

## Evaluation of Size and Lesion Scores of Bursa Cloacae in Broiler Flocks in Algeria

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### ABSTRACT

The outbreaks of IBD (infectious bursal disease) are frequently observed among correctly vaccinated broiler flocks in Algerian Nord-East region. The present study aimed to search for the immunosuppression state as possible consequence of IBD. Our investigation focused on nine broilers flocks whom one suffering from IBD. Total of 400 bursa cloacae (bursa Fabricius) were collected from broiler chickens during the rearing period or at slaughtering. The parameters of the bursa cloacae are evaluated: body weight ratio, index bursal, morphometric characteristics and the histopathological observations. The results obtained show that the weight and diameter of bursa Fabricius are not proportional to the age and weight of chickens. The weight and size of the bursa Fabricius were found lower than the accepted standards. According to the evaluation system in effect, 58 % of examined chickens belong to the poor category and 29 % to the excellent category. Such results indicate bursa atrophy and confirm state of immunosuppression which was suspected because of poor performances recorded in some broiler flocks. In conclusion, the bursa characteristics (body weight ratio, morphometric and histopathological studies) are practical and not expensive tools for any field investigation to evaluate the immune status of broilers

**Keywords:** Algeria, bursa of Fabricius, chicken, lesion score.

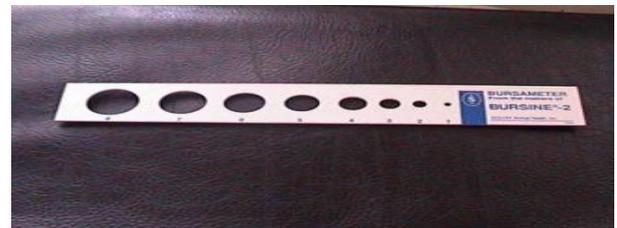
### INTRODUCTION

Infectious bursal disease (IBD), or Gumboro disease, is a viral disease affecting chickens in a subclinical form (early bursa atrophy) that may lead to a temporary or permanent immunosuppression. The clinical form in chickens may appear at 3-6 weeks of age. This disease causes high mortality in chickens especially when vaccination is done wrong (OIE, 2001). The bursa of Fabricius is an immunological organ that plays a primordial role in the poultry immunity (Toivanen et al., 1987; Awad, 2002). It is according to its physiological state that will especially depend on the immune status of poultries at the beginning of broiler chickens weight development. The different aggressions of the environment (stress, bad hygiene, vaccination, pathologies...) undergone by birds, influential on the anatomical and physiological development of the bursa of Fabricius. It can, therefore, lead to an immunosuppression at certain birds. The use of vaccines called virulent "warm" can sometimes compromise immunity at poultries while causing some lesions of this organ (OIE, 2001; van den Berg et al., 2000). The consecutive immunosuppression to lesions of this vital organ provokes very often negative vaccinal reactions and some complications in poultry flocks: bad absorption, secondary infection, weak gain

of weight and finally diverse diseases. In this survey, we valued morphometrical and histological evolution of the broiler cloacal bursa in the natural conditions.

### MATERIAL AND METHODS

The investigation is done on nine flock poultry of 3000 broilers each, elevated in open broiler houses and vaccinated against the infectious bursal disease (IBD) with a vaccine "*Intermediate plus*". Morphometrical survey of the bursa of Fabricius has been done thanks to the method of Kuney (1982). Broilers are weighed then sacrificed during raising. The autopsy is achieved on broiler chickens presenting no clinical sign of disease. The bursa of Fabricius are taken, examined, weighed and measured with the help of a "*bursameter*" (Figure 1).



**Figure 1.** Bursameter (Solvay animal health, 1992)

The calculation of bursal index (BI) is obtained by the following formula: weight of Fabricius bursa / body weight x 100 (Bennet, 2002). Histological cuts of Fabricius bursa are prepared from broiler chickens of every flock according to the conventional method (Campell, 1995). Histopathological observation is realized thanks to an optic microscope AXIOSCOPZO - ICS – Zeiss-Germany. For the assessment of broiler chickens immune status, we used the method developed by Solvay (1992) based on the degree of severity of lymphocyte depletion in the medullary follicular zone of this organ. Statistical analysis was performed by SPSS 15.0. Factorial analysis of multiple

correspondences (FAMC) realized to determine different class of bursal index and the correlation between the live weight of the chicken and that of the bursa Fabricius.

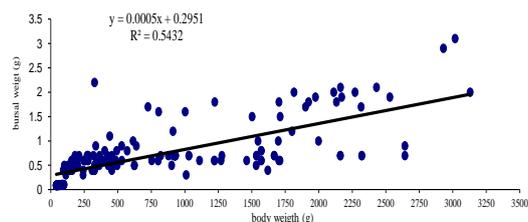
## RESULTS AND DISCUSSION

The bursal index (BI) calculated during all the period of raising (49 day) for the 9 flocks of broiler chickens demonstrates that more than the half belong to the bad class (57.63%) and only a quarter belongs to the one excellent (27.75%), what confirms the heterogeneity of poultry flocks (Table 1).

**Table 1.** Bursal index (BI) in boiler flocks (%)

Class Flock	Class			
	BI > de 0.20% (excellent)	0.18% < BI < 0.20% (average)	0.15% < BI < 0.18% (mediocre)	BI < de 0.15% (bad)
1	28.12	3.12	3.12	62
2	19	4.76	4.76	71.42
3	40.9	4.54	4.54	50
4	22.22	11.11	22.22	44.44
5	27.77	11.11	11.11	50
6	31.25	0	0	68.75
7	18.75	6.25	6.25	68.75
8	6.22	0	6.45	61.29
9	31.57	10.5	10.5	42.1
<b>Mean</b>	<b>27.75</b>	<b>5.71</b>	<b>7.96</b>	<b>57.63</b>

The evolution of the bursal weight with regard to the body weight gives a correlation coefficient  $r^2 = 0.54$  (Figure 2).



**Figure 2.** Correlation between body weight and bursal weight in the broiler chickens

It is a positive and significant correlation ( $p \leq 0.001$ ), what explains that the weight of the bursal increased effectively according to the body weight, but without reaching some compliant values This variation of the bursal morphology demonstrates the immunodepression state at certain broilers chickens (Table 2).

**Table 2.** Lesion scores of bursa cloacae in broiler flocks (n = 62)

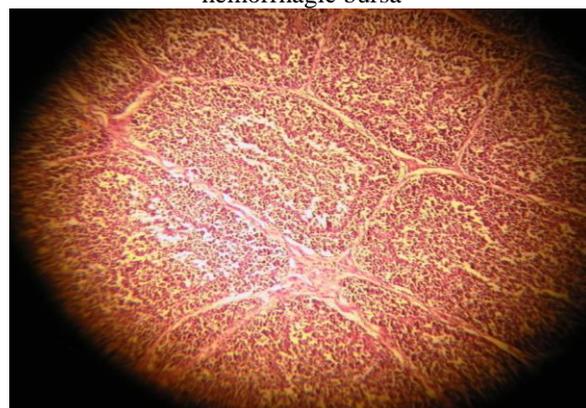
*Lesional score	0	1	2	3	4
% of Fabricius bursae affected	47	10	5	32	6

\* 0 = normal, 1 = <15% of lymphoid follicles depletion, 2 = 15-30%, 3 = 31-60%, 4 = >61%

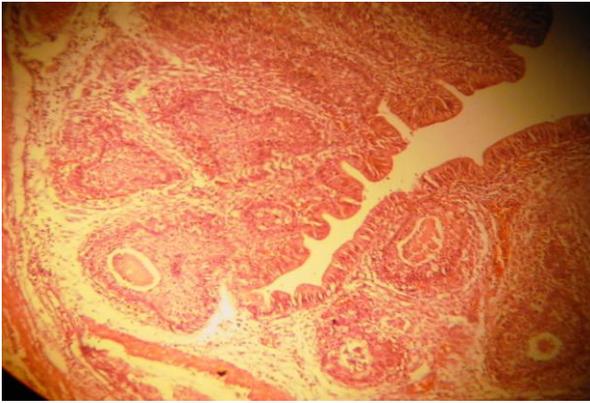
Lesional score survey demonstrated that more than the half (53%) of the examined organs present lesions of different degrees (Figures 3, 4, 5).



**Figure 3.** Left= Normal bursa. Right= Atrophied and hemorrhagic bursa



**Figure 4.** Lympho-epithelial follicles with clear medulla and dark cortical, a clear basal membrane as a chapelet (X40)



**Figure 5** Intrafollicular cystic cavities and interstitial edema (X40)

The distribution of the observed lesions is very variable within the different flocks and even inside of one same flock. They are especially characterized by atrophy, lymphocyte depletion. In the more serious cases, one notes a follicular lymphoid necrosis, an interfollicular interstitial fibrosis and a degeneration of the coating epithelium (not mentioned). The observed lesions of Fabricius bursa are caused by a wild virus of IBD having infected broiler chickens since their arrival in the badly decontaminated buildings or by the vaccinal strain called "*Intermediary plus*". Researches demonstrated, that in spite of an elevated rate of maternal antibodies at broiler chicks, it can have precocious and lasting colonization of the bursa of Fabricius there by a wild strains (Pastoret and al., 1990). It exists an optimum moment of difficult vaccination to determine, it is necessary sufficiently of maternal antibodies to master a possible wild strain but not too much to not neutralize the vaccinal virus (Goutebroze and al., 2003; Lemiere, 2003). Boudaoud (2004, 2008) demonstrated the immunodepression and pathological state caused of "*intermediate plus*" vaccine strains against IBD with regard to those so-called "*intermediate*."

## CONCLUSION

The size and lesion scores of bursa Fabricius demonstrates that the immune status of broilers is below standard. Determining bursa: body weight ratio, morphometrical and histopathological studies, calculating of percentage and bursal index are easy ways and not expensive to evaluate the immune status in the broiler, which allows to identify the problem in time at the end to remedy and correct failures.

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