effekte und ihrer therapeutischen und prophylaktischen Nutzung beim Schwein. Prom. B. Leipzig : Karl-Marx-Universität.
3. Golbs, S. and Kuehnert, M. (1983). Huminsäurenanwendung in Therapie, Pro- und Metaphylaxe in der Veterinärmedizin. Z. Physiother. 35:151-158.
4. Golbs, S., Kuehnert, M. and Fuchs, V. (1984). Beeinflussung der akuten Toxizität von ausgewählten Pestiziden durch Huminsäuren. Z. Ges. Hyg. 30:720-723.
5. Schnitzer, M. and Khan, S.U. (1972). Humic Substances in the Environment. New York : Marcel Dekker, Inc.