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Analysis of clinical manifestation of Newcastle disease in traditional poultry of Chad

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Abstract: Since its discovery in 1926, the virus of Newcastle disease (NDV) has been well described by several authors. But the control of this disease remains today a topical issue. It causes economic losses in industrialized and developing countries. The clinical manifestation of NDV differs from one species to another. This article places a state of clinical manifestation of the virus of Newcastle disease in traditional avian population, raised in the same breeding conditions. That avian population has been made up of chickens, ducks, guinea fowl and pigeons. The clinical manifestation of NDV has been observed by species, age and in epidemiological units (EpUn). The choice of EpUn has been done randomly. A total of 372 EpUn with a workforce of 13608 volatile have been observed. Young people aged at least 6 months have been 51.5% , 5.6%, 0.4% and 1.3% of the total, for chickens, ducks, guinea fowl and pigeons respectively. According to this order, adults over 6 months represented 28%, 5.4%, 4.8% and 3%. The clinical manifestation of the NDV has been observed in all domestic poultry species. Mortality varied between 26 and 99% in chickens; 17 and 75% in ducks; 8 and 100% in guinea fowls, and 11 and 100% among pigeons. Young volatiles have been more sensitive to NDV than adults. Mortality varied between 33 and 99% in young chickens, 21 and 75% in young ducks; 22 and 100% in young guinea fowl; 18 and 100% among young pigeons. In adults the rate varied respectively between 26 and 78%; 17 and 47%; 8 and 26%, 11 and 73% in the same species. Among this population of young volatiles, ducklings have been less sensitive than other young. Maternal antibodies seem to persist beyond a month and a half, while the chicks aged a month could present the clinical manifestations of the disease. Animal concentration, climatic changes, socio-economic activities of man and other emergence of ND factors seem to play an important role in the clinical manifestation of NDV from traditional domestic poultry. Knowledge of the clinical manifestation of this disease among the traditional bird population is one of the essential elements of its control.

Keywords: Newcastle Disease, Traditional Poultry, Clinical Manifestation, Control, Chad

1. Introduction

Newcastle disease (ND) is a classic viral poultry disease, highly contagious with significant economic consequences. The causative agent is an avian paramyxovirus 1 (APMV 1) *Avulavirus* kind belonging to the family of paramyxoviridae. It is characterized mainly by damage to the respiratory, digestive and central nervous system of many domestic and wild bird populations device. ND causes considerable loss on mortality rate, slaughter and sanitary measures in poultry farms [2,11,12,15]. This disease is on the list of notifiable diseases in member countries of the World Animal Health Organization. It is classified as particularly dangerous diseases that can spread rapidly across borders of countries and possibly globally [6,7]. All continents are affected by this disease except Australia and proximate islands. ND represents a threat to the international trade in poultry and poultry products.

In the country of Chad, Newcastle disease is the main

cause of economic losses in the poultry industry. According to the producers mortality rate ranged between 65 and 100% among non-vaccinated poultry, yearly. In some avian species, the clinical manifestations of the NDV seem to be severe while in others it appears as less symptomatic [3,10]. A survey has been conducted in 2007 on 372 poultry farm distributed among two different agro climatic zones. The purpose of this study was to better understand the clinical manifestation of NDV among the poultry population, in Chad, and to advocate for measures to improve the poultry production.

2. Materials and Methods

A survey has been conducted in 2007 in nine cities and their peripheries, on the sidelines of an assessment mission on biosecurity level of farms located along the western border of Chad. This mission conducted by the Ministry of Livestock and Animal Resources (MLAR) involved regions: N'Djamena, the capital city of the Republic of Chad; Bongor and Fianga (region of East Mayo Kebbi); Pala (region of West Mayo Kebbi; Moundou (region of western river). Baibokoum (region of eastern river) and Karal (region of Hajar Lamis). Agricultural households, representing a wider family of the term has been considered as an epidemiological Unit (EpUn). Their choice has been made randomly and according to an availability of producers. Survey forms have been developed on the basis of existing bibliographic data in the country. Aspects of the investigation focused on the annual number of poultry in an EpUn; fatalities by species and age, established during the year, the period of onset of ND, its progress in the concession, age of affected poultry, farmed environment. Birds have been considered to be young those whose age ranged between one day and six (6) months. We considered as adults birds aged more than six (6) months. For this study the term poultry represents all of the following species: chickens, ducks, guinea fowls and pigeons.

The data was collected by the field agents and sent to the central epidemiology unit for analysis. The collected data were analyzed using Excel. We studied particularly the sensitivity of poultry to Newcastle disease.

3. Results and Discussion

Table I and II shows that chickens are present in every courtyard of an EpUn. It represents about 80% of the workforce poultry in EpUn. Mopaté (2010) [13] made the same observations. This rate is similar to that observed in Mali [16]. In rural areas, domestic poultry (chickens, ducks, guinea fowl, pigeons) is found quite often in the same areas with wild fowl (pigeons, doves, crows, eats millet, etc.). Also, in the courtyard of an EpUn poultry shares food with other domestic animals, such as sheep, goats, cattle, horses, pigs, dogs and cats. As a poultry flock who walks all day long looking for food and water, and in ongoing contact with various animals is exposed to various infections such as Newcastle disease, when we know that some of these animals are healthy carriers [4,5,17]. In addition to this, most flocks consists of young pretty fragile the balance of all the stress and often more tolerant adults.

Table I. *Number of poultry in the EU, 2007*

Cities and provinces	rural households	Chickens		Ducks		guinea fowls		Pigeons		TOTAL
		Adults	Young	Adults	Young	Adults	Young	Adults	Young	
Baibokoum	35	419	745	48	33				0	1245
Bongor	47	305	645	159	221	45	7	4	8	1394
Guelendeng	50	414	861	74	40	11	0	0	0	1400
Léré	31	477	844	80	87	197		47	23	1755
Moundou	42	445	677	84	115	43	18	41	15	1438
Pala	62	752	1680	118	7	262	4	229	70	3122
Fianga	40	651	824	141	190	99	22	65	34	2026
Total area Sudanian	307	3463	6276	704	693	657	51	386	150	12380
Karal	26	248	462	4	0	0	0	0	0	714
N'Djaména	39	111	266	32	67			16	22	514
Total area Sahelian	65	359	728	36	67	0	0	16	22	1228
TOTAL	372	3822	7004	740	760	657	51	402	172	13608
%		35	65	49	51	93	7	70	30	

Table II. *Representation by species and age*

Species	Chickens		Ducks		Guinea fowls		Pigeons	
Age	Adults	Young	Adults	Young	Adults	Young	Adults	Young
Effective	3822	7004	740	760	657	51	402	172
Species%	35	65	49	51	93	7	70	30
SAMPLING%	28,1	51,5	5,4	5,6	4,8	0,4	3,0	1,3

In terms of numbers (Table III), the highest mortality rates have been observed in young chickens whose age varied between 1 and 3 months. This sensitivity to the ND appears to be related to the presence of maternal antibodies. The disappearance of maternal antibodies has been observed in chickens between 3 and 4 weeks of age [8]. Maminiaina et al. (2007) [11] argue that positive individuals belonging to the class of adults lose their maternal antibodies during the months of lull. This period of lull varies from countries to regions. In Chad, it has been observed between May-June and August-September and up to 4 months in the Sudanian zone and five months in the Sahelian zone. During this period, the presence of natural barriers is observed around houses limiting routes of birds: surface water, ponds, tall grass, etc. [4,5] .

Table III. *Number of dead poultry by species and age, 2007*

Cities and provinces	Chickens		Ducks		guinea fowls		Pigeons		TOTAL
	Adults	Young	Adults	Young	Adults	Young	Adults	Young	
Baibokoum	227	475	8	0				0	710
Bongor	99	214	55	92	0	0	0	8	468
Guelendeng	255	677	15	14	0	0	0	0	961
Léré	123	355	26	38	51		5	2	600
Moundou	347	668	28	24	10	4	30	10	1121
Pala	269	598	0	0	22	17	0	13	919
Fianga	367	545	66	130	14	29	30	19	1200
S / Total area Sudanian	1687	3532	198	298	97	50	65	52	5979
Karal	150	357	0	0	0	0	0	0	507
N'Djaména	54	166	6	50	0	0	0	4	280
S/Total area Sahelian	204	523	6	50	0	0	0	4	787
Total	1891	4055	204	348	97	50	65	56	6766
		5946		552		147		121	6766

According to the laboratory results, mortality rate has been more remarkable in chicks whose age ranged between 1 and 1.5 months. The rate reached 99% in the region of Moundou.

Table IV and Figure 1 show that all domestic species are affected by the ND. Overall mortality varied between 26 and 99% in chickens; 17 and 75% in ducks; 8 and 100% in guinea fowls and 11-100% for pigeons. In young birds population, the mortality rate varied between 33 and 99% in chickens; 21 and 75% in ducks; 22 and 100% in guinea fowls and 18-100% for pigeons. For adults, the mortality rate varied between 26 - 78%; 17%- 47; 8 - 26% and 11-73%. These results show that young of all species of birds surveyed have been sensitive to NDV.

Table IV. *Mortality by species and age (%)*

Cities and provinces	Chickens		Ducks		Guinea fowls		Pigeons	
	Adults	Young	Adults	Young	Adults	Young	Adults	Young
Baibokoum	54,18	63,76	16,67	0,00	0,00	0,00	0,00	0,00
Bongor	32,46	33,18	34,59	41,63	0,00	0,00	0,00	100,00
Guelendeng	61,59	78,63	20,27	35,00	0,00	0,00	0,00	0,00
Léré	25,79	42,06	32,50	43,68	25,89	0,00	10,64	8,70
Moundou	77,98	98,67	33,33	20,87	23,26	22,22	73,17	66,67
Pala	35,77	35,60	0,00	0,00	8,40	425,00	0,00	18,57
Fianga	56,37	66,14	46,81	68,42	14,14	131,82	46,15	55,88
Average Sudanian zone	48,71	56,28	28,13	43,00	14,76	98,04	16,84	34,67
Karal	60,48	77,27	0,00	0,00	0,00	0,00	0,00	0,00
N'Djaména	48,65	62,41	18,75	74,63	0,00	0,00	0,00	18,18
Average Sahelian zone	56,82	71,84	16,67	74,63	0,00	0,00	0,00	18,18
General average	49,48	57,90	27,57	45,79	14,76	98,04	16,17	32,56
		54,92		36,80		20,76		21,08

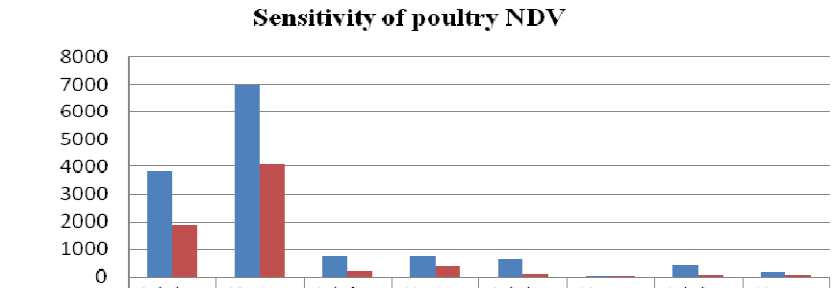

Figure 1. *Sensitivity in the various species*

Most ducks whose age varied between 0 and 4 weeks seem to support the presence of the virus. Raised in the same conditions as chickens, their mortality has been observed beyond 1.5 months. This trend ducks resistance to NDV observed in the survey is similar to those made by Otim et al. (2006) [14]. Young chicks in the presence of negative ducklings have been infected and showed clinical signs of disease, whereas the latter had no clinical signs. Serological tests showed that these ducklings were all infected subclinicaly and can infect seronegative poultry. Similar observations have been noted by Alexander (2001) and Higgins (1971) [1,9]. But the resistance of this species seems to disappear during the concentration of poultry (November-December). Mortality seems to appear as a result of stress related to the operating system. The ongoing contact with different carrier species of the virus may be a cause of continual re-infection of ducks and the disappearance of resistance.

The breeding of guinea fowl and pigeons is not well developed in the provinces where the survey took place. The few farmers interviewed did not control their production. The number of dead guinea fowl which exceeded the actual declared explains this situation. However, the sick guinea fowl showed clinical signs of ND: green diarrhea, prostration, nervous disorders (torticollis, paralysis goest and legs, etc.). The autopsy revealed rings clots between the proventriculus and gizzard, petechiae in the proventriculus. Mortality was 100% in the provinces of Pala and Fianga among fowls which ranged from 1.5 months of age. The same observations were made with the youngsters in the provinces of Bongor.

4. Conclusion

Clinical manifestations of NDV were observed in all domestic poultry. These events appear to be excessive in relation to young adults. In the same production conditions, chicks seem to be more sensitive than ducklings of the same age. Mortality rate of chickens can reach up to 100% among the population of less than one month. For the ducks, mortality rate was approximately 80% among the population over the age of 1.5 months. According to the producers, no death related to the ND was observed among the species of poultry with less than one month. The fowls and pigeons seem to be also sensitive to ND, but the lack of management of this production system does not does allow to know the age group. However, mortality has been observed among young under six months.

If the presence of maternal antibodies appears to play a key role in the onset of ND, it is not least for the factors favoring the appearance of this disease, including: climate change, high pressure of animal in a given period, human activity, etc. which are one of the main causes of ND in Chad [5].

References

[1] D.J. Alexander, Newcastle disease. Brit. Poult. Sci. 2001, vol. 42, pp. 5-22.

[2] D.J. Alexander, Newcastle disease, other avian paramyxoviruses and pneumovirus infectious, in: Disease of poultry, 11th ed. Iowa State University Press Ames, 2003, pp. 63-87.

[3] B.A. Ban-bo, Particularités du processus de la manifestation de la maladie de Newcastle au Tchad. Thèse de doctorat PhD. Université Russe de l'Amitié des Peuples en Russie (URAP), Moscou, 2009, 152pp + annexes.

[4] B.A. Ban-bo, K. Bidjeh, L.Y. Mopaté, Epidemiology of Newcastle disease and its economic impact in chad. Euro. J. Exp. Bio. 2012, vol. 2 (6) pp. 2286-2292

[5] B.A. Ban-bo, K. Bidjeh, D. Nadjilem, Facteurs favorisant l'apparition de la maladie de Newcastle au Tchad. J. Appl. Biosci. 2013, vol. 70, pp. 5591-5598

[6] B.Y. Birman, I.V. Nasonov, Situation épidémiologique dans le monde et la question de biosécurité des fermes en Biélorussie. Epidémiologie, immunologie, pharmacologie et assainissement. 2005, pp. 2-4

[7] K.N. Grouzdev, Questions vétérinaires des fermes industrielles en Russie. In 1er congrès international des vétérinaires sur l'aviculture. Moscou, 2005, pp. 1-5

[8] E.F. Guèye, Family poultry research and development in low-income food-deficit countries: approaches and prospects. Outlook Agric. 2002, vol. 31(1) pp. 13-21.

[9] D.A. Higgins, Nine disease outbreaks associated with myxoviruses among ducks in Hong Kong. Tropical Animal Health and Production, 1971, Vol. 3, pp. 232-240.

[10] A. Maho, N.D. Ndeledje, L.Y. Mopaté, K.Ganda, La maladie de Newcastle au sud du Tchad : période de pic épidémique et impact de la vaccination. Rev. Sci. Off. Int. Epiz. 2004, vol. 23 (3), pp. 777-782

[11] O.F. Maminiaina, M. Koko, J. Ravanomana, S.J. Rakotonindrina, Epidémiologie de la maladie de Newcastle en aviculture villageoise à Madagascar. Rev. sci. tech. Off. int. Epiz, 2007, vol. 26 (3) pp. 691-700.

[12] M.A. Mayo, Virus taxonomy, Houston 2002. Arch. Virol., vol. 147, pp. 1071-1076.

[13] L.Y. Mopaté, Revue du secteur avicole, Projet CHD/OSRO/602/EC, 2010.

[14] M.O. Otim, H. Christensen, G.M. Mukiibi, M.A. Bisgaard, Preliminary study of the role of ducks in the transmission of Newcastle disease virus to in-contact rural free-range chickens. Trop. Anim Health Prod. 2006, vol. 3, pp. 285-289.

[15] B. Rima, D.J. Alexander, M.A. Billeter, P.L. Collins, D.W. Kingsbury, M.A. Lipkind, Y. Nagai, C.Orvell, C.R. Pringle, & V. Ter Meulen,. Family paramyxoviridae. In virus taxonomy. Sixth report of the international committee on the taxonomy of viruses (F.A. Murphy, C.M. Fauquet, D.H. Bishop, S.A. Ghabrial, A.W. Jarvis, G.P. Martelli, M.A. Mayo & M.D. Summers edit.). Springer-Verlag, Vienne & New York, 2002, pp. 268-274

[16] M. Sylla, B. Traoré, S. Sidibé, S. Keita, F.C. Diallo, B. Koné, A. Ballo, M. Sangaré, N'G. Koné, Epidémiologie de la maladie de Newcastle en milieu rural au Mali, Rev. Elev. Med. Vet. Pays trop. 2003, vol. 56, (1-2) pp.7-12.

[17] Xiaoyuan Yuan, Youling Wang, Jinxing Yang, Huaiying Xu, Yuxia Zhang, Zhuoming Qin, Hongbin Ai and Jinbao Wang. Genetic and biological characterizations of a Newcastle disease virus from swine in china. Virology Journal 2012, vol. 9, pp.129.