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**EFFICIENT  
CONCENTRATED  
KILLED VACCINE**  
**YOU JIN AN**



Tianjin Ringpu Bio-technology Co., Ltd.

Address: No.1 Dongjiu Road, Tianjin Free Trade Area (Airport Economic Area), Tianjin, China  
Email: export@ringpu.com Website: www.ringpu.com

# YOU JIN AN

Recombinant Newcastle Disease Virus Vaccine, Inactivated(Strain A-VII)

- Matching the prevalent strains
- High antigen content
- Little stresses
- Good protection effect



Reg. No.: 1108 in 20/11/2023

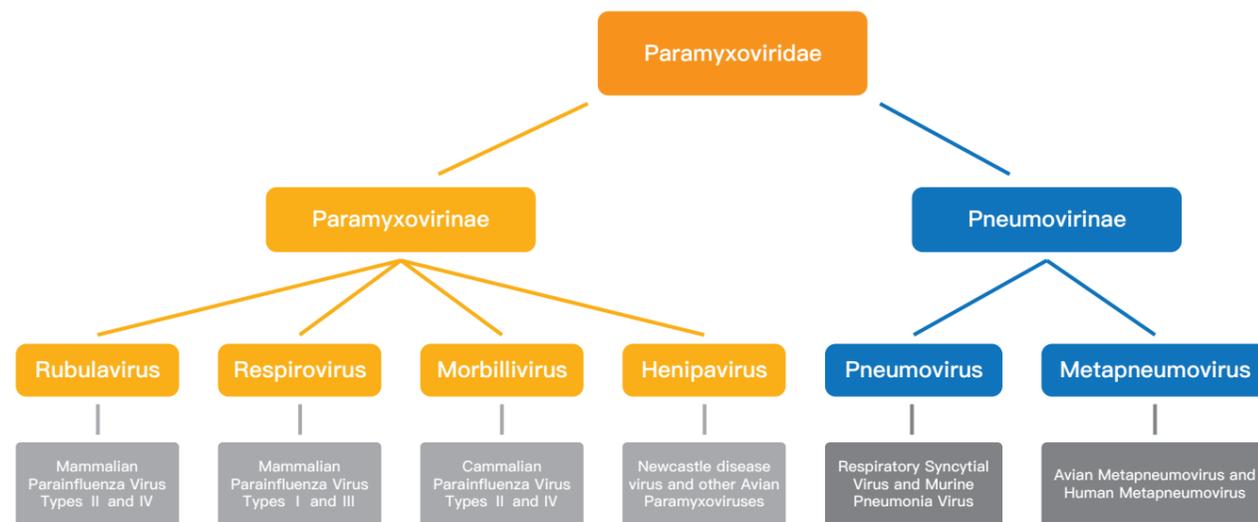
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# OVERVIEW OF NEWCASTLE DISEASE

- Newcastle disease is a contagious disease of poultry caused by the Newcastle disease virus. It is acute, febrile, and septicemic.
- Its main characteristics are difficult breathing, diarrhea, neurological disorders, and bleeding of mucous membranes and serosa.
- A major infectious disease that poses a significant threat to the poultry industry. It is classified as list A disease by OIE.

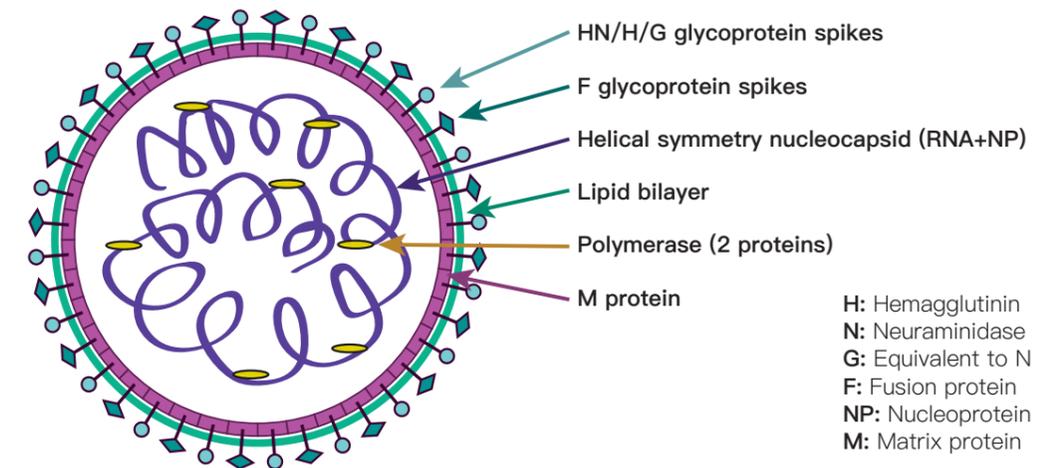
# THE ETIOLOGICAL CHARACTERISTICS OF NEWCASTLE DISEASE

- The Newcastle disease virus (NDV) is classified under Paramyxoviridae family, Paramyxovirinae subfamily, Avian Avulavirus, Avian paramyxovirus Type I (APMV-1).
- NDV doesn't easily mutated. It has only one serotype, but there are differences in pathogenicity among different strains.
- Can agglutinate red blood cells from other animals.



# THE ETIOLOGICAL CHARACTERISTICS OF NEWCASTLE DISEASE

- NDV is a single-stranded, negative-sense, non-segmented RNA with an envelope. It is pleomorphic with a diameter ranging from 100-500 nm, and over 95% of its genome is coding region. It encodes six structural proteins and is the smallest among all members of the Paramyxoviridae family.



# VIRULENCE DETERMINATION OF NEWCASTLE DISEASE VIRUS

- Based on the criteria for pathogenicity experiment

	MDT	ICPI	IVPI
Strongly virulent	40-60	1.6-2.0	> 1
Moderately virulent	60-90	0.6-1.5	0.0-0.8
weakly virulent	> 90	0.0-0.5	0

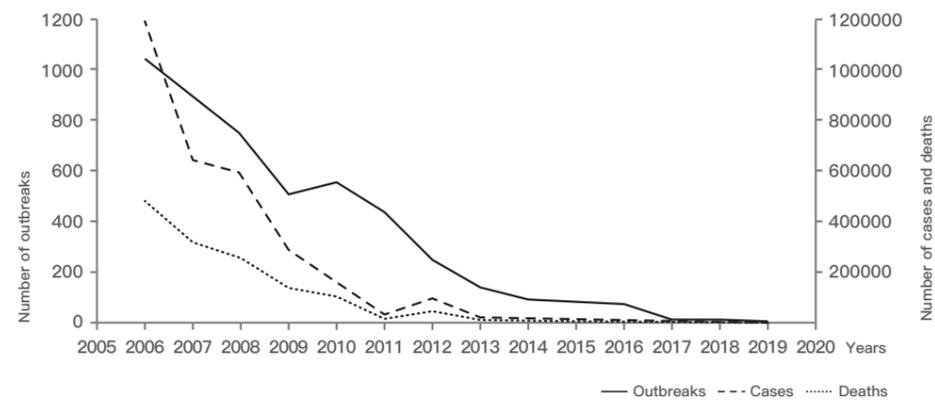
1. MDT: The mean time in hours for the minimal lethal dose (MLD) to kill embryos.
2. ICPI: The pathogenicity index of 1-day-old chicks after intracerebral inoculation: based on clinical signs within 8 days of 10 SPF chicks at 1 day of age after intracerebral inoculation.
3. IVPI: The pathogenicity index of 6-week-old SPF chickens within 10 days after intravenous inoculation.
4. Hemagglutination and Detachment Rate.
5. Thermal Stability of Viral Hemagglutinin, Chinese Journal of Avian Diseases.

# THE CURRENT EPIDEMIC SITUATION OF NEWCASTLE DISEASE

■ Newcastle disease has occurred four times in the world.

	Time	Note
The first global outbreak	From 1920s to 1960s	Originating from Southeast Asia, it was mainly caused by NDV of the three major genotypes, Genotypes II, III, and IV.
The second global outbreak	From 1960s to 1970s	May have originated from the Middle East, the main genotypes include V and VI.
The third global outbreak	Late 1970s to 1980s	First caused by pigeons, it likely originated in the Middle East, then spread to Europe, and subsequently became global, the main genotypes include VI bsubtype.
The fourth global outbreak	After 1980s	Primarily caused by genotypes VII and VIII of Newcastle disease virus, it may also have originated from Asia.

■ Newcastle disease has been decreasing in morbidity year by year, almost disappearing in 2017. The most genotype for the disease before 2015 is genotype A–VII.



# EPIDEMIOLOGICAL CHARACTERISTICS OF NEWCASTLE DISEASE

## ① The range of susceptible hosts is continuously expanding

- Chickens are highly susceptible, and pigeons, quails, parrots, turkeys, geese, ducks, and ostriches can all be affected, with pigeons and parrots playing a key role in the spread of the disease; in recent years, there has been an increasing trend in the incidence of Newcastle disease in ducks and geese.
- The current host range has significantly expanded, with over 250 species of birds that can be naturally or artificially infected.

## ② The seasonal nature of the disease is becoming less apparent

- The disease can occur in all seasons, but it is more common during the transition from autumn to winter and during sudden cold weather.

## ③ Characteristics of the age at which the disease occurs

- The disease mainly occurs at the following stages: 20–40 days, 60–100 days, and 180–350 days; however, the age-specific stages of the disease are becoming less distinct, with cases of disease in chicks (mainly 3–10 days old white-feathered broiler chickens), and maternal antibodies are not effective in preventing infection through mucosal routes.

## ④ Non-typical symptoms are becoming more prevalent

## ⑤ The duration of immunity in some flocks is reduced

- The widespread presence of immunosuppressive diseases and the existence of wild viruses in the environment contribute to the shortening of the immunity period.

## ⑥ Disease outbreaks can sporadically occur even after vaccination

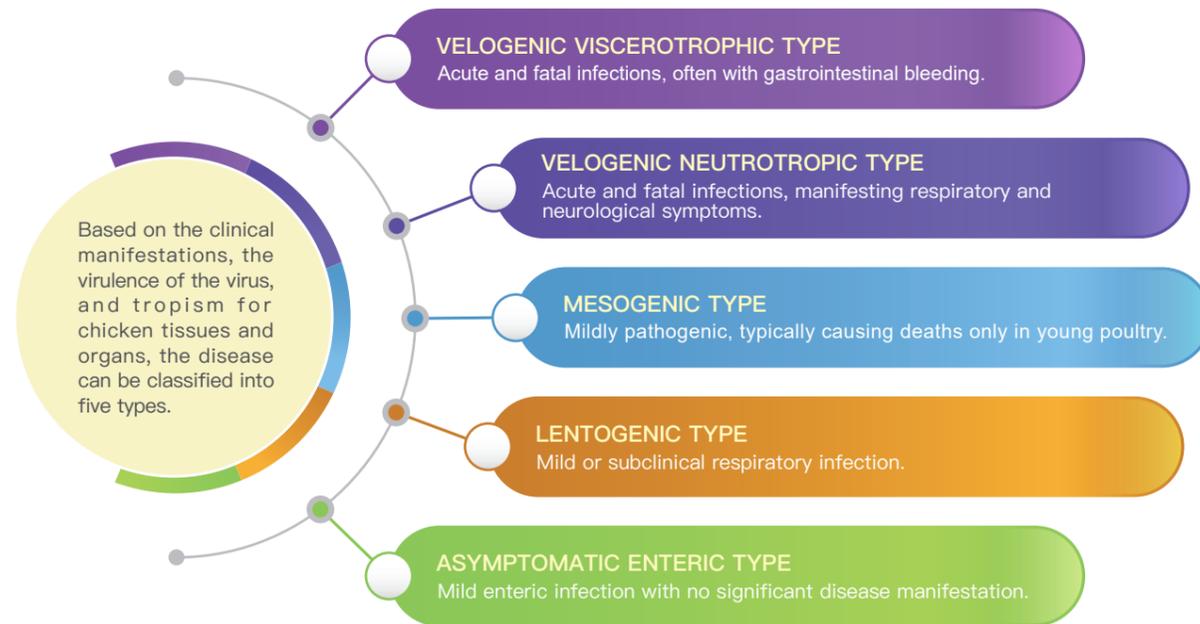
- In vaccinated flocks, there is varied antibody levels, which means there are always a certain number of chickens with antibody levels below the critical protective threshold. With poor management, once the virus invades the flock, it can infect these chickens, leading to the sporadic spread of atypical Newcastle disease within the flock.

⑦ Infected chickens are the main source of infection for this disease. The virus is present in all tissues, organs, body fluids, secretions, and excretions of the infected chickens. Chickens carrying the virus during the inter-epidemic period are also sources of infection; birds are also important transmitters.

⑧ The virus can enter the body through the digestive tract, respiratory tract, as well as through the conjunctiva of the eyes, injured skin, and cloacal mucosa.

⑨ The shedding of NDV generally stops 5–7 days after the symptoms disappear.

# CLINICAL AND NECROPSY SYMPTOMS OF NEWCASTLE DISEASE



## LATEST CLINICAL SYMPTOMS

- The incubation period ranges from 2~15 days or longer, with an average of 5~6 days.
- Affected chickens show signs of depression, with ruffled feathers, and their eyes are half-closed. In severe cases, the comb and wattles may be dark red.



Listless and with ruffled feathers



Exhibiting neurological symptoms – Neck twisting

- Chicks can start showing symptoms as early as 13~15 days old, with most affected chicks around 3~4 weeks of age. In the early stages of the disease, there is an increasing number of paralyzed chickens, with green diarrhea, and respiratory symptoms.



Persistent paralysis



Green feces



Yellow-green watery feces

- Laying hens: They exhibit mild respiratory symptoms, diarrhea, and may go through a phase of reduced feed intake. Egg production typically decreases by 10~20%. Egg quality is affected, exemplified by the production of soft-shelled eggs, misshapen eggs, and fading of egg-shell color.



## NECROPSY SYMPTOMS

- Atypical Newcastle disease do not show prominent symptoms at autopsy, mainly manifesting in the intestinal lymphoid tissues (the descending part of the duodenum, 3~5 cm below the yolk sac, and the rectum encircled by the cecum), where redness, necrosis, and ulceration may occur.



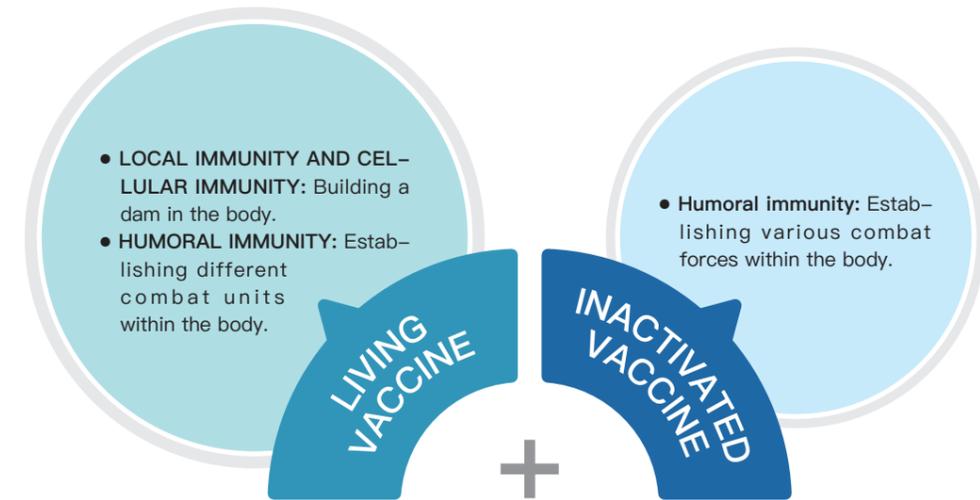
■ Hemorrhage in the glandular stomach papillae, date-pit-like ulcers in the intestines, and bleeding in the trachea.



■ In laying hens: The follicles are congested and turn red, with frequent leakage of yolk into the abdominal cavity leading to yolk peritonitis.



■ Implement scientific immunization and conduct antibody monitoring to determine the immunization program.



## COMMON NEWCASTLE DISEASE VACCINE STRAINS

## COMPREHENSIVE PREVENTION AND CONTROL

### ■ Implement biosecurity measures on the chicken farms

- ① Strengthen the isolation and sanitation of the internal and external environments of the chicken farm, and strictly implement biosecurity measures or comprehensive veterinary and sanitation measures to minimize the chances of the virus entering the flock.
- ② Practice all-in and all-out management, and separate the rearing of poultry of different ages, breeds, and types.

### ■ Enhance feeding and management

- ① Alternate disinfection with Glutaral and Deciquam Solution and Compound Potassium Peroxymonosulphate Powder, 2-3 times a week, and twice a day during outbreaks to purify the environment.
- ② During each immunization (especially during the brooding period and the immunity window period), use Transfer Factor Oral Solution in drinking water to enhance the body's resistance to disease.

### MODERATELY VIRULENT

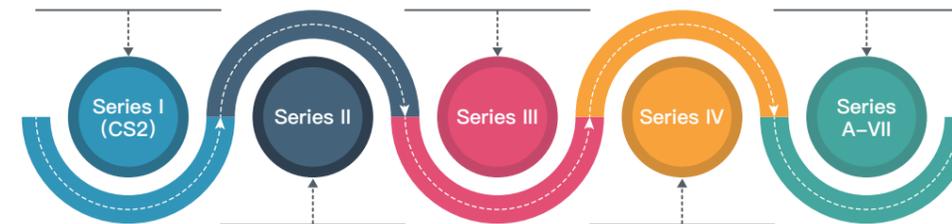
Introduced to China in 1945; virulent to chicks, suitable for two-month-old chickens, strong immunity, long duration. Disadvantage: easy to develop symptoms after 6 months.

### LOW VIRULENCE

The F series refers to naturally attenuated strains that are similar to the II series.

### ATTENUATED VIRUS CONSTRUCTION

Academician Xiufan Liu from Yangzhou University, using the VII d strain as a backbone, constructed a reverse genetics vaccine; effectively controlled the atypical avian influenza and provided good immunity against it in geese.



### LOW VIRULENCE

The B1 or HB1 strain, low virulence, good safety profile and suitable for chicks, rapid increase in antibody levels. Disadvantage: Rapid decrease in antibodies, short duration of immunity, and significant impact on chickens with high levels of maternal antibodies.

### LOW VIRULENCE

The La Sota strain is stronger than the II series and provides longer-lasting immunity; it is widely applied and can be used for drinking water vaccination. The N79 strain introduced to China in 1981 has a virulence level between the II and IV series.

# PRODUCT FEATURE

## NEWCASTLE DISEASE VIRUS STRAINS USE GENOTYPE VII STRAINS

The Newcastle disease virus strain is a reverse-genetically modified A-VIII strain, which has a good match with the prevailing strains of Newcastle disease, with low virulence and strong reproductive capacity.

Comparison of biological characteristics between A-VII strain and La Sota strain

Strain	Genotype	MDT	ICPI	Antigenic content	HA	Amino acid sequence of F0 cleavage site
La Sota	II	≥ 120h	≤ 0.4	≥10 <sup>8.0</sup> EID <sub>50</sub>	≥9 Log <sub>2</sub>	-G-G-R-Q-G-R*L-
A-VII	VII	≥ 120h	< 0.3	≥10 <sup>9.0</sup> EID <sub>50</sub>	≥10 Log <sub>2</sub>	-G-G-R-Q-G-R*L-
JS5/05/GO	VIII	48	1.3	≥10 <sup>8.0</sup> EID <sub>50</sub>	≥9 Log <sub>2</sub>	-G-R-R-Q-K-R*F-

K-Lysine, Q-Glutamic acid, F-Phenylalanine, L-Leucine, G-Glycine, R-Arginine; A-Alanine; H-Histidine

## A-VII STRAIN OF NEWCASTLE DISEASE PROVIDES A HIGH PROTECTION RATE

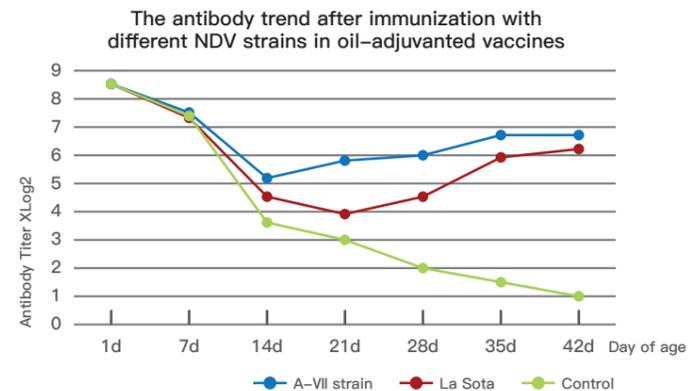
The immunizing efficacy of the NDV A-VII strain—Virus isolation results after challenge in immunizing commercial chickens. Short period of virus carrying, low rate of virus shedding.

Group	Virus isolation results after challenge (swab) (positive number/total number of samples)							
	Day 2		Day 4		Day 7		Day 10	
	Throat	Cloaca	Throat	Cloaca	Throat	Cloaca	Throat	Cloaca
PBS	10/10	10/10	10/10	10/10	NS <sup>b</sup>	NS	NS	NS
A-VII, killed	5/10	0/10	2/10	2/10	0/10	0/10	0/10	0/10
La Sota, killed	9/10	0/10	4/10	4/10	1/10	0/10	0/10	0/10

Note: (A) Each group was challenged with 10<sup>5.0</sup>ELD<sub>50</sub> JS2/06 strain (B) NS: No surviving chicken embryos

## THE ANTIBODIES AGAINST A-VII STRAIN RISE A WEEK EARLIER, WITH ANTIBODIES BEING ONE TITER HIGHER

After the white-feathered broiler flock is vaccinated with the Newcastle Disease and Avian Influenza Vaccine, the antibodies against Newcastle disease viruses rise a week earlier than those produced by regular vaccines, with an average increase of one titer, uniformity, and a longer duration of immunity.



## COMPARATIVE EXPERIMENT BETWEEN STRAIN A-VII AND COMPETITORS-NDV ANTIBODY RESULTS

Experimental vaccine	Antigen	0W	3W	4W	5W
Ringpu	A-VII	9.1	9.1	6.6	8.5
Competitor 1	A-VII	9.1	9.1	4.9	7.1
Competitor 2	La Sota strain	9.1	9.1	4.8	7.1
Competitor 3	La Sota strain	9.1	9.1	3.9	/
Blank control group	/	9.1	9.1	1.6	/

## TWO-WAY FLOW PURIFICATION AND CONCENTRATION TECHNOLOGY - HIGH CONTENT, PURITY

Ringpu has an automated purification system for vaccine purification. The harvest virus liquid undergoes a two-way flow purification process, and after three-stage purification, the endotoxin is less than 50EU/ml. Quickly and effectively remove heterologous proteins, endotoxins, and other impurities from urinary bladder fluid, with minimal immune side effects.

