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## Relation Between the Incidence of Ascites Syndrome and the Ventilation Factor in Broiler Chickens

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**Abstract:** The Ascites syndrome is the primary cause of death for rapidly growing broiler strains, resulting in economic loss. The experiment carried out on male broilers to study the relation between the incidence rate of ascites syndrome and the ventilation factor in the northwest region of Iran. In this study, seven poultry houses which did not have standard ventilation conditions were selected. Then the ventilation conditions were improved by changing the inlet speed of the fan. The standard ventilation rate for the broilers in summer and winter is 4 and 0.7 m<sup>3</sup> h<sup>-1</sup> kg<sup>-1</sup> body weight, respectively. There were significant (p<0.05) changes in the incidence rate of ascites syndrome and FCR between before and after the correction of ventilation conditions. During this study all other factors were fixed.

**Key words:** Ascites syndrome, ventilation, broiler, Iran

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### INTRODUCTION

The Ascites syndrome is the primary cause of death for rapidly growing broiler strains, resulting in economic loss (Huchzemeyer and Deruyck, 1986). Ascites is a condition that leads to accumulation of ascitic fluid, in body cavities resulting in carcass condemnation or death. Physiologically, low oxygen concentration creates an oxygen deficit (hypoxia) and a demand for more oxygen. The increased demand may exceed the cardiopulmonary capacity to supply sufficient oxygen, resulting in pulmonary hypertension and right ventricular failure (Julian, 1993; Lorenzoni *et al.*, 2008).

Mortality in broiler chickens associated with fluid accumulation in the abdominal cavity is the ultimate consequence of an excessively high blood pressure in the pulmonary circulation and is known as Pulmonary Hypertension Syndrome (PHS). The symptoms are generalized oedma, hydropericardium syndrome, ascites, hypertrophy and dilatation of the heart, particularly hypertrophy of the right ventricle (Decuypere *et al.*, 2000).

The housing environment, including factors such as temperature (cold or fluctuating temperatures) and air quality (dust concentration, carbon dioxide levels and oxygen levels) is known to influence the incidence of ascites in broiler chickens. The incidence of ascites greatly increases at altitudes greater than 1300 m above sea level, presumably because of the low oxygen partial pressure (Hernandez, 1987).

The metabolic rate of fast growing broiler chickens is very high and in less well ventilated poultry house as well as at higher altitudes, oxygen becomes a limiting factor as far as their health, welfare and performance are concerned. The high metabolic demands, together with decreased availability of oxygen, may lead to hypoxia, hypoxemia and anoxia (Scheele *et al.*, 1992; Julian, 1993; Maxwell *et al.*, 1995).

At this study, seven poultry houses (day old male broilers of a commercial strain) located in the North west region of Iran were selected. The birds were maintained on the fixed condition to 45 day

Table 1: Guiding standards for ventilation rates in poultry house (Pattison, 1993)

Season	Ventilation rate (m <sup>3</sup> /h/kg body weight)	
	Broilers	Adults
Summer/maximum	4.0	8.0
Winter/minimum	0.7	1.5

Table 2: Paired samples t-test (a: After the correction, b: Before the correction)

Pair	Paired differences			95% Confidence interval of the difference		t	df	Sig. (2-tailed)
	Mean	SD	SEM	Lower	Upper			
1 FCRb-FCRa	0.0871	0.03302	0.01248	0.0566	0.1177	6.982	6	0.000
2 CRDb-CRDa	4.1286	0.82606	0.31222	3.3646	4.8926	13.223	6	0.000
3 ascites-b-ascites-a	4.7286	1.24595	0.47092	3.5763	5.8809	10.041	6	0.000

SD = Standard Deviation, SEM = Standard Error Mean

of age. Then ventilation factors of poultry houses were corrected according to standards (Table 1) and birds reared for 45 days again. The incidence rate of ascites syndrome, the prevalence of CRD complex and FCR were measured in all flocks before and after the correction. During this experiment all factors except the ventilation factor were unchanged.

Data were analyzed by SPSS (Release 11.5.0, 2002). For analysis used t-test procedure. After correction of the broiler houses conditions, mean incidence of ascites syndrome was 1.20% and mean prevalence of CRD complex was 2.42%. Mean Food Conversion Ratio (FCR) was 2.19%. There were significant ( $p < 0.05$ ) changes in the incidence rate of ascites syndrome the prevalence of CRD complex and FCR between before and after the correction of ventilation conditions (Table 2).

McGovern *et al.* (2001) reported that the birds in the low CO<sub>2</sub> treatment did not have a reduced ascitic score compared to the birds in the raised high CO<sub>2</sub> treatment, however, the right ventricle area was significantly reduced in the low CO<sub>2</sub> treatment from 0.50 to 0.47 cm<sup>3</sup> suggesting more ascites syndrome percent in the high CO<sub>2</sub> treatment and under recommended management practices in Alberta, CO<sub>2</sub> and O<sub>2</sub> levels should not be a contributing factor to the incidence of ascites (McGovern *et al.*, 2001). Some believes that ascites may be a consequence of lowered oxygen tension in poultry sheds caused by increased quantities of dust or noxious fumes as a result of poor ventilation (Pattison, 1993). Tafti and Karima (2000) reported that male broiler chickens were more susceptible than females to ascites syndrom, probably because of their higher metabolic requirement for oxygen. The objective of the present study was to detect the relation between the incidence of ascites syndrome and the ventilation factor in broiler chickens. It is clear from this study that there is a relation between the incidence of ascites syndrome and the ventilation factor in broiler chickens. There are significant ( $p < 0.05$ ) changes in the incidence rate of ascites syndrome, the prevalence of CRD complex and FCR between before and after the correction of ventilation conditions ( $p < 0.05$ ).

From this study, the following conclusions can be drawn:

This study confirms that carbon dioxide and oxygen contribute significantly to the incidence of ascites under unsuitable ventilation and it is possible to decrease the incidence rate of ascites by correction of the poultry house conditions.

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