Protective effect of Shegan-Dilong granules on avian infectious bronchitis

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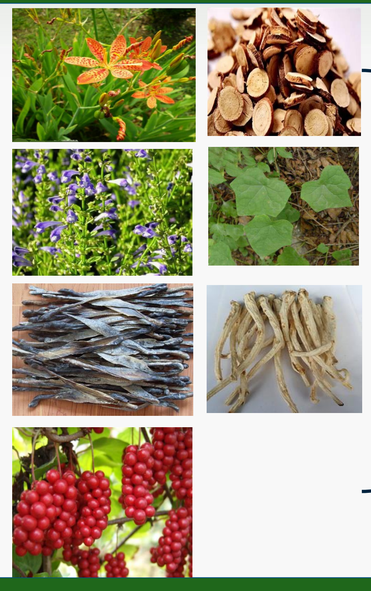
Background

Avian infectious bronchitis is an acute and highly contagious infectious disease caused by avian infectious bronchitis virus(IBV). It mainly damages the respiratory, urogenital and digestive systems of chickens. IBV can cause varying degrees of damage to chickens of all ages, often leads to serious economic losses. ***Shegan Dilong*** granules composes seven traditional Chinese drugs which have antiviral effect, for example, radix isatidis (Ban Lan Gen), Scutellaria baicalensis(Huang Qin), and Forsythia (Lian Qiao), etc. The ***Shegan Dilong*** granules has effect of anti-infective, anti-virus , freeing lung and relieving asthma.

Objective

- ✓ To investigate the protective effect of ***Shegan Dilong*** granules on avian infectious bronchitis
- ✓ Provide options for the prevention and control of respiratory diseases in poultry, and provide reasonable basis for antibiotic replacement therapy.

Approach



- Determine the EID_{50} of IBV (M41) in chicken embryos
- The optimal dose of challenge was selected
- clinical symptoms of each group of chickens after challenge
- Statistics of morbidity and mortality of chickens
- Statistical analysis of pathogen detection results

Results

Fig. 1 The herbal formula of *Shegan Dilong* granules

Proportion（%）	English name	Chinese pinyin	Part	Action
18	Belamcanda chinecsis rhizoma	*She Gan*	root, stem	clear heat, anti-virus
18	Earthworm	*Di Long*	whole	relieving asthma
15	Scutellaria baicalensis	*Huang qin*	stem	clear heat
15	Platycodon grandiflorum	*Jie Geng*	stem	preventing phlegm from forming and stopping coughing
12	rhizoma menispermi	*Bei Dou Gen*	root	clear heat
12	Schisandra chinensis	*Wu Wei Zi*	fruit	astringing the lung to stop cough, engender liquid and allay thirst
10	glycyrrhiza	*Gan Cao*	stem	tonify deficiency, relieve cough and detoxicate

Fig.2 The chicken embryo allantoic fluid of IBV was detected by RT-PCR

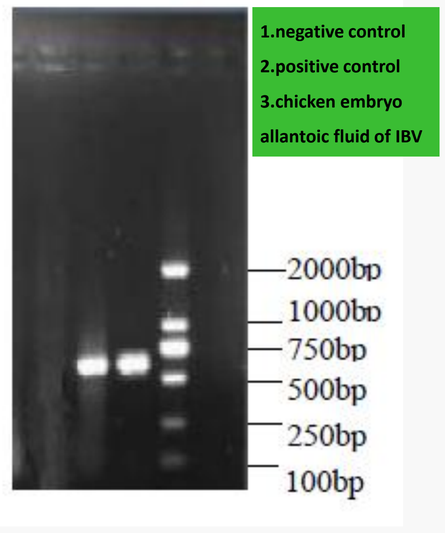


Fig.3 The EID50 of IBV was calculated by Reed-Muench method

Dilution	Inoculated Number	Infected embryos	Uninfected embryos	Cumulative number of infections	Cumulative number of uninfected	Total embryo	Infection rate(%)
10-3	5	5	0	18	0	18	100
10-4	5	4	1	13	1	14	92.9
10-5	5	5	0	9	1	10	90.0
10-6	5	4	1	4	2	6	66.7
10-7	5	0	5	0	7	7	0

Fig. 4 Evaluation of the artificial pathological model

	Model evaluation index	
1	Clinical symptoms:	Sick chickens are sneezing, nose shaking, coughing and tracheal rales, depressed spirit, feathers loose chaos, fear of cold, Some sick chickens may have moist eyes, swollen noses, and difficulty breathing.
2	Pathologic autopsy	There is serous exudate inside trachea, some larynx has haemorrhagic dot, nasal cavity has mucous
3	Etiological examination	More than 80% of IBV RT-PCR results in lung and tracheal tissues were positive
4	Serologic detection	In hemagglutination inhibition test, the IBV antibody titer should be increased by more than 5log2.
If the above typical clinical symptoms and pathological changes of autopsy are found in infected chickens, and the serological test results of the pathogen detection are all positive, the artificial IB infection can be judged to be successful		

Fig. 5 Pathologic examination of trachea

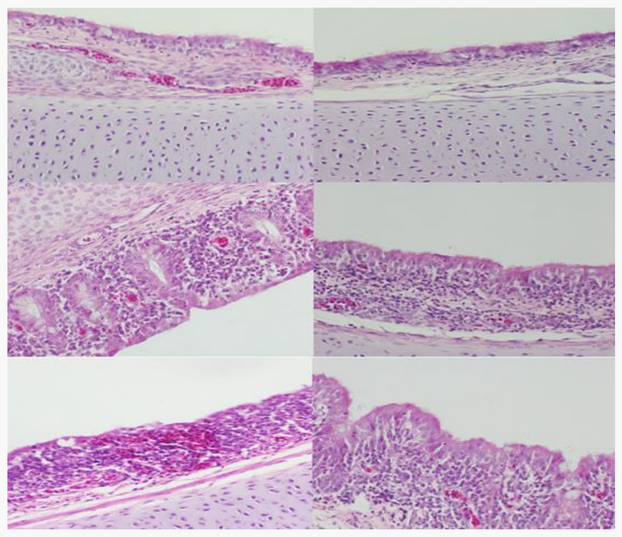
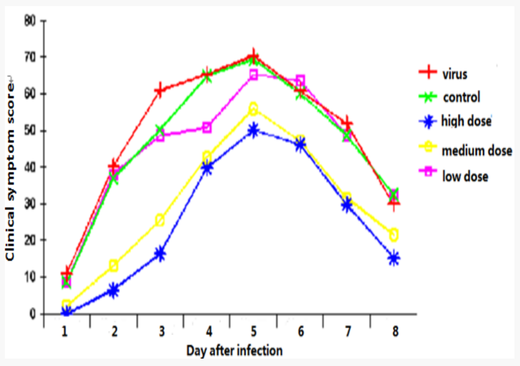


Fig. 6 Statistical chart of clinical symptom score percentage of chickens in each experimental group



Group	Day 3	Day 5	Day 7
Mock	0	0	0
Virus	63.3(57/90)	71.1(64/90)	53.3(48/90)
Control	51.1(46/90)	68.9(62/90)	51.1(46/90)
High dose	17.8(16/90)	50.0(45/90)	28.9(26/90)
Medium dose	26.7(24/90)	55.6(50/90)	31.1(28/90)
Low dose	46.7(42/90)	64.4(58/90)	51.1(46/90)

Fig.7 Incidence statistics of chickens

group	Animal number	number of the infected	incidence rate(%)	inhibition rate(%)
Blank control	30	0	0	/
Challenge control	30	30	100	/
Control drug	30	30	100	0
High dose	30	23	76.7	23.3
Medium dose	30	24	80.0	20.0
Low dose	30	30	100	0

Fig. Results of IBV RT-PCR pathogen detection in trachea

group	Animal number	number of positive sample	positive rate (%)
Blank control	30	0	0
Challenge control	30	26	86.7
Control drug	30	22	73.7
High dose	30	17	56.7
Medium dose	30	18	60.0
Low dose	30	22	73.3

Conclusions & Future Study

1. The incidence of IB could be reduced by 20% by adding the drug Shegan-dilong granules to the feed at a dose of 0.5g/kg body weight (medium dose) for 7 consecutive days.
2. The percentage of clinical symptoms score was significantly lower than that in the challenge control .

Future study: How does the Shegan Dilong granules protect the chicken from IBV infection? What are the prospect for the replacement of antibiotics by Shegan Dilong granules?

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