

## FIELD STUDY ON EFFICACY OF RED PEPPER (*Capsicum Annum*) ALONG WITH ANTIBIOTICS AGAINST NEWCASTLE DISEASE IN BROILER AT NARAIL SADAR UPAZILLA, BANGLADESH

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This study was carried out to determine the efficacy of red pepper in controlling Newcastle Disease (ND) along with some symptomatic antibiotic and supportive therapy. A total of 1110 broiler from two farms were used in this study. The results revealed that the inclusion of red pepper (8 pieces per liter water) along with combined antibiotics produce higher efficacy in controlling ND, where survival rate was 92.35% in one farm (Farm A) and 90.5% in another farm (Farm B) containing 600 broilers at the age of 19 days. Overall mortality reduces to 15.88% and 18.5% of Farm A and Farm B, respectively. After treatment with red pepper the average body weight was recorded 1.57 kg and 1.6 kg at the age of 35 days in two farms respectively. Therefore, the study revealed that inclusion of red pepper helps to control the ND in broiler. When red pepper act as natural drug and widely used for prophylactic treatment then small scale farmers will be capable to produce with cost effectively. It is therefore recommended that further research is essential to know the antiviral activity of red pepper in poultry.

**Keywords:** Red Pepper, Antibiotics, Newcastle Disease, Broiler

Newcastle Disease (ND) is considered to be one of the most important viral diseases in chickens throughout the world and has a devastating effect on poultry production in most countries (Alexander, 2003). ND or Ranikhet Disease constitutes the most serious epizootic poultry disease throughout the world, particularly in low-income food-

deficit countries (Aini, 1990 and Guèye, 2002). The majority of farmers keep their chickens in a scavenging system, where the main source of feed is household refuse and picking from the surroundings. The infection still occurs in Bangladesh every year in the form of epidemic and appears to cause up to 40-60% of the total mortality in poultry population creating one of the major problems in the development of poultry industry in Bangladesh (Chowdhury et al., 1982).

ND is caused by the Newcastle disease virus (NDV) which is also called avian paramyxovirus serotype 1 (APMV-1) is a single stranded, enveloped, negative sense RNA virus belonging to the genus *Rubulavirus* of subfamily *Paramyxovirinae* and family *Paramyxoviridae* (Barbezange et al., 2005 and Mayo, 2002). The transmission of NDV occurs through newly introduced birds, selling or giving away sick birds, exposure to fecal and other excretions from infected birds and contact with contaminated feed, water, equipment and clothing (Tu et al., 1998).

Hot red pepper is one of the most important herbs, which is widely used in human feed all over the world, its originated from central and South America and its belonged to Solanaceae family, genus *Capsicum* is belong to the most heavily and frequently consumed as spices throughout the world (Kobata et al., 1998). *Capsicum annum* is the first introduced worldwide which is divided into two categories: sweet (or mild) pepper and hot (or chilli) pepper. *Capsicum annum* is the most spread in term of

household consumption and industrial processing (Kodama et al., 2008).

Capsinoids are widely present at low levels in chilli pepper fruit, it includes capsiate, dihydrocapsiate and it has a very favorable safety profile (Kobata et al., 1998). Capsinoids present in red peppers causes pungent, hot tasting sensations when consumed as a part of the diet in addition to sensory properties that it may be affects human health, capsinoids includes antimicrobial activities against disease caused by bacteria. It exhibited protective effects against mutagens and carcinogens, cholesterol, obesity and pains (Choi et al., 2006). Capsaicin (CAP) is the main capsaicinoid in chilli peppers. CAP is stable in water and some animal studies indicated that it absorbed into blood stream (Diepvens, 2007).

Capsaicin is a pungent principle of hot red pepper, has been used as spices, feed additives and drugs in hot red pepper are capsaicin (Collier et al., 1965 and Nwaopara et al., 2007) carotenoids e.g. capsanthin, capsorubin, carotene (Govindarjan, 1968) and steroidal saponins known as capsicidins found in seed and root. CAP is the main component of Hrp, including hot taste and is known to active afferent nerve fiber (Holzer, 1991), CAP has been shown to have a protective function in the gastric mucosa as the stimulation of afferent nerve endings by capsaicin protects against aspirin or alcohol-induced gastric injury (Gonzalez et al., 1998).

The free range chicken farmers in the Uganda commonly used *Capsicum annum* together with ash and water to manage the Newcastle disease. The objectives of this study were to determine the efficacy of red pepper for controlling ND and to know the prevalence of ND in broiler at Narail Sadar Upazilla, Bangladesh.

## MATERIALS AND METHODS

The study was conducted at Narail Sadar Upzilla, Bangladesh. This study evaluated the naturally ND infected 1110 broilers of two different farms at the age of 24 and 19 days respectively. The ND infected farms were selected, examined, treated and follow

up was done. History of the cases were taken from the owner and carefully recorded in each case individually.

### Physical and clinical examination

Examination of different parts and system of the body of each of the sick birds were examined by using procedure of palpation, percussion, auscultation, needle puncture and walking of the birds. The weight of each experimental bird was measured by weight machine regularly.

### Recording of signs and symptoms

Different exposed signs and symptoms were recorded carefully by history and also close infection like ocular and/or nasal discharge, dyspnea, and lime color feces. Central nervous system signs can also occur, including depression or the opposite-hyperexcitability; vestibular or balance problems; tremors, especially of the head and neck; weakness; and partial or total paralysis.

### Postmortem examination

Postmortem examinations include hemorrhage at the proventriculus and intestine, frothy nasal mucosa. In this examination the different internal organs were closely observed and compared with normal one.

### Preparation of fresh water extract

Matured, ripe and disease free red pepper were collected from Narail market. The red peppers were dried and grinded. 20 gm red pepper was added in 4 litter distilled water. By continuous boiling 4 litters volume was reduced to 3 litters. Finally, 15g iodine salt was added and stored in a refrigerator at 4°C to preserve the active ingredients of extracts.

### Newcastle disease virus vaccines

In this study all the experimental birds were vaccinated with the commercially available vaccine at the age of 5 days. Due to early outbreak of this disease, 2<sup>nd</sup> dose of vaccine was not applied.

### Experimental Design

The experiment was conducted in two broiler farms at Narail Sadar Upzilla in which the broiler chickens were purchased from two different commercial breeder farms. The two broiler farms were named as Farm A and Farm B, respectively. A total of 510 broilers of 24 days ages were selected

and isolated from Farm A in which broilers were naturally infected with ND. Further, broilers of Farm A were grouped into A1, A2, and A3, respectively and each group consisted of 170 birds respectively. In Farm B, a total of 600 broilers of 19 days old were selected for this experiment and grouped into B1, B2 and B3. Each group of Farm B consisted of 200 birds respectively. In addition, each group of broilers was reared in different sheds with almost similar management practices.

#### Follow up treatment

As being a viral disease of ND, only supportive therapy was applied to the ND infected broilers. Antibiotic, vitamin C, glucose and red pepper therapy were given to the study population. The therapy regime was the application of Ciprofloxacin @ 10 mg / kg for 5 days in A1 and B1 groups. Group A2 and B2 were treated with combined application of Ciprofloxacin @ 10 mg / kg + Amoxicillin @ 10 mg / kg for 5 days. Group A3 and B3 were treated with Ciprofloxacin @ 10 mg / kg + Amoxicillin @ 10 mg / kg + 8 pieces of dry red peppers (grinded) per liter of drinking water for 5 days. Additional therapy with vitamin C and glucose @ 10 gm / liter of water for 5 days were given in each groups.

### RESULTS AND DISCUSSION

The main purpose of this study was carried out to evaluate the efficiency of red pepper along with antibiotic and supportive therapy to control ND in broiler. In this study, total numbers of broilers were 1110. In Farm A 510 were affected among 2000 and in Farm B were 600 among 1800 broiler which indicate the incidence of ND in two farm is 25.5% and 33.3% (Figure 1). Young chicks are more susceptible to Newcastle Disease than adults. Young unvaccinated (about 50.5 %) are mostly affected than vaccinated (about 4.4 %) (**Barman et al., 2010**). The most common clinical signs were found edema of the head-face-wattles, twisted neck and paralysis, greenish diarrhea, cessation of egg production, soft-shelled egg and death which were similar with the findings of **Beach (1942)**, **Banerjee et al. (1994)** and **Alexander (1997)**. Most commonly

observed postmortem lesions were pin point hemorrhages at the tip of proventricular hemorrhagic ulcers in intestinal wall and caecal tonsils, petechial hemorrhage in colon, hemorrhagic lungs, tracheitis with congestion and catarrhal exudates. These findings agree with the findings of **Kotani et al. (1987)** and **Crespo et al. (1999)**.

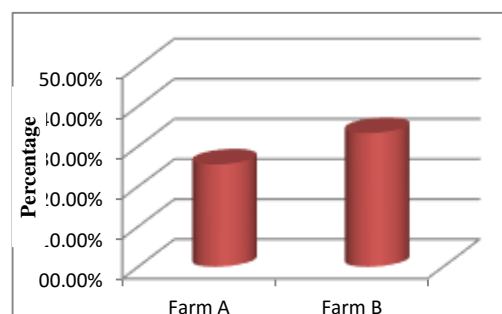


Figure 1: Incidence of ND related to age

In this study, red pepper was used with antibiotic. There are three groups of birds where 170 birds in each group have been selected from Farm A. After the treatment 429 birds were survived among 510 of Farm A and 489 birds were survived among 600 of Farm B. Mortality 15.88% and 18.5% respectively which indicate reduce the mortality where **Chowdhury et al., (1982)** reported that 40-60% mortality in poultry population creating one of the major problems in the poultry industry in Bangladesh. The efficacy of treatment found 76.47 % (130 broiler have been cured) in group A1, 83.52 % (142 broiler have been cured) in group A2 and 92.35 % (157 broiler have been cured) in group A3 (Figure 2). In Farm B where three groups and each group contain 200 birds respectively. The efficacy of treatment found 73.50 % (147 broiler have been cured) in group B1, 80.5 % (161 broiler have been cured) in group B2 and 90.50 % (181 broiler have been cured) in group B3 (Figure 2).

We found that the red pepper is effective to control the ND in broiler where as **Kaoma and Chiteta (2001)** found that fruits of *Capsicum sp.* (in 38% of the surveyed households) reduced mortality in local chickens by 38.4% when given during an outbreak of ND.

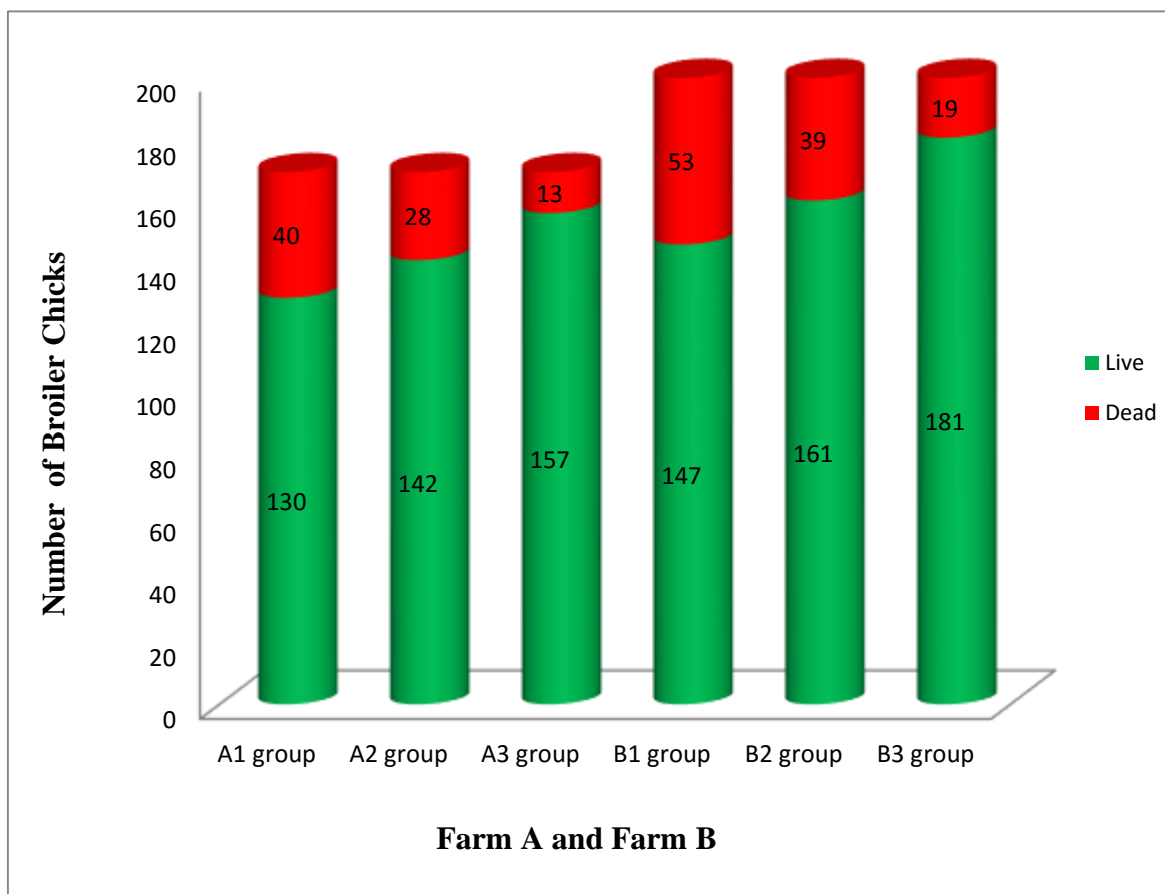


Figure 2: Therapeutic effect of red pepper for the treatment of ND affected broiler chicks.

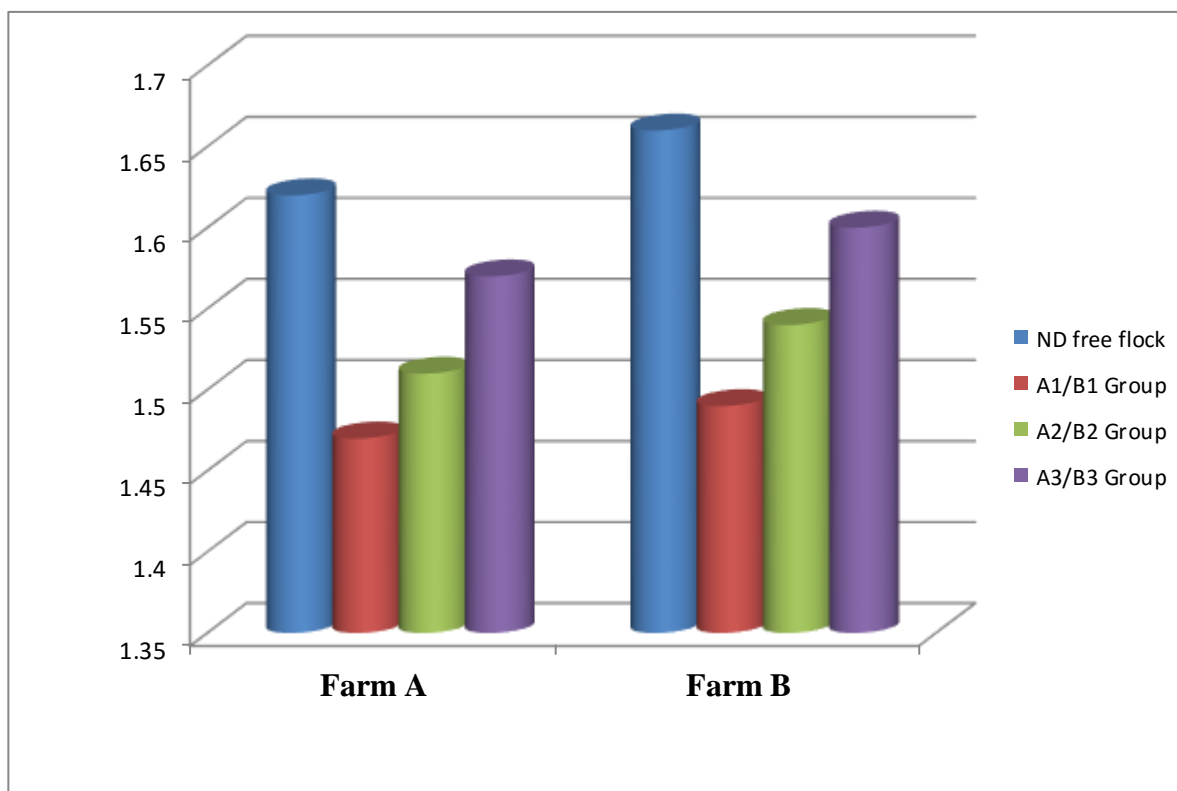


Figure 3: Body weight gain after treatment with red pepper.

However, **Okitoi et al 2007**, found that most poultry farmers in Western Kenya commonly use *Aloe vera* extracts to manage Newcastle disease. The farmers in the SWAEZ of Uganda also practiced that the use of *Capsicum annum* with ash and water which gives good results in Newcastle disease control. The addition of leaves of *Aloe vera* extracts as boosters to the concoctions improved the efficacy of the plant medicinal extracts.

Consequently this study also agrees with **Cichewicz et al., (1996)** and **Tajkarimi et al., (2010)** where they reported that natural antimicrobials, such as chili peppers, are receiving a good deal of attention for a number of microorganism-control issues. **Guèye (1998)** reported that *Capsicum sp.* is to be widely used to treat various unknown diseases, including ND and, the pungent agent (Capsaicin) in red pepper was indeed found to increase bird's resistance against major health threats, which is almost similar to this present work.

At the age of 35 days the average body weight was recorded 1.57 kg and 1.6 kg in A3 and B3 treatment group which is higher than other treatment group (Figure 3). Whereas the average body weight of ND free broiler of Farm A and Farm B was 1.62 kg and 1.66 kg which is almost similar to **Islam et al., (2014)**.

## CONCLUSION

Newcastle Disease (ND) is a highly contagious viral disease with high morbidity and mortality of birds. It's a threat for the poultry farmer. The study reveals the efficiency of red pepper in controlling ND. After giving treatment by the combination of ciprofloxacin and amoxicillin, Vitamin-C, sugar along with red pepper produces higher efficiency about 92.35 %. If we can apply this, it's become very helpful for our rural farmer. They can save their birds from mortality and prevent their loss. ND control could significantly improve backyard poultry production in Bangladesh. Because of the small flock size it would be impractical to expect that the farmers treat their birds. Instead, vaccination coverage needs to be ensured through either by the

Department of Livestock Services or self-employed village vaccinators. A wide range of herbal medicines were used in poultry health management. The commercial farmers vaccinated and prophylactic treated their birds compared to subsistence poultry farmers. The subsistence farmers utilized the herbal drugs because of cost effectiveness of using them. When red pepper act as natural drug and widely used for prophylactic treatment then small scale farmers will be capable to produce with cost effectively. Perhaps this study will help to evaluate the growth performance of broiler after recovery with following treatment. The future work should be the detection of therapeutic effect of red pepper along with *Aloe vera* on the aspects of Bangladesh.

## REFERENCES

1. Aini I. (1990). Indigenous chicken production in South-East Asia. *World's Poultry Sci J.* 40: 51-57.
2. Alexander DJ. (1997). Newcastle disease and other avian Paramyxoviridae infections. In: Calnek BW, Barnes HJ, Beard CW, McDougald LR, Saif YM (ed), *Disease of poultry*, 10th edn. Iowa State University Press, Ames Iowa, pp 541-570.
3. Alexander DJ. (2003). Newcastle disease, other avian paramyxoviruses, and pneumovirus infections. In: Saif Y, Barnes JH, Glisson JR, Fadly AM, McDougald LR and Swayne DE (Eds.), *Diseases of Poultry*. 11th edn. Iowa State University Press, Ames, USA. pp. 63-99.
4. Banerjee M, Reed W, Fitzgerald SD and Paniger B. (1994). Neurotropic, Velogenic Newcastle disease in cormorants in Michigan: pathology and virus characterization. *Avian Dis.* 38: 873-8.
5. Barbezange C and Jestin V. (2005). Molecular study of the quasispecies evolution of a typical pigeon paramyxovirus type 1 after serial passages in pigeons by

- contact. *Avian Pathol.* 34: 111–122.
6. Barman LR, Flensburg MF, Permin AM, Madsen and Islam MR. (2010). A controlled study to assess the effects of vaccination against Newcastle disease in village chickens. *Bangladesh Veterinarian.* 27(2): 56 – 61
  7. Beach JR. (1942). Avian pneumoencephalitis. *Proceeding of annual meeting in US livestock sanitary association.* 46: 203-223.
  8. Choi Suk, Kozukue E, Levin CE and Friedman. (2006). Analysis of the contents of pungent compounds in fresh Korean red peppers and in containing food. *J Agric Food Chem.* 54: 9024-9031.
  9. Chowdhury T, Sarker AJ, Amin MM and Hossain W. (1982). Studies on Newcastle disease in Bangladesh. A Research Report, Sec 2. The role of residual maternal antibody on immune response and selection of an optimum age for primary vaccination of chicks. pp. 12-22.
  10. Cichewicz RH and Thorpe PA. (1996). The antimicrobial properties of chile peppers (*Capsicum* species) and their uses in Mayan medicine. *J Ethnopharmacol.* 52: 61-70.
  11. Collier HO, McDonald-Gibson WJ and Saeed SA. (1965). Letter stimulation of postaglandion biosynthesis by capsaicin, ethanol and tyranine. *J Physiol.* 179: 248-262.
  12. Crespo R, Shivaprasad HL, Woolcock, PR, Chin R.P, Davidson YD and Tarbell R. (1999). Exotic Newcastle disease in a game chicken flock. *Avian Dis.* 43: 349-355
  13. Diepvens K. (2007). Regulatory intergrative and comparative physiology. *Am J Physio.* 292: 77-8.
  14. Gonzalez R, Dunkel MR, Dunkel B, Koletzko MV, Schusdziarra and Allescher MHD. (1998). Effect of Capsaicin containing red pepper sauce suspension on upper gastrointestinal motility in healthy volunteers. *Dig Dis Sci.* 43: 1165-1171.
  15. Govindarjan. (1968). Chemistry of the colour, aroma and pungency stimuli. *Nutr Dieta Eur Rev Nutr Diet.* 10: 194-214.
  16. Guèye E. (2002). Newcastle disease in family poultry. Prospects for its control through ethnoveterinary medicine, 27th World Veterinary Congress, 25-29. Tunis, Tunisia.
  17. Holzer P. (1991). Cellular targets, mechanism of action and selectivity for thin sensory neurons. *Pharmacol Rev.* 43: P.143-201.
  18. Islam F, Hossain MS, Sarker SC and Hossain MS. (2014). Performances of commercial hybrid broiler in villages of Bangladesh. *The Bangladesh Vet.* 31: 84 – 90.
  19. Kobata KT, Todo S, Yazawa KI and Watanabe T. (1998). Novel capsaicinoid-like substances, capsiate and dihydrocapsiate, from the fruits of a nonpungent cultivar, CH-19 sweet, of pepper (*Capsicum annuum*). *J Agric Food Chem.* 46:1695-1697.
  20. Kodama T, Watanabe E, Masuyama T, Tsubuku SA, Otabe Y, Katsumata and Bernard BK. (2008). Studies of toxicological potential of capsinoids: A two generation reproduction study of Ch-19 sweet extract in rats. *Int J Toxicol.*, 27: 29-40.
  21. Kodama T, Watanabe E, Tsubuku S et al.(2008).Studies of the toxicological potential of capsinoids VII: A 13-week gavage toxicity study of dihydrocapsiate in rats. *Int J Toxicol.* 27:79-100
  22. Kotani T, Ddagiri Y, Nakamura J and Horiuchi T. (1987). Pathological changes of tracheal

- mucosa in chickens infected with lentogenic NDV. *Avian Dis.* 31: 491-497.
23. Mayo MA. (2002). A summary of taxonomic changes recently approved by ICTV. *Archives of Virology.* 147: 1655-1663.
  24. Nwaopara AO, Odiike MA, Ingbenebor CU and Adoye MI. (2007). The combined effects of excessive consumption of ginger, Clove, Red Pepper and black pepper on the Histology of the liver.
  25. Okitoi LO, Ondwasy HO, Siamba DN and Nkurumah D. (2007). Traditional herbal preparations for indigenous poultry health management in Western Kenya. *Livestock Research for Rural Development.* 19:72.
  26. Pazhanivel N, Balsubramaniam GA, George VT and Mohan B. (2002). Study of natural outbreak of Newcastle disease in and around Namakkal. *Indian Vet J.* 79: 293-294
  27. Tajkarimi MM, Ibrahim SA, Cliver DO. (2010). Antimicrobial herb and spice compounds in food. *J Food Control.* 21: 1199-1218.
  28. Tu TD, Phuc KV, Dinh NTK, Quoc DN and Spradbrow PB. (1998). Vietnam trials with a thermostable Newcastle disease vaccine (strain I2) in experimental and village chickens. *Prev Vet Me.* 34: 205-214.